

# **Hooked on the Internet:**

## The Prevalence, Risk, Theory and Presenting Problem of Internet Addiction

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requirements of Nottingham Trent University  
for the degree of Doctor of Philosophy

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I declare that the work presented in this thesis is, to the best of my knowledge and belief, original and my own work, except as acknowledged in the text. The material (presented as my own) has not been submitted previously, in whole or in part, for a degree at any other institution.

### **Statement of Contribution of Others**

In those cases in which the work presented in this thesis was the product of collaborative efforts I declare that my contribution was substantial and prominent, involving the development of original ideas, as well as the definition and implementation of subsequent work. Detailed information about my contribution to collaborative work in this thesis is outlined in Appendix I, and the published papers on which individual chapters are based are presented in Appendix II.

## **Dedication**

This work is dedicated to my loving family, my parents and brother, as well as my amazing partner. All of you have encouraged this doctoral research project from start to finish. Without you I wouldn't have been able to make it! Thank you.

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It is done.

## List of Publications

### Peer-reviewed journal articles

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- Kuss, D. J., Griffiths, M. D., & Binder, J. F. (2013). Internet addiction in students: Prevalence and risk factors. *Computers in Human Behavior*, 29(3), 959–966.
- Kuss, D. J., van Rooij, A., Shorter, G. W., Griffiths, M. D., & van de Mheen, D. (2013). Internet addiction in adolescents: Prevalence and risk factors. *Computers in Human Behavior*, 29(5), 1987–1996.
- Stavropoulos, V., Kuss, D. J., & Motti-Stefanidi, F. (2013). The dynamic reverse of Internet Addiction risk and protective factors within context and time: The examples of online gaming and aggression. Under revision.
- Van Rooij, A. J., Kuss, D. J., Griffiths, M. D., Shorter, G. W., Schoenmakers, T. M., & van de Mheen, D. (2013). The (co-)occurrence of problematic video gaming, substance use, and psychosocial problems in adolescents. Under revision.
- Kuss, D. J., Shorter, G. W., van Rooij, A. J., Griffiths, M. D., & Schoenmakers, T. (2013). Assessing Internet addiction using the parsimonious Internet addiction components model. *International Journal of Mental Health and Addiction*, in press.
- Kuss, D. J., Louws, J., & Wiers, R. W. W. (2012). Online gaming addiction? Motives predict addictive play behavior in Massively Multiplayer Online Role-Playing Games. *Cyberpsychology, Behavior & Social Networking*, 15(9), 480-485.
- Kuss, D. J., & Griffiths, M. D. (2012). Internet and gaming addiction: A systematic literature review of neuroimaging studies. *Brain Sciences*, 2, 347-374.
- Kuss, D. J., & Griffiths, M. D. (2012). Internet gaming addiction: A systematic review of empirical research. *International Journal of Mental Health and Addiction*, 10(2), 278-296. doi: 10.1007/s11469-011-9318-5
- Kuss, D. J., & Griffiths, M. D. (2012). Online gaming addiction in children and adolescents: A review of empirical research. *Journal of Behavioral Addiction*, (1), 1-20. doi: 10.1556/JBA.1.2012.1.1
- Kuss, D. J., & Griffiths, M. D. (2012). La dépendance au jeu sur Internet: Une revue systématique de recherche empirique disponibles dans la littérature. *Adolescence (Special issue: Fantômes et réalités du virtuel)*, 30(1), 17-49.

- Griffiths, M. D., Kuss, D. J., & King, D. L. (2012). Video game addiction: Past, present and future. *Current Psychiatry Reviews*, 8(4), 308-318.
- Kuss, D. J., & Griffiths, M. D. (2011). Addiction to social networks on the Internet: A literature review. *International Journal of Environmental Research and Public Health*, 8(9), 3528-3552. doi: [10.3390/ijerph8093528](https://doi.org/10.3390/ijerph8093528).
- Beutel, M. E., Brähler, E., Glaesmer, H., Kuss, D. J., Wölfling, K., & Müller, K. W. (2011). Regular and problematic leisure-time Internet use in the community: Results from a population-based survey. *Cyberpsychology, Behaviour & Social Networking*, 14(5), 291-296, doi:10.1089/cyber.2010.0199.
- Griffiths, M. D., Lewis, A. M., Ortiz de Gortari, A. B., & Kuss, D. J. (2011). Online forums and solicited blogs: Innovative methodologies for online gaming data collection. *Studia Psychologica*, 11(1), 5-18.

### **Editorials**

- Kuss, D. J. (2012). Substance and behavioral addictions: Beyond dependence. *Journal of Addiction Research and Therapy*, 56, e001.

### **Books**

- Kuss, D. J. (2013). *For the Horde! How playing World of Warcraft reflects our participation in popular media culture*. Saarbrücken: LAP LAMBERT Academic Publishing, in press (ISBN: 978-3-659-40359-0).

### **Book chapters**

- Griffiths, M.D., Kuss, D.J. & Demetrovics, Z. (in press). Social networking addiction: An overview of preliminary findings. In K. Rosenberg & L. Feder (Eds.), *Behavioral Addictions: Criteria, Evidence and Treatment*. New York: Elsevier.
- Billieux, J., Deleuza, J., Griffiths, M. D., Kuss, D. J. (2014). Internet gaming addiction: The case of Massively Multiplayer Online Role-Playing Games. In N. El-Gabaly, G. Carrà & M. Galanter (Eds.), *The textbook of addiction treatment: International perspectives*. New York: Springer, in press.
- Griffiths, M. D., & Kuss, D. J. (2013). Online addictions: The case of gambling, video gaming, and social networking. In S. S. Sundar (Ed.), *Handbook of the Psychology of Communication Technology*. Chichester: Wiley-Blackwell, submitted.

Kuss, D.J. & Griffiths, M.D. (2012). Online social networking and addiction - A review of the psychological literature. In S. Sussman (Ed.), *Substance and behavioral addictions: Co-occurrence and specificity* (pp.117-141). Basel, Switzerland: MPDI.

Kuss, D. J., & Griffiths, M. D. (2012). Internet gambling addiction. In Yan, Z. (ed.). *Encyclopedia of Cyber Behavior* (pp. 735-753). Pennsylvania: IGI Global.

Griffiths, M. D., Kuss, D. J., & Ortiz de Gortari, A. (2012). Videogames as therapy: A review of the medical and psychological literature. In I. M. Miranda & M. M. Cruz-Cunha (eds.), *Handbook of research on ICTs for healthcare and social services: Developments and applications*. IGI global, in press.

### **Reports**

Griffiths, M. D., & Kuss, D. J. (2012). Childrens' excessive social networking: A brief overview of the empirical literature. Research Highlights for Children's Online Safety (Vol. 30): UK Council for Child Internet Safety.

Griffiths, M. D., & Kuss, D. J. (2011). Children's online gaming: A brief review of the empirical literature. In *UK Council for Child Internet Safety*, Research Highlight No. 12. London: UKCCIS.

### **Conference Proceedings**

Griffiths, M. D., Kuss, D. J. & Ortiz de Gortari, A. B. (2012). The therapeutic benefit of video games: A review of the medical and psychological literature. In D. Brown (Ed.), *Interactive Technologies and Games 2011 Conference Proceedings* (pp.180-202). Nottingham: NTU (ISBN: 978-1-84233-147-7).

Kuss, D. J. (2012). Internet addiction or else? A way out of conceptual crisis and a call for nosological precision. *European Psychiatry*, 27, Supplement 1, 1.

### **Non-Refereed Articles**

Kuss, D. J., & Griffiths, M. D. (2012). Adolescent online gaming addiction. *Education and Health*, 30(1), 15-17.

Kuss, D. J., & Griffiths, M. D. (2012). Social networking on the Internet: From pastime to excess and addiction. *Mental Notes*, Summer 2012, 26-29.

Kuss, D. J., & Griffiths, M. D. (2011). Excessive online social networking: Can adolescents become addicted to Facebook? *Education and Health*, 29(4), 63-66.

Griffiths, M. D., & Kuss, D. J. (2011). Adolescent social networking: Should parents and teachers be worried? *Education and Health, 29*(2), 23-25.

### Conference Papers

Kuss, D. J. (2013, June). *Online gaming addiction: The issue of diagnostics. Extended session: Playing with fire? Intense game experiences and discussions and debates in pathological gaming.* Paper presented at the International Communication Association Conference, London.

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Van Rooij, A. J., Kuss, D. J., Griffiths, M. D., Shorter, G. W., Schoenmakers, T. M., van de Mheen, D. (2013, June). *The (co-)occurrence of problematic video game play, substance use, and psychosocial problems in adolescents. Extended session: Playing with fire? Intense game experiences and discussions and debates in pathological gaming.* Paper presented at the International Communication Association Conference, London.

Kuss, D. J., Griffiths, M. D., and Binder, J. (2013, April). *Online on campus: Internet addiction and personality in English university students.* Presented at the Annual Conference of the European Psychiatric Association, Nice, France.

Kuss, D. J., & Griffiths, M. D. (2012, July). *Internet addictions at an English university: The influence of personality traits on problematic online behaviours.* Paper presented at the Cyberpsychology and Computer Psychology Conference, University of Bolton, Bolton, UK.

Griffiths, M. D. & Kuss, D. J. (2012, June). *Gambling and gaming addictions on the Internet.* Paper presented at the ESCON small group meeting, University of Kent, Canterbury, UK.

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Kuss, D. J. (2012, April). *Video games as therapy.* Paper presented at the Gaming Conference Genk, Genk, Belgium.

Kuss, D. J. (2012, March). *Internet addiction or else? A way out of conceptual crisis and a call for nosological precision.* Paper presented at the 20th Annual Conference of the European Psychiatric Association, Prague, Czech Republic.

Kuss, D. J. (2011, September). *Unterschiede und Gemeinsamkeiten von Glücksspielsucht und Computerspielabhängigkeit* [Differences and similarities of pathological gambling and



computer game addiction]. Paper presented at the 3. Symposium des Fachverbands Medienabhängigkeit, Köln, Germany.

Kuss, D. J. (2011, May). *Hooked on the Internet – Experience, context and prevalence of Internet addictions*. Paper presented at the Postgraduate Conference, Nottingham Trent University, Nottingham, UK.

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## Abstract

As the Internet becomes increasingly ubiquitous and mobile, Internet addiction appears as a potential mental health problem in adolescents and students. From the reported negative consequences, it appears Internet addiction can have a variety of detrimental outcomes for young people that may require professional intervention. The unique contribution to knowledge of this research is (i) the assessment of the interplay between certain personality traits and the usage of specific Internet applications in contributing to an elevated risk of Internet addiction in two independent samples of 3,105 adolescents in the Netherlands and 2,257 university students in the UK, (ii) the development and testing of the concise Internet addiction components model using the quantitative data obtained, and (iii) the phenomenological exploration of the presenting problem of Internet addiction from the perspective of 20 psychotherapists from Europe, the USA, and Canada. A mixed methods approach was used in the form of psychometric measurement and qualitative interviews. Data were analysed using logistic regression, confirmatory factor analysis, structural equation modelling, and interpretative phenomenological analysis. The results of the empirical studies indicate that (i) Internet addiction symptoms are prevalent in approximately 3% of the included adolescent and student populations, (ii) certain personality traits and Internet application usages are risk factors for Internet addiction, (iii) the Internet addiction components model may facilitate initial assessment, and (iv) the presenting problem of Internet addiction is relevant for contemporary psychotherapeutic practice. Overall, this research supports the American Psychiatric Association's decision to include Internet Gaming Disorder as distinct condition in the appendix of the revised diagnostic manual (DSM-5), with beneficial consequences for treatment, research, and prevention efforts. Conclusively, additional support is offered for

understanding Internet addiction as disease, not as a transient and easily dispensable by-product of a technophilic generation's new media consumption.

# PART I: INTRODUCTION

## CHAPTER 1

### Internet Addiction:

### A Literature Review of Epidemiological Research for the Last Decade

#### Introduction

In contemporary society approximately 40% of the world population is online, and global Internet usage has grown nearly six-fold over the last decade, with 96% of Internet users in Korea using high-speed Internet connections in comparison to 78% in the UK and 56% in the USA (International Telecommunication Union, 2012, 2013). Compared to Internet access in 2000, the USA has more than doubled its usage, while mobile Internet use has increased substantially up to 2011 (The Nielsen Company, 2012a), indicating that Internet use has become a highly prevalent activity for both adolescents and adults. From a global perspective, *Google* is the most popular online destination, closely followed by the social networking site *Facebook*<sup>1</sup>(The Nielsen Company, 2012a). In 2012, children and adolescents in Australia spent an average of 24 hours online per month, compared with 65 hours for those aged 18-24 years, and more than 100 hours per month in 25-34 year olds (The Nielsen

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<sup>1</sup> Only in Japan, *Google* and *Facebook* fall a few places behind services such as *Yahoo* (The Nielsen Company, 2012a).

Company, 2012b), suggesting that young adults are the most active Internet users as they spend approximately three hours online per day.

The increasing popularity and frequency of Internet use has led to the emergence of clinical cases presenting abuse symptoms. Since the 1980s school counsellors were advised to take excessive use of video games seriously as it could result in “addiction” (Soper & Miller, 1983). In 1996, the concept of *Internet Addiction Disorder* emerged for the first time, initially as a satirical hoax as a response to the perceived pathologising of everyday behaviours (Goldberg, 1996). Goldberg understood the condition as an analogue to substance dependence, as based on criteria in the Diagnostic and Statistical Manual for Mental Disorders (DSM-IV; American Psychiatric Association, 1994). Based on this, the individual had to experience a minimum of three of the following symptoms over the period of twelve months: tolerance, withdrawal, lack of control, relapse, large amounts of time spent online, negative consequences, and continuation of use irrespective of problem awareness (Goldberg, 1996). Following this initial proposal, Young (1996) and Griffiths (1996) emerged as the pioneers of early research into Internet addiction as they were the first to scrutinise the phenomenon empirically. Young (1996) modelled the Internet addiction criteria after the American Psychiatric Association’s substance dependence diagnosis (1994), presented the case of a female homemaker who progressively increased her engagement in chat rooms because of her growing commitment to virtual communities, which have been described as offering emotional support and a platform for discussion and information (Rheingold, 1993). The homemaker spent increasing amounts of time online to the detriment of her real life responsibilities and eventually developed withdrawal symptoms (Young, 1996). This case exemplified for the first time that the stereotypical view of the excessive Internet user, i.e., a young male technophile, had to be overturned and in its place appeared a female user seeking a sense of belonging

and comfort on the Internet. Griffiths (1996) also published case study accounts including both males and females. Following these initial case reports, Young (1998a) was among the first to present findings from an exploratory survey comprising 396 dependent Internet users who endorsed a minimum of five out of eight criteria adapted from a diagnosis of pathological gambling (American Psychiatric Association, 1994), and 100 non-dependent Internet users. On average, the dependent users spent eight times more hours online than the controls, and used chat rooms and MUDs<sup>2</sup> more frequently (Young, 1998a). These early studies can be seen as the beginning of empirical research into the area of Internet addiction.

Since these initial efforts to shed light upon an emerging mental health problem, empirical research into Internet addiction has greatly increased. Various terms have been used to name the condition, including compulsive computer use (Black, Belsare, & Schlosser, 1999), Internet dependency (te Wildt, 2011), pathological Internet use (Morahan-Martin & Schumacher, 2000), problematic Internet use (Davis, Flett, & Besser, 2002), virtual addiction (Greenfield, 1999), and Internet addiction disorder (Ko, Yen, Chen, Chen, & Yen, 2005b). Recently, the APA (2013) published the updated version of the DSM and included *Internet Gaming Disorder* in the appendix as condition that requires further empirical and clinical research. In the DSM-5, Internet Gaming Disorder includes nine criteria, namely preoccupation, withdrawal, tolerance, loss of control, continued use irrespective of problem awareness, neglect of alternative recreational activities, escapism and mood modification as usage motivations, deception, and jeopardisation of relationships and job. This clearly situates the behaviour within the new diagnostic entity of *Addiction and Related Disorders*. Five or more symptoms need to be met over a 12-month period for

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<sup>2</sup> Multi-User Dungeons, the exclusively textual precursors of today's Massively Multiplayer Online Role-Playing Games (MMORPGs) (Mortensen, 2006).

diagnosis which must cause the individual clinically significant impairment or distress (American Psychiatric Association, 2013). The conflation of Internet use and online gaming in this diagnostic category creates further diagnostic imprecision as seven out of the nine criteria relate to gaming specifically. Therefore, although the inclusion of Internet Gaming Disorder in the research appendix of the DSM-5 emphasises the necessity for further research, the new research diagnosis appears somewhat crude and vague, further complicating a clinical evaluation.

Although empirical research over the last decade has significantly increased in this area, the classification of Internet addiction is still controversial. No gold standard definition or measurement of Internet addiction has emerged. A number of review papers on Internet addiction have been published since 2005 (Beard, 2005; Byun et al., 2009; Chou, Condrón, & Belland, 2005; Widyanto & Griffiths, 2006). Some of the most recently published reviews specifically integrated treatment outcome research (King, Delfabbro, Griffiths, & Gradisar, 2011; Liu, Liao, & Smith, 2012) and comorbidity (Ko, Yen, Yen, Chen, & Chen, 2012), while others have looked at the biological basis and the psychological factors involved in the aetiology for the disorder (e.g., Billieux & Van der Linden, 2012; Kuss & Griffiths, 2012c). These reviews highlight the dissimilarity in assessment across studies that impedes the possibility of cross-comparisons as well as an evaluation of the epidemiological prevalence rates across samples. In order to elucidate the potential problem of Internet addiction, the aim of this chapter is to review the epidemiological Internet addiction research of the last decade. This review chapter sets out to answer the following research questions: (i) what is Internet addiction? (i.e., how is it assessed?), (ii) how common is it?, and (iii) what are the associated factors?

The succeeding two chapters are concerned with outlining the current literature base for Internet gaming addiction in children and adolescents.



Subsequently, Part II presents the empirical research that has been conducted in the context of the present doctoral research project as based on the identified gaps in current scientific knowledge. Finally, Part III synthesizes the findings from the literature and empirical studies to provide a comprehensive picture of Internet addiction, as concerned with its prevalence, risk, theory, and the presenting problem.

### **Methods**

A literature search was conducted using the database *Web of Science*. This database was used as it is more comprehensive than other commonly used databases, such as *Psycinfo* or *PubMed* because it includes various multidisciplinary databases. The following search terms (and their derivatives) were entered with regards to Internet addiction specifically: 'Internet' or 'online' and 'excessive', 'problematic', 'compulsive', and 'addictive'. Studies were selected based on the following inclusion criteria. Studies had to (i) contain quantitative empirical data, (ii) have been published after 2000, (iii) include an analysis relating to Internet addiction, (iv) include a minimum of 1000 participants, and (v) provide a full-text article published in English. For comparison purposes, studies focusing solely on particular online applications (e.g., gaming) were excluded from analysis as these studies will be addressed in Chapters two and three. The data bases were searched in April and May 2013. The initial search yielded 1,332 results. Following a thorough inspection of the articles' titles and abstracts, 1,265 articles not meeting the inclusion criteria were excluded. Data were organised with regards to assessment approach, prevalence, and factors associated with Internet addiction.

## Results

A total of 67 epidemiological research papers were identified from the literature search that met the initial inclusion criteria. However, one study (Chiang & Su, 2012) had to be excluded as it did not provide sufficient information on how Internet addiction was assessed. Therefore, a total of 66 studies were included in this literature review. The first part of the results section will present the assessment approaches adopted. They highlight the various conceptualisations of Internet addiction, which will be classed in accordance with the specific samples used, namely adolescents and adults. Three main diagnostic assessment approaches comprised Young's Internet Addiction Test and Internet Addiction Diagnostic Questionnaire (Young, 1998b, 1998a), Chen et al.'s Chinese Internet Addiction Scale (Chen, Weng, Su, Wu, & Yang, 2003), and various miscellaneous approaches for classification. The next part will summarize the reported prevalence rates, which will be followed by the last part that outlines the factors that were found to be statistically associated with Internet addiction.

### *What is Internet addiction? Assessment tools and conceptualisations*

#### *The Internet Addiction Test and the Internet Addiction Diagnostic Questionnaire*

Two related, but slightly different tools for Internet addiction assessment have been developed by Young (1998b, 1998a). The Internet Addiction Test (IAT) (Young, 1998b) is a 20-item self-report scale that assesses Internet addiction as based on criteria for substance dependence and pathological gambling (American Psychiatric Association, 1994). The criteria include loss of control, neglecting everyday life, relationships and alternative recreation activities, behavioural and cognitive salience, negative consequences, escapism/mood

modification, and deception, and are rated on a Likert scale ranging from 1 (“not at all”) to 5 (“always”), allowing a dimensional rather than categorical assessment. Internet users are classed as having significant problems due to Internet use if they score 70-100, and having frequent problems when scoring 40-69 (Young, 1998b). The internal consistency of the IAT has been reported as satisfactory, with a *Cronbach’s alpha* of .84 (Conti et al., 2012). The IAT does not contain a temporal dimension by asking the participant to rate the presence of the symptoms over a specified period of time. Moreover, the cut-offs appear rather arbitrary as they are not based on empirical considerations, such as a clinical evaluation of disorder severity based on the presence and impact of symptoms. A recent study (Stavropoulos, Alexandraki, & Motti-Stefanidi, 2013) including a Greek adolescent sample indicates that a lower cut-off point of 51 presents the highest specificity and sensitivity. This finding raises issues concerning the cultural context of analysis, suggesting that sociocultural factors impact upon Internet addiction assessment.

The Internet Addiction Diagnostic Questionnaire (IADQ) (Young, 1998a) is a parsimonious 8-item self-report measure based on the diagnostic symptoms of pathological gambling (American Psychiatric Association, 1994). The criteria utilised for the IADQ include preoccupation, tolerance, loss of control, withdrawal, negative consequences, denial, and escapism. Two of the original ten criteria for pathological gambling (i.e., committing illegal acts to finance the behaviour and reliance on others for money) were omitted to produce a “slightly more rigorous cut-off score” (Young, 1998a, p. 239). Endorsing five or more of the criteria indicates Internet addiction.

*Chen's Internet Addiction Scale*

Chen's Internet Addiction Scale (CIAS) (Chen, et al., 2003) was the most frequently used scale in the included empirical research papers as a total of 16 studies made use of it to assess Internet addiction. The CIAS is a 26-item self-report measurement scored on a 4-point Likert scale, assessing the core symptoms of Internet addiction, tolerance, compulsive use, and withdrawal, as well as related problems in terms of negative impact on social activities, interpersonal relationships, physical condition, and time management. In addition to this, it inquires into weekly online hours and Internet use experience. The internal consistency of the scale was found to be good, with *Cronbach's alpha* values between .79 to .93 for the respective subscales (Chen, et al., 2003). It has also been reported that the screening cut-off of 57/58 points has high sensitivity, and the diagnostic cut-off point of 63/64 as performed by psychiatrists revealed the highest diagnostic accuracy with 87.6% of patients diagnosed with Internet addiction appropriately (Ko et al., 2005). Adopted cut-off points for Internet addiction varied marginally between studies, as scores of 63/64 or 67/68 have been used as cut-offs for Internet addiction classification, without the authors specifying reasons for their choice, such as the instrument's factor structure.

*Miscellaneous diagnostic assessment tools*

The remaining assessment tools represent a plethora of newly designed measurement instruments or alternative criteria based on which Internet addiction and Internet use-related problems have been categorised. A total of 20 studies were identified that used miscellaneous criteria. Of these, 14 studies used miscellaneous criteria to identify Internet addiction in adolescents (Ang, Chong, Chye, & Huan, 2012; Bener et al., 2011; Carbonell et al., 2012; Gamez-

Guadix, Villa-George, & Calvete, 2012; Liu, Desai, Krishnan-Sarin, Cavallo, & Potenza, 2011; Lopez-Fernandez, Freixa-Blanxart, & Luisa Honrubia-Serrano, 2013; Mythily, Qiu, & Winslow, 2008; Sun et al., 2012; Sung, Lee, Noh, Park, & Ahn, 2013; van den Eijnden, Spijkerman, Vermulst, van Rooij, & Engels, 2010; van der Aa et al., 2009; Xu et al., 2012). In addition to the adolescent samples, miscellaneous classification criteria for Internet addiction have been used in adult samples, including a total of seven studies (Bergmark, Bergmark, & Findahl, 2011; Beutel et al., 2011; Cuhadar, 2012; Demetrovics, Szeredi, & Rozsa, 2008; Huang, Wang, Qian, Zhong, & Tao, 2007; Meerkerk, Van Den Eijnden, Vermulst, & Garretsen, 2009; Thatcher, Wretschko, & Fridjhon, 2008). Classifications for Internet addiction varied tremendously, ranging from the adoption of official criteria for substance use disorders or pathological gambling, to no or few criteria relevant for an addiction diagnosis. In yet other cases excessive use was assessed based on how much time is spent online or how many problems occur as a consequence of use, providing an overly simplistic picture of Internet addiction. Detailed information concerning each of the assessment instruments, criteria, and problems with the respective classifications are provided in Table 1.

### ***How common is Internet addiction?***

#### *Prevalence of Internet addiction in adolescents*

A total of seven studies used the IAT for Internet addiction assessment in adolescents and children aged 8 to 24 years, with sample sizes ranging from 1,618 (Lam, Peng, Mai, & Jing, 2009b) to 17,599 participants (Cao, Sun, Wan, Hao, & Tao, 2011). Although the same measurement instrument has been used in these studies, various cut-offs have been applied to demarcate addiction or excessive use across studies. Reported prevalence rates varied significantly

Table 1  
*Internet Addiction Assessment Instruments*

Study	Instrument	Structure	Addiction classification and criteria	Cut-off	Problems
Young (1998a)	Internet Addiction Test (IAT)	20-item self-report scale rated on a Likert scale ranging from 1 ("not at all") to 5 ("always")	Criteria for substance dependence and pathological gambling (American Psychiatric Association, 1994): loss of control, neglecting everyday life, relationships and alternative recreation activities, behavioural and cognitive salience, negative consequences, escapism/mood modification, and deception	- Score of 70-100: significant problems - Score of 40-69: frequent problems	- No temporal dimension - Cut-offs arbitrary
Young (1998b)	Internet Addiction Diagnostic Questionnaire (IADQ)	8-item self-report measure scored dichotomously	Based on the diagnostic symptoms of pathological gambling (American Psychiatric Association, 1994): preoccupation, tolerance, loss of control, withdrawal, negative consequences, denial, and escapism	Endorsing $\geq 5/8$ : Internet addiction	- No equivalents for PG criteria committing illegal acts to finance the behaviour and reliance on others for money - Dichotomous scoring
Chen et al. (2003)	Chen's Internet Addiction Scale (CIAS)	26-item self-report measurement scored on a 4-point Likert scale	Core symptoms of Internet addiction, tolerance, compulsive use, and withdrawal, as well as related problems in terms of negative impact on social activities, interpersonal relationships, physical condition, and time management	- Liberal scoring: 63/64, - Conservative: 67/68 indicates Internet addiction	Different cut-offs used for classification
Meerkerk et al. (2009a)	Compulsive Internet Use Scale (CIUS)	14-item unidimensional self-report questionnaire rated on a 5-point scale	Based on the DSM-IV-TR diagnoses for substance dependence and pathological gambling (American Psychiatric Association, 2000): loss of control, preoccupation, withdrawal symptoms, coping/mood modification, and conflict (inter- and intrapersonal)	N/A	- No cut-off - No assessment of tolerance
Caplan (2000)	Generalized Problematic Internet Use Scale (GPIUS)	29-item self-report questionnaire rated on 5-point Likert scale	Based on Davis' (2001) cognitive-behavioural model of problematic Internet use; measures mood alteration, perceived social benefits online, negative consequences of and compulsive Internet use, excessive amounts of time spent online, withdrawal, and perceived social control online	N/A	Not all items relevant for addiction classification

Caplan (2010)	Modified Generalised Problematic Internet Use Scale (GPIUS2)	15-item self-report questionnaire rated on 8-point Likert scale	Similar to GPIUS (Caplan, 2000), but includes 2 additional factors: preference for online social interaction and deficient self-regulation (as higher-order factor impacting upon cognitive preoccupation and compulsive Internet use), and the previous factors social benefits and social control were combined	N/A	Not all items relevant for addiction classification
Kim et al. (2008)	Internet Addiction Proneness Scale - Short Form (KS-Scale)	20 items scored on a 4-point Likert scale	Criteria: tolerance, withdrawal, addictive automatic thoughts, disturbance of adaptive function, deviate behaviours, and virtual interpersonal relationships	- Scoring $\geq 52/80$ : high risk for Internet addiction - Scoring 48-52: potential risk	Not all items relevant for addiction classification
Lopez-Fernandez et al. (2013)	Problematic Internet Entertainment Use Scale for Adolescents (PIEUSA)	30 items rated on a 7-point Likert scale	Based on DSM-IV-TR criteria for substance dependence and pathological gambling disorders: assesses symptom experience over last 12 months	N/A	No cut-off
Xuet et al. (2012)	DRM 52 Scale of Internet Use	Includes direct and indirect questions organised into 52 items assessed on a 5-point Likert scale	Adapted from Young's Internet Addiction Scale (Young, 1996a); criteria: tolerance, withdrawal, planning, lack of control, time-consuming, socialisation, and negative life consequences because of Internet use	Scoring $>163/260$ indicates Internet addiction	Not all items relevant for addiction classification
Beranuy et al. (2009)	Questionnaire on Internet-Related Experiences (CERI)	10 questions scored on a 4-point Likert scale	Criteria: interpersonal and intrapersonal conflicts	N/A	No use of recognised diagnostic criteria
Sun et al. (2010)	Compulsive Internet Use Scale (CIUS)	4 items on 5-point Likert scale	Based on Davis et al.'s (2002) Online Cognition Scale	Scoring mean of 4/possible 5: Internet addiction	No use of recognised diagnostic criteria
Liu et al. (2011)	Problematic Internet Use Scale (PIU)	6 items scored dichotomously	Based on Minnesota Impulsive Disorder Inventory (Grant, Levine, Kim, & Potenza, 2005)	Endorsing craving, withdrawal, abstinence attempts simultaneously: problematic Internet use	Overly simplistic classification
Bener et al. (2011)	Excessive Internet use	Daily hours spent online	Length of daily Internet use	Spending $\geq 3$ hours online/daily: excessive Internet use	Overly simplistic classification
Mythily et al. (2008)	Excessive Internet use	Daily hours spent online	Length of daily Internet use	Spending $\geq 5$ hours online/daily: excessive Internet use	Overly simplistic classification

Thatcher & Goolam (2005)	Problematic Internet Use Questionnaire (PIUQ)	20 items scored on 5-point Likert scale	Based on Young's criteria for Internet addiction (1996) and the South Oaks Gambling Screen (Lesieur & Blume, 1987), assesses online preoccupation, adverse effects, and online social interactions	N/A	Not all items relevant for addiction classification
Demetrovics et al. (2008)	Problematic Internet Use Questionnaire (PIUQ)	30 items scored on a 5-point Likert scale	Based on the Internet Addiction Questionnaire (Nyikos, Szeredi, & Demetrovics, 2001) and the Internet Addiction Test (Young, 1998b), assesses obsession, neglect and control disorder	- Scoring > 2SD above mean: significant problems because of Internet use - Scoring 1-2SD above mean: problematic Internet use	Overly simplistic classification, lacks some addiction criteria
Ceyhan et al. (2007)	Problematic Internet Use Scale (PIUS)	33 items scored on 5-point Likert scale	Factors: negative consequences, social benefit/comfort, and excessive usage	N/A	Overly simplistic classification, lacks important addiction criteria
Huang et al. (2007)	Chinese Internet Addiction Inventory (CIAI)	42 items scored on 5-point Likert scale	Based on Young's Internet Addiction Test (1998a), 3 dimensions of Internet addiction: conflicts, mood modification, and dependence; classification based on "5+3" principle (Beard & Wolf, 2001)	For diagnosis, all of the following must be endorsed: preoccupation, tolerance, lack of impulse control, mood modification, increasing usage, and $\geq 1$ of conflict, lying to others, and escaping from problems	N/A
Bergmark et al. (2011)	Indicators of Internet addiction	Presence of 5 indicators rated on 4-point Likert scale	Indicators: time spent online, family conflicts due to Internet use, withdrawal symptoms, neglect of needs, and unsuccessful abstinence attempts	N/A	- Likert-scale scores converted to binary measures - Not all items relevant for addiction classification used
Beutel et al. (2011)	Problems because of Internet use	Number of problems due to Internet use	Problem areas: work, school, family, partnership, finances, recreational activities, health-related	N/A	No use of recognised diagnostic criteria



with 0.8% of Italian high school students were considered to be seriously addicted (Poli & Agrimi, 2012), and 20.3% of adolescents and 13.8% of children in a South Korean sample were classed as addicted to using the Internet (Ha et al., 2006).

In eleven studies, the IADQ (Young, 1998a) was used to assess Internet addiction in adolescents. The sample sizes ranged from 1,270 adolescents in Greece (Fisoun et al., 2012; Fisoun, Floros, Siomos, Geroukalis, & Navridis, 2012) to 10,988 adolescents and young adults in China, aged 13-23 years (Wang et al., 2013). The same cut-off, i.e., endorsing a minimum of five out of eight diagnostic items, has been applied to a majority of these studies. Internet addiction prevalence rates ranged from 1.7% of boys and 1.4% of girls in a representative sample of Finnish adolescents (Kaltiala-Heino, Lintonen, & Rimpela, 2004) to 26.4% and 26.7% at wave one and wave two, in a longitudinal sample of adolescent students in Hong Kong, respectively (Shek & Yu, 2012). The reported prevalence rates in Asian adolescents were found to be significantly higher in comparison to both, Western countries, as well as samples of children.

Chen's Internet Addiction Scale was used in nine studies including adolescent samples. The sample sizes ranged from 1,890 students in Taiwan (Yen, Ko, Yen, Wu, & Yang, 2007) to including 9,405 participants in Southern Taiwan. In all of these studies, the relatively liberal cut-off point of 63/64 on the CIAS has been applied. Prevalence estimates varied substantially, with the lowest rate of 10.8% found in an adolescent sample in Southern Taiwan (Ko, Yen, Chen, Yeh, & Yen, 2009), whereas in other adolescents samples in Southern Taiwan prevalence rates between 18% and 21% were reported (Ko et al., 2008; Ko et al., 2006; Ko, Yen, Liu, Huang, & Yen, 2009; Ko, Yen, Yen, Chen, & Wang, 2008; Yen et al., 2008; Yen, Ko, et al., 2007; Yen, Yen, Chen, Chen, & Ko, 2007).

A total of 12 studies used miscellaneous criteria to identify Internet addiction in adolescents. Sample sizes varied from including 1,098 adolescents in Singapore (Ang, et al., 2012) to 73,238 adolescents in South Korea (Sung, et al., 2013). Sung and colleagues (2013) used the Internet Addiction Proneness Scale - Short Form (KS-Scale; Kim, Jeng, Lee, Kim, & Joe, 2008) in a sample of 73,238 adolescents in South Korea and found that 3.0% and 11.9% of adolescents were found to be at high risk and at potential risk for developing Internet addiction in South Korea, respectively (Sung, et al., 2013). On the other end of the spectrum, Xu et al. (2012) used the DRM 52 Scale of Internet use in a random sample of 5,122 adolescents in Shanghai, China, with the result that 8.8% of adolescents in this sample were classified as Internet addicts (Xu, et al., 2012). The only cross-cultural study of Internet addiction prevalence included two separate samples of 1,761 high school students in China and 1,182 students in the USA who were used in a longitudinal study by Sun et al. (2012) using the (CIUS), and it showed that the prevalence rates were 5.8% in Chinese females, 15.7% in Chinese males, 9.7% in US females, and 7.3% in US males (Sun, et al., 2012). A detailed summary of the epidemiological studies that assessed Internet addiction prevalence in adolescents is provided in Table 2.

### *The prevalence of Internet addiction in adults*

In six studies, Young's Internet Addiction Test (Young, 1998b) was used to assess Internet addiction in adults. The sample sizes ranged from 1,034 young adults in Turkey (Canan, Ataoglu, Ozcetin, & Icmeli, 2012) to 13,588 Internet users in Korea (Whang, Lee, & Chang, 2003). Similar to the usage of the IAT in adolescent samples, in the adult samples, various cut-off criteria have been utilised in order to demarcate Internet addiction from non-pathological Internet usage behaviours. Reported prevalence rates using the IAT ranged

Table 2  
*Epidemiological Studies of Internet Addiction in Adolescents*

Study	Sample and design*	Instruments	Addiction classification and criteria	Results
Ak et al. (2013)	N = 4,311 adolescents in Turkey (46% male, age range 15-19 years)	- Turkish version of Internet Addiction Test (IAT) (Young, 1998b)	- Scoring $\geq 60/100$ on the IAT = excessive Internet users	- 5% excessive users - Predictors of Internet addiction: Internet access at home, male gender, family income
Poli & Agrimi (2012)	N = 2,533 high school students in Cremona, Italy (44.3% males, mean age = 16.4 years, SD = 1.51, range 14-21)	- Italian version of the Internet Addiction Test (IAT) (Young, 1998b)	- Scoring 50-79/100 = moderately addicted  - Scoring $\geq 80$ = seriously addicted	- 5.01% moderately and 0.79% seriously addicted to the Internet - Higher prevalence in males
Cao et al. (2011)	N = 17,599 students in 8 cities in China (51.2% male, mean age = 16.1, SD = 2.8 years, range = 10-24)	- Young's Internet Addiction Test (YIAT) (Young, 1998a) - Multidimensional Sub-health Questionnaire of Adolescents (Tao, Hu, Sun, & Hao, 2008) - Multidimensional Students' Life Satisfaction Scale (Tian & Liu, 2005) - Demographics and Internet usage patterns	- Potential problematic Internet use (PIU): scores > 50/100 on YIAT	- Problematic Internet use prevalence 8.1% - PIU associated with male gender, high school status, urban, Eastern and Western areas, high family economy, Internet for entertainment use, loneliness motivation, and Internet use frequency - PIU adolescents had higher psychosomatic symptoms, lacked physical energy, physiological dysfunction, weakened immunity, emotional and behavioural symptoms, social adaptation problems, low life satisfaction relative to non-PIU
Wang et al. (2011)	N = 14,296 high school students in Guangdong Province, China (48.7% males)	- Young Internet Addiction Test (YIAT) (Young, 1998a) - Demographics - Family and school factors - Internet usage pattern	- Potential problematic Internet use: scoring > 50/100 on YIAT	- 12.2% problematic Internet users - Risk factors for PIU: study-related stress, social friends, poor relations with teachers and students, conflicts in family relations, time spent online
Lam et al. (2009)	N = 1,618 adolescents (45.4% male, age range = 13-18 years) in Guangzhou city, China	- Internet Addiction Test (Young, 2009) - Zung Self-Rating Depression Scale (Zung, 1965)	- Scoring 20-49 on IAS = normal, 50-79 moderate, and 80-100 = severe Internet addiction	- 10.2% moderately and 0.6% severely addicted to the Internet - Risk factors: male gender, drinking behaviour, family dissatisfaction, and recent stressful events

Choi et al. (2009)	<i>N</i> = 2,336 high school students in South Korea (57.5% male, mean age = 16.7, <i>SD</i> = 1.0 years)	- Korean version of Young's Internet Addiction Test (Kim, 2000; Young, 1998a) - Epworth Sleepiness Scale (ESS) (Johns, 1991)	- Scoring $\geq 70$ on IAT addicted, 40-69 possibly addicted	- Prevalence of Internet addiction and possible Internet addiction: 2.5% and 53.7% for boys, and 1.9% and 38.9% for girls - Internet addicts more likely to be male, drink more alcohol, have poor health condition, experience EDS
Kim et al. (2006)	<i>N</i> = 1,573 high school students in Korea (35.0% males, aged 15-16 years)	- Korean version of the modified Internet Addiction Scale (Kim, 2000; Young, 1998a) - Korean version of the Diagnostic Interview Schedule for Children-Major Depression Disorder-Simple Questionnaire (Korean Neuropsychiatry Association, 1999) - Suicidal Ideation Questionnaire-Junior (Reynolds, 1988)	- Scoring $> 70/100$ on IAS = Internet addiction, scoring 40-69 = possible Internet addiction	- 1.6% addicted to the Internet - 38.0% possibly addicted to the Internet - Depression and suicidal ideation highest in the Internet addicts
Ha et al. (2006)	- Structured clinical interview - <i>N</i> s = 455 children (50.3%; mean age = 11, <i>SD</i> = .9 years) and 836 adolescents (92.9% male; mean age = 15.8, <i>SD</i> = .8 years) - Of Internet addicts, 12 children and 12 adolescents randomly selected for psychiatric evaluation	- Young's Internet addiction scale - K-SADS-PL-K for children - SCID-IV for adolescents	- Cut- off of 80	- Internet addiction prevalence in adolescents 20.3%, in children 13.8% - In child Internet addiction group, 7 with ADHD - In adolescent Internet addiction group, 3 with depression, 1 schizophrenia, 1 obsessive-compulsive disorder
Guo et al. (2012)	<i>N</i> = 3,254 children (mean age = 12.56, <i>SD</i> = 1.83 years; age range = 8-17-years), with <i>n</i> = 1143 left behind children (LBC; 49.9% male), <i>n</i> = 574 migrant children (MC; 57.1% male), and <i>n</i> = 1287 non-left-behind rural children (RC; 51.8% male) in China	- Young's 8-item Internet Addiction Scale (Young, 1998) - Children's Depression Inventory-Short Form (CDI-S) (Kovacs, 2004) - Nutritional status, health condition and health behaviours	- Endorsing $\geq 5/8$ items on IAT = Internet addicted	- Internet addiction prevalence = 3.7% in RC, 6.4% in MC and 3.2% in LBC - LBC and MC with Internet addiction, and MC without Internet addiction more at risk for depression than RC with no Internet addiction
Siomos et al. (2012)	<i>N</i> = 2,017 teenage students (51.8% males, boys' mean age = 15.05, <i>SE</i> = .05; girls' mean age = 15.08, <i>SE</i> = .05; overall age range = 12-19) in Greece, and <i>n</i> = 1,214 parents	- Diagnostic Questionnaire for Internet Addiction (YDQ) (Young, 1998) - Greek version of Adolescent Computer Addiction Test (ACAT; modelled after Internet Addiction Test) (Siomos, Floros, Mouzas, & Angelopoulos, 2009) - Parental Bonding Instrument (Parker, 1990)	- Scoring min. 5/8 indicates Internet addiction	- 15.2% addicted to the Internet, 26.9% moderately addicted - Internet addiction predicted by parental bonding, not parental security practices - Online activities associated with Internet addiction: online pornography, gambling, and gaming
Siomos et al. (2008)	Randomized stratified sample of <i>N</i> = 2,200 adolescents students in Greece (mean age = 15.34, <i>SD</i> = 1.66, range = 12-18 years)	- Diagnostic Questionnaire for Internet Addiction (YDQ) (Young, 1998) - Sociodemographics	- Scoring min. 5/8 indicates Internet addiction	- Prevalence of Internet addiction 8.2%, mostly male online gamers who visit Internet cafés

Fisoun et al. (2012)	<i>N</i> = 1,270 adolescent students on Kos (48.3% male, mean age = 15.99, <i>SE</i> = .05, girls' mean age = 16.02, <i>SE</i> = .05, age range 14-18 years)	<ul style="list-style-type: none"> <li>- Diagnostic Questionnaire for Internet Addiction (YDQ) (Young, 1998)</li> <li>- Internet Addiction Test (Young, 1998)</li> <li>- Demographic questions</li> </ul>	N/A	<ul style="list-style-type: none"> <li>- 5.3% addicted users, 14.7% heavy Internet users</li> <li>- Correlations between antisocial and aggressive behaviours with Internet abuse regarding interest-driven activities for boys, and communication activities for girls</li> </ul>
Fisoun et al. (2012)	<i>N</i> = 1,270 adolescent students on Kos (48.3% male, mean age = 15.99, <i>SE</i> = .05, girls' mean age = 16.02, <i>SE</i> = .05, age range 14-18 years)	<ul style="list-style-type: none"> <li>- Internet Addiction Test (Young, 1998)</li> <li>- Demographic questionnaire, incl. questions on substance use</li> <li>- Eysenck's Personality Questionnaire (Gossop &amp; Eysenck, 1980)</li> </ul>	- Scoring 5/8 on IAT = addicted to the Internet	<ul style="list-style-type: none"> <li>- 7.2% of males, and 5.1% of females addicted to the Internet</li> <li>- Internet and substance abusers share personality characteristics, i.e., psychoticism</li> <li>- Pathological Internet use severity related to illicit substance use</li> </ul>
Shek & Yu (2012)	<ul style="list-style-type: none"> <li>- Longitudinal survey (2 waves) in Hong Kong</li> <li>- <i>N</i><sub>1</sub> = 3,328 students, (52.1% males; mean age = 12.59, <i>SD</i> = .74 years)</li> <li>- <i>N</i><sub>2</sub> = 3,580 students, mean age = 13.50 years, <i>SD</i> = .75)</li> </ul>	- Internet Addiction Test (IAT) (Young, 1998)	<ul style="list-style-type: none"> <li>- Internet addiction diagnosis based on DSM-IV gambling criteria (5/8?)</li> <li>- Chinese Positive Youth Development Scale (CPYDS)</li> </ul>	<ul style="list-style-type: none"> <li>- Internet addiction prevalence 26.4% in W1, and 26.7% in W2</li> <li>- Internet addiction at W1 increased chance of Internet addiction at W2 by 7.6</li> </ul>
Gong et al. (2009)	<i>N</i> = 3,018 secondary school and university students (47% male, mean age = 15.8, <i>SD</i> = 2.1 years, age range = 11-23 years) in Wuhan, China	<ul style="list-style-type: none"> <li>- Young's Internet Addiction Diagnostic Questionnaire (DQ) (Young, 1999)</li> <li>- Lifetime drug use</li> <li>- Susceptibility to drugs</li> <li>- PDA and ADA as based on Standardized Attitudes and Knowledge Scale (STAK) (Chappel, Veach, &amp; Krug, 1985)</li> <li>- Social norm of drug use</li> </ul>	- Scoring ≥ 5/8 on DQ = Internet addicted	<ul style="list-style-type: none"> <li>- Prevalence of addictive Internet use 5%</li> <li>- DU and DU intentions predicted by AIU, and mediated by PDA, ADA, and perceived social norm of DU</li> </ul>
Lin et al. (2009)	<i>N</i> = 1,289 adolescents from 11 senior high schools in Taiwan (52.1% males, mean age = 17.46, <i>SD</i> = 1.00, range 16-19 years)	<ul style="list-style-type: none"> <li>- Internet Addiction Diagnostic Questionnaire (Young, 1998)</li> <li>- Parental monitoring (Patterson &amp; Stouthamer-Loeber, 1984)</li> <li>- Adapted Leisure Boredom Scale (Iso-Ahola &amp; Weissinger, 1990)</li> <li>- Leisure activities participation</li> </ul>	- Endorsing ≥ 5/8 of criteria = Internet addiction	<ul style="list-style-type: none"> <li>- 23.4% addicted to the Internet</li> <li>- Internet addiction predicted by parental monitoring perception, leisure boredom and activities</li> <li>- Family and outdoor activities, supportive parental monitoring decreased addiction likelihood</li> </ul>
Johansson & Gotestam (2004)	Representative sample of Norwegian youth ( <i>N</i> = 3,237, 51.0% male, mean age = 14.9 years, age range 12-18 years)	- Internet Addiction Diagnostic Questionnaire (Young, 1998)	- Endorsing ≥ 5/8 criteria = classed as Internet addicts, endorsing 3-4 = at risk	<ul style="list-style-type: none"> <li>- 1.98% Internet addicts</li> <li>- 8.68% at risk for developing Internet addiction</li> </ul>

Kaltiala-Heino et al. (2004)	Representative sample of Finnish adolescents ( $N = 7,292$ , age range 12-18 years)	<ul style="list-style-type: none"> <li>- Internet Addiction Test (Center for On-Line Addiction, 2001)</li> </ul>	<ul style="list-style-type: none"> <li>- Endorsing <math>\geq 4/7</math> DSM-IV pathological gambling criteria classed as Internet addicted</li> </ul>	<ul style="list-style-type: none"> <li>- 1.7% of boys and 1.4% of girls addicted to the Internet</li> <li>- Addicts spent more time online than non-addicts</li> </ul>
Wang et al. (2013)	$N = 10,988$ adolescents from 9 cities in China (age mean = 17.2 years, range 13-23 years)	<ul style="list-style-type: none"> <li>- Diagnostic Questionnaire (DQ) for Internet addiction (Kuang, Cao, &amp; Dai, 2011)</li> <li>- Center for Epidemiologic Studies Depression Scale (Chien &amp; Cheng, 1985)</li> <li>- Rosenberg Self-esteem Scale (Rosenberg, Schooler, &amp; Schoenbach, 1989)</li> <li>- Adolescent's Satisfaction with Life Scale (Zhang &amp; Gao, 2010)</li> </ul>	<ul style="list-style-type: none"> <li>- Endorsing <math>\geq 5/8</math> symptoms = Internet addiction</li> </ul>	<ul style="list-style-type: none"> <li>- 7.5% prevalence of Internet addiction</li> <li>- Breadth of extracurricular activities, age of first Internet use, Internet use for first time in Internet bar: significant predictors of Internet addiction</li> <li>- Problematic use associated with low self-esteem, life satisfaction, high depression</li> </ul>
Ko et al. (2009)	- 2-year prospective study - $N = 2,293$ adolescents (51.4% male, mean age = 12.36, $SD = .55$ years) in Southern Taiwan	<ul style="list-style-type: none"> <li>- Chen Internet Addiction Scale (Chen, Weng, Su, Wu, &amp; Yang, 2003)</li> <li>- Modified Vanderbilt ADHD Diagnostic Parent Rating Scale (Wolraich et al., 2003)</li> <li>- Mandarin Chinese version of the Center for Epidemiological Studies Depression Scale (CES-D) (Chien &amp; Cheng, 1985)</li> <li>- Brief Version of the Fear of Negative Evaluation Scale (BV-FNE) (Leary, 1983)</li> <li>- Buss-Durkee Hostility Inventory-Chinese Version-Short Form (BDHIC-SF) (Lin et al., 2008)</li> </ul>	<ul style="list-style-type: none"> <li>- Scoring <math>\geq 64/104</math> on CIAS = addicted to the Internet</li> </ul>	<ul style="list-style-type: none"> <li>- 10.8% addicted to the Internet</li> <li>- Depression, ADHD, social phobia, and hostility predicted Internet addiction</li> <li>- Hostility predicted Internet addiction in males and ADHD in predicted Internet addiction in females</li> </ul>
Ko et al. (2009)	$N = 9,405$ adolescents (48.2% male, age range = 13-17 years) in Southern Taiwan	<ul style="list-style-type: none"> <li>- Chen Internet Addiction Scale (CIAS) (Chen, et al., 2003)</li> <li>- Adolescent Aggressive Behaviors Questionnaire (McConville &amp; Cornell, 2003)</li> <li>- Internet behaviours</li> <li>- Violent TV programme exposure</li> <li>- Chinese version of APGAR index of family function satisfaction (Smilkstein, 1978)</li> <li>- Mandarin Chinese version of Center for Epidemiological Studies' Depression Scale (CES-D) (Chien &amp; Cheng, 1985)</li> <li>- Rosenberg Self-Esteem Scale (Rosenberg, 1986)</li> </ul>	<ul style="list-style-type: none"> <li>- Scoring <math>\geq 64/104</math> on CIAS indicates Internet addiction</li> </ul>	<ul style="list-style-type: none"> <li>- 18.8% addicted to the Internet</li> <li>- Internet addicts more likely to behave aggressively during last year (particularly in junior high school rather than senior high school)</li> </ul>
Yen et al. (2009)	$N = 8,941$ adolescents in Taiwan (48.0% male, mean age = 17.7, $SD = 1.7$ years)	<ul style="list-style-type: none"> <li>- Chen Internet Addiction Scale (CIAS) (Chen, et al., 2003)</li> <li>- Chinese version of the Center for Epidemiological Studies' Depression Scale (CES-D) (Radloff, 1977)</li> <li>- Adapted subscale of the Adolescent Family and Social Life Questionnaire (AFSLQ) (Yen &amp; Shieh, 2006; Yen, Yang, &amp; Chong, 2006)</li> </ul>	<ul style="list-style-type: none"> <li>- Scoring <math>&gt;63</math> on CIAS = Internet addicted</li> </ul>	<ul style="list-style-type: none"> <li>- Internet addiction prevalence: 13.8% in old girls (<math>\geq 15</math> years), 12.2% in young girls (<math>&lt; 15</math> years), 26.6% in old boys (<math>\geq 15</math> years), and 22.5% in young boys (<math>&lt; 15</math> years)</li> <li>- Internet addiction predicted by depression, low family monitoring, low connectedness to</li> </ul>

		<ul style="list-style-type: none"> <li>- Chinese-version of the Family APGAR Index (Smilkstein, 1978)</li> <li>- Rosenberg Self-Esteem Scale (RSES) (Rosenberg, 1965)</li> </ul>		school, family conflict, drinking peers, living in rural areas
Ko et al. (2008)	<i>N</i> = 2,114 high school students (57.0% male, mean age = 16.26, <i>SD</i> = .99 years, range 15-23 years) in Taiwan	<ul style="list-style-type: none"> <li>- Chen Internet Addiction Scale (CIAS) (Chen, et al., 2003)</li> <li>- CRAFFT Substance Abuse Screening Test (Knight et al., 1999)</li> <li>- Behaviour inhibition system and behaviour approach system Scale (BIS/BAS) (Gray, 1991)</li> <li>- Alcohol attitudes</li> <li>- Rosenberg Self-Esteem Scale (RSES) (Rosenberg, 1986)</li> <li>- Family APARG Index (APGAR) (Smilkstein, 1978)</li> <li>- Brief Multidimensional Students' Life Satisfaction Scale (BMSLSS) (Zullig, Huebner, Gilman, Patton, &amp; Murray, 2005)</li> </ul>	- Scoring $\geq$ 63/104 on CIAS indicated Internet addiction	<ul style="list-style-type: none"> <li>- Prevalence of Internet addiction 18.3%</li> <li>- Internet addiction associated with problematic alcohol use and psychosocial variables (i.e., psychosocial proneness for problem behaviours)</li> </ul>
Ko et al. (2008)	<i>N</i> = 2,113 senior and vocational high school students in Taiwan (57.0% male, mean age = 16.26, <i>SD</i> = .99, range = 15-23 years)	<ul style="list-style-type: none"> <li>- Chen Internet Addiction Scale (Chen, et al., 2003)</li> <li>- Frustration Discomfort Scale (FDS) (Harrington, 2005)</li> </ul>	- Scoring $\geq$ 64 on CIAS indicated Internet addiction	<ul style="list-style-type: none"> <li>- 18.3% classed as addicted to the Internet</li> <li>- Internet addiction and frustration intolerance significantly associated with each other in males</li> </ul>
Yen et al. (2008)	<i>N</i> = 3,662 junior and vocation high school students (63.6% males, mean age = 15.48, <i>SD</i> = 1.65, range = 11-21 years) in Kaohsiung City and County in Taiwan	<ul style="list-style-type: none"> <li>- Chen Internet Addiction Scale (Chen, Weng, Su, Wu, &amp; Yang, 2003)</li> <li>- Brief Symptom Inventory (BSI) assessing somatization, obsession-compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, psychoticism (Derogatis &amp; Melisaratos, 1983)</li> <li>- Questionnaire for Experience of Substance Use (Yen, Yang, Ko, &amp; Yen, 2005)</li> </ul>	- Scoring $>$ 63/104 on CIAS indicates Internet addiction	<ul style="list-style-type: none"> <li>- Internet addiction prevalence 20.8%</li> <li>- Internet addiction associated with psychiatric symptoms (i.e., hostility, depression, phobic anxiety, low anxiety) and male gender</li> </ul>
Yen et al. (2007)	<i>N</i> = 3,480 junior, senior, and vocational high school students in southern Taiwan (62.9% male, mean age = 15.47, <i>SD</i> = 1.65 years)	<ul style="list-style-type: none"> <li>- Chen Internet Addiction Scale (Chen, et al., 2003)</li> <li>- Questionnaires for Experience of Substance Use (Q-ESU) (Yen, Yang, Ko, &amp; Yen, 2005)</li> <li>- Family APGAR Index (APGAR) (Smilkstein, 1978)</li> </ul>	- Internet addiction classification when scoring $>$ 63 on CIAS	<ul style="list-style-type: none"> <li>- 20.7% prevalence of Internet addiction</li> <li>- Internet addiction predicted by parent-adolescent conflict, siblings' habitual alcohol use, perceived positive parents' attitude to adolescent substance use, low family function</li> <li>- Internet addiction and substance use experience have common family factors</li> </ul>
Ko et al. (2006)	<i>N</i> = 3,412 junior, senior and vocational high school students (62.5% male, mean age = 15.48, <i>SD</i> = 1.65, range = 11-21 years) in southern Taiwan	<ul style="list-style-type: none"> <li>- Chen Internet Addiction Scale (CIAS) (Chen, et al., 2003)</li> <li>- Tridimensional Personality Questionnaire (TPQ) (Kuo, Yang, Soong, &amp; Chen, 2002)</li> <li>- Questionnaires for Experience in Substance Use (Q-ESU) (Yen, et al., 2005)</li> </ul>	- Scoring $\geq$ 64 on CIAS classed as addicted to the Internet	<ul style="list-style-type: none"> <li>- 20.7% addicted to the Internet</li> <li>- Internet addicts likely to have experience with substance use</li> </ul>

				- Novelty seeking, harm avoidance and low reward dependence predicted Internet addiction
Yen et al. (2007)	<i>N</i> = 1,890 students (56.3% male, mean age = 16.26, <i>SD</i> = 1.00, range = 15-23 years) in Kaoshiung City and County in Taiwan	<ul style="list-style-type: none"> <li>- Chen Internet Addiction Scale (CIAS) (Chen, Weng, Su, Wu, &amp; Yang, 2003)</li> <li>- Modified Vanderbilt ADHD Diagnostic Parent Rating Scale (Wolraich et al., 2003)</li> <li>- Center for Epidemiological Studies' Depression Scale (CES-D), Mandarin version (Chien &amp; Cheng, 1985)</li> <li>- Social Phobia Inventory (SPIN) (Connor, Davidson, Churchill, Sherwood, &amp; Weisler, 2000)</li> <li>- Chinese Hostility Inventory-Short Form (CHI-SF) (Lin &amp; Weng, 2002)</li> </ul>	- Scoring $\geq 64/104$ on CIAS indicated Internet addiction	<ul style="list-style-type: none"> <li>- 17.9% classed as addicted to the Internet</li> <li>- Internet addicts: higher ADHD symptoms, depression, social phobia, and hostility, all associated with Internet addiction in males, but only ADHD symptoms and depression associated with Internet addiction in females</li> </ul>
van der Aa et al. (2009)	<i>N</i> = 7,888 Dutch adolescents (77.1% male, mean age = 17.79, <i>SD</i> = 2.22 years, age range = 11-21 years)	<ul style="list-style-type: none"> <li>- Compulsive Internet Use Scale (Meerkerk, Van Den Eijnden, Vermulst, &amp; Garretsen, 2009)</li> <li>- Daily Internet use</li> <li>- UCLA Loneliness Scale (Russell, Peplau, &amp; Cutrona, 1980)</li> <li>- Rosenberg Self-Esteem Scale (Rosenberg, 1989)</li> <li>- Depressive Mood List (Kandel &amp; Davies, 1986)</li> <li>- Quick Big Five (Vermulst &amp; Gerris, 2005)</li> </ul>	- CIU used as dimensional measure	<ul style="list-style-type: none"> <li>- CIU moderated relationship between daily Internet use and low well-being</li> <li>- CIU associated with loneliness in introverted, low-agreeable, less emotionally stable participants</li> </ul>
van den Eijnden et al. (2010)	<ul style="list-style-type: none"> <li>- Pen-and-paper study using a cross-sectional sample of <i>n</i> = 4,483 Dutch students (51.3% male, mean age = 13.1, <i>SD</i> = 1.15 years, age range = 11-15 years)</li> <li>- Longitudinal online survey of sample of 510 Dutch adolescents at T1 and 6 months later (32.2% male, mean age = 14.1, <i>SD</i> = .80 years, age range = 10-15 years)</li> </ul>	<ul style="list-style-type: none"> <li>- Adapted version of Compulsive Internet Use Scale (Meerkerk, et al., 2009)</li> <li>- Internet-specific parenting practices ( i.e., rules about time and content, reactions to excessive use, quality and frequency of communication)</li> </ul>	- Dimensional view of Internet addiction, i.e. high CIUS score indicated high level of CIU	<ul style="list-style-type: none"> <li>- Good communication, parental reactions to excessive Internet use and rules for content of Internet use: preventative tools</li> <li>- Internet times rules promote compulsive engagement</li> <li>- CIU predicted parental communication about Internet use decrease</li> </ul>
Gamez-Guadix et al. (2012)	<i>N</i> = 1,491 Mexican adolescents (47.6% female, mean age = 14.51, <i>SD</i> = 1.57, range = 12-18)	<ul style="list-style-type: none"> <li>- Generalized Problematic Internet Use Scale 2 (GPIUS2) (Caplan, 2010)</li> <li>- Time spent online</li> <li>- Scale of Interference of Internet Use in Daily Life</li> <li>- Depression and anxiety subscales of Spanish version of Brief Symptom Inventory (Derogatis &amp; Melisaratos, 1983; Pereda, Forns, &amp; Peró, 2007)</li> </ul>	N/A	<ul style="list-style-type: none"> <li>- GPIUS2: adequate construct and convergent validity and internal consistency</li> <li>- Preference for online social interaction and Internet use for mood regulation increased deficient self-regulation (i.e., compulsive Internet use and cognitive preoccupations with Internet use), associated with negative life outcomes</li> </ul>



- Spanish version of Dysfunctional Impulsivity subscale of the Dickman Impulsivity Inventory (Chico, Tous, Lorenzo-Seva, & Vigil-Colet, 2003; Dickman, 1990)

Ang et al. (2012)	<i>N</i> = 1,098 adolescents (49.2% male, mean age = 14.54 years ( <i>SD</i> = 0.61)) in Singapore	<ul style="list-style-type: none"> <li>- Generalized problematic Internet use scale (GPIUS) (Caplan, 2002)</li> <li>- UCLA loneliness scale (Russell, et al., 1980)</li> </ul>	N/A	<ul style="list-style-type: none"> <li>- Perceived parental knowledge moderated relationship between loneliness and generalized PIU</li> <li>- Parental knowledge differentiated adolescents' level of generalized PIU at lower levels of loneliness better than at higher levels</li> </ul>
Sung et al. (2013)	<i>N</i> = 73,238 adolescents drawn from South Korea Youth Risk Behavior Web-based Survey KYRBWS-V (age <i>M</i> = 15.1, <i>SD</i> = 1.7 years, range = 13-18 years)	<ul style="list-style-type: none"> <li>- Korean self-reporting internet addiction scale short form (KS-scale) (Kim, Jeng, Lee, Kim, &amp; Joe, 2008), 20 items scored with a four-point Likert scale</li> <li>- KYRBWS-V containing 128 questions in 14 fields including demographics, smoking, alcohol, drugs, obesity, eating behaviors, physical activity, prevention of trauma, sexual behaviors, psychiatric illness, oral hygiene, individual hygiene, atrophy/asthma, and internet use; heavy smokers <math>\geq 10</math> cigarettes/day; defined as drug users when they ever used any drugs</li> </ul>	Scoring $\geq 52/80$ on KS-S = high risk, 48-52 = potential risk	<ul style="list-style-type: none"> <li>- 11.9% Internet users with potential risk for Internet addiction</li> <li>- 3.0% users with high risk for Internet addiction</li> <li>- Smoking and drug use predict high risk</li> </ul>
Lopez-Fernandez et al. (2013)	<i>N</i> = 1,131 high school students ( <i>M</i> = 14.55, <i>SD</i> = 1.82, range = 12 and 18 years) in Spain	<ul style="list-style-type: none"> <li>- Problematic Internet Entertainment Use Scale for Adolescents (PIEUSA), based on DSM-IV-TR criteria for substance dependence and pathological gambling disorders in adults; diagnostic criteria proposed for IUD in adults and adolescents and literature on adolescent IUD prevalence.</li> <li>- Scale contains 30 items rated on a 7-point Likert scale, total score between 30-210</li> </ul>	PIEUSA highest score representing the maximum presence of the construct under study over the last 12 months	<ul style="list-style-type: none"> <li>- Prevalence of problematic behaviour in Spanish adolescents ca. 5%</li> <li>- Scale was unidimensional, with excellent internal consistency (Cronbach's alpha of 0.92), good construct validity, and positive associations with alternative measures of maladaptive Internet use</li> </ul>
Xu et al. (2012)	Random sample of <i>N</i> = 5,122 adolescents in Shanghai, China (age mean = 15.9 years, range 11-20 years)	- DRM 52 Scale of Internet-use (DRM Study Group, 2006), adapted from Young's Internet Addiction Scale (Young, 1996)	- Scoring $>163/260$ = Internet addiction	<ul style="list-style-type: none"> <li>- 8.8% Internet addicts</li> <li>- Poor academic achievement, male gender, being in senior high school, have monthly spending <math>&gt;100</math> RMB, online hours, gaming and chatting predicted Internet addiction</li> </ul>
Carbonell et al. (2012)	<i>N</i> = 1,879 students in Spain (45.5% males, mean age = 15.5, <i>SD</i> = 2.43 years)	<ul style="list-style-type: none"> <li>- Questionnaire on internet-related experiences (CERI) (Beranuy, Chamarro, Graner, &amp; Carbonell, 2009) with two factors, intra-and interpersonal conflicts</li> <li>- Questionnaire on cell phone related experiences (CERM) (Beranuy, 2009)</li> </ul>	- Cluster analysis revealed 3 groups; highest scoring group (26-40 points) classed as having frequent problems	<ul style="list-style-type: none"> <li>- 6.1% of sample had frequent problems with Internet use with no gender differences</li> <li>- Specific Internet application usages explained 27.5% of total CERI variance</li> </ul>

Sun et al. (2012)	<ul style="list-style-type: none"> <li>- Longitudinal study (2 waves)</li> <li>- <math>N = 1,761</math> students in China (49% male, mean age = 16.8, <math>SD = .93</math> years)</li> <li>- <math>N = 1,182</math> students in the USA (57% male, mean age = 15.9, <math>SD = .76</math> years)</li> </ul>	<ul style="list-style-type: none"> <li>- Compulsive Internet Use Scale based on Scale for Problematic Internet Use (Davis, 2004; Davis, Flett, &amp; Besser, 2002)</li> <li>- Frequency of cigarette smoking and binge drinking in last 30 days</li> </ul>	<ul style="list-style-type: none"> <li>- Scoring a mean of 4/5 on CIUS as indicative of Internet addiction</li> </ul>	<ul style="list-style-type: none"> <li>- No relationship between CIU and substance use at baseline</li> <li>- CIU at baseline predicted change in CIU and substance use in females</li> <li>- Substance use at baseline was not predictive of CIU increase</li> </ul>
Liu et al. (2011)	<ul style="list-style-type: none"> <li><math>N = 3,560</math> high school students in Connecticut, USA (age range 14-18 years)</li> </ul>	<ul style="list-style-type: none"> <li>- Demographics</li> <li>- Risk behaviours</li> <li>- Internet use</li> <li>- Problematic Internet use</li> </ul>	<ul style="list-style-type: none"> <li>- PIU modelled after Minnesota Impulsive Disorder Inventory and defined as affirming symptoms of craving, withdrawal, and abstinence attempts simultaneously</li> </ul>	<ul style="list-style-type: none"> <li>- Prevalence of problematic Internet use 4%</li> <li>- PIU more common among Asian and Hispanic students, girls, associated with substance use, depression, and aggression</li> </ul>
Bener et al. (2011)	<ul style="list-style-type: none"> <li>- Interviews based on questionnaire</li> <li>- <math>N = 3000</math> school students (age range = 6-18 years) in Qatar</li> </ul>	<ul style="list-style-type: none"> <li>- Excessive Internet use and television viewing</li> <li>- Vision and vision disorders</li> <li>- Obesity and overnutrition</li> </ul>	<ul style="list-style-type: none"> <li>- Excessive Internet use defined as spending <math>\geq 3</math> hours/day online</li> </ul>	<ul style="list-style-type: none"> <li>- Obesity linked to online hours</li> <li>- 1.9% spent <math>\geq 3</math> hours/day online, were overweight/obese and had low vision</li> </ul>
Mythily et al. (2008)	<ul style="list-style-type: none"> <li><math>N = 2,735</math> adolescents in Singapore (49.3% male, mean age = 13.9, <math>SD = 1.0</math> years)</li> </ul>	<ul style="list-style-type: none"> <li>- Sociodemographic questions</li> <li>- Academic performance</li> <li>- Social support and general wellbeing</li> </ul>	<ul style="list-style-type: none"> <li>- Excessive Internet use = using the Internet <math>&gt; 5</math> hours/day</li> </ul>	<ul style="list-style-type: none"> <li>- 17.1% excessive Internet users</li> <li>- Excessive Internet use related to no rules regarding Internet use, less confidants, sadness and depression, poor academic performance</li> </ul>

\* If not otherwise indicated, the study design was a cross-sectional survey.

from 1.2% of Internet users in the UK (Morrison & Gore, 2010) to 9.7% of Turkish college students (Canan, et al., 2012).

The Internet Addiction Diagnostic Questionnaire (Young, 1998a) was used in three adult samples. The reported Internet addiction prevalence rates in these studies were notably diverse as in a sample of Norwegian adults, 1.0% (Bakken, Wenzel, Gotestam, Johansson, & Oren, 2009) and in a sample of 1,856 Iranian Internet users 22.8% (Kheirkhah, Juibary, & Gouran, 2010) were found to be addicted to the Internet.

Chen's Internet Addiction Scale was used in seven studies including adult samples. All samples included college or university students in Taiwan. Sample sizes ranged from 1,360 university freshmen (Tsai et al., 2009) to 4,456 college students (Lin, Ko, & Wu, 2008). The studies that reported prevalence rates used teenage samples. Using the rather conservative cut-off of 67/68 on the CIAS, relatively similar prevalence rates of 12.9% and 12.3% have been reported by Yen et al. in Taiwan (2009; Yen, Ko, Yen, Chen, & Chen, 2009), ranging up to 17.9% as reported by Tsai et al. (2009).

Miscellaneous classification criteria for Internet addiction have been used in a total of seven studies including adult samples. All sample sizes were between 1000 and 2000 participants, with the exception of a sample of 16,925 regular Internet users in the Netherlands (Meerkerk, et al., 2009). Prevalence rates varied, ranging from 1.8% of a sample of 1,147 participants in Sweden (age range 15-94 years) who experienced all of the inquired problems due to Internet use, whereas Demetrovics and colleagues (2008) reported that of a sample of 1,037 Hungarian young adults, 4.3% had significant problems because of their Internet use as measured via the PIUQ. A complete summary of the epidemiological studies of Internet addiction in adults is provided in Table 3.

Table 3  
*Epidemiological Studies of Internet Addiction in Adults*

Study	Sample and design	Instruments	Addiction classification and criteria	Results
Barke et al. (2012)	Total $N = 1,882$ (online sample [ $n = 1,041$ , mean age = 24.2 years, $SD = 7.2$ years, 46.7% male] and offline student sample [ $n = 841$ , mean age = 23.5, $SD = 3.0$ years, 46.8% male] and student sample [ $n = 108$ , mean age = 21.5, $SD = 2.0$ years, 25.7% male]) in Germany	<ul style="list-style-type: none"> <li>- German version of the Internet Addiction Questionnaire (Young, 1998a)</li> <li>- Generalised Problematic Internet Use Scale (GPIUS2) (Caplan, 2010)</li> <li>- Demographics</li> <li>- Internet use</li> </ul>	<ul style="list-style-type: none"> <li>- Scoring <math>\geq 70/100</math> on IAT = significant problems, scoring 40-69 = frequent problems</li> </ul>	<ul style="list-style-type: none"> <li>- 2% addicted to the Internet</li> <li>- German IAT with good psychometric properties</li> <li>- 2-factorial structure</li> <li>- IAT high correlation with GPIUS2 scores (good convergent validity)</li> </ul>
Canan et al. (2012)	$N = 1,034$ students (age range = 18-27 years) in Turkey	<ul style="list-style-type: none"> <li>- Turkish version of Internet Addiction Scale (IAS) (Nichols &amp; Nicki, 2004)</li> <li>- Dissociative Experiences Scale (Bernstein &amp; Putnam, 1986)</li> </ul>	<ul style="list-style-type: none"> <li>- Scoring <math>&gt; 80</math> on IAS indicated Internet addiction</li> </ul>	<ul style="list-style-type: none"> <li>- 9.7% of the study sample addicted to the Internet</li> <li>- Internet addiction correlated with dissociative experiences</li> <li>- Internet addiction higher in males</li> </ul>
Yates et al. (2012)	$N = 1,470$ college students (62.9% female, age mean = 19.13, $SD = 1.49$ ) in the USA	<ul style="list-style-type: none"> <li>- Young's Internet Addiction Test (Young, 1998b)</li> <li>- Child Abuse and Trauma Scale (CATS)</li> <li>- Toronto Alexithymia Scale (TAS-20) (Sanders &amp; Becker-Laussen, 1995)</li> <li>- Self-Perception Profile for College Students (Bagby, Parker, &amp; Taylor, 1994)</li> <li>- Duke-UNC Functional Social Support Questionnaire (PSSQ) (Broadhead, Gehlbach, de Gruy, &amp; Kaplan, 1988)d</li> <li>- Symptom Checklist-90-Revised (SCL-90-R) (Derogatis, 1983)</li> </ul>	<ul style="list-style-type: none"> <li>- Problematic Internet Use (PIU) = scoring <math>\geq 50/100</math></li> <li>- PIU = moderate Internet addiction</li> </ul>	<ul style="list-style-type: none"> <li>- 6% addicted</li> <li>- Higher levels of PIU in males and Asian students</li> <li>- PIU associated with low self-concept, low social support, high psychopathology, child maltreatment experiences (latter partially mediated by alexithymia)</li> </ul>
Morrison & Gore (2010)	$N = 1,319$ UK online social network users (63% female, mean age = 21.24, $SE = .11$ , age range = 16-51)	<ul style="list-style-type: none"> <li>- Internet Addiction Test (Young, 1998a)</li> <li>- Internet Function Questionnaire</li> </ul>	<ul style="list-style-type: none"> <li>- Scoring <math>\leq 49</math> considered normal, 50-79 problematic, 80-100 significantly problematic Internet use</li> </ul>	<ul style="list-style-type: none"> <li>- 1.2% Internet addiction prevalence</li> <li>- Internet addicts more depressed than controls</li> </ul>

		- Beck Depression Inventory (BDI) (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961)		- Internet addiction higher in males and younger people, engagement in gaming, chat, and online sexual gratification
Whang et al. (2003)	<i>N</i> = 13,588 Internet users in Korea (7,878 males, mean age = 26.74, <i>SD</i> = 7.27 years, age range = 20-40 years)	- Modified Internet Addiction Scale (Young, 1998a) - Internet use - Modified Diagnostic Scale of Excessive Internet Use	- Internet addiction classification when scoring > 60/80 on IAS, scoring 50-60 classed as possible Internet addicts	- 3.5% Internet addicts, 18.4% possible Internet addicts - Internet addiction associated with escape from reality, dysfunctional social behaviours, depressed mood, loneliness, compulsivity, vulnerability to interpersonal dangers
Ni et al. (2009)	<i>N</i> = 3,557 first-year university students in China (68.18% male, mean age = 18.77, <i>SD</i> = 1.15 years, age range = 17-24 years)	- Young's Internet Addiction Test (Young, 1998b) - Self-Rating Depression Scale (SDS) (Zung, 1965) - Self-Rating Anxiety Scale (SAS) (Zung, 1971) - Basic information	- Scoring 50/100 on IAT = Internet addicts	- 6.44% addicted to the Internet - Internet addiction predicted by SDS and SAS scores, single-parent family, first Internet exposure, age, city residence, home sickness
Kheirkhah et al. (2010)	<i>N</i> = 1,856 Internet users from Mazandaran Province cities, Iran (50.9% males, mean age = 20.25, <i>SD</i> = 4.19 years)	- Farsi version of Young's Internet Addiction Questionnaire - Time spent online	- Endorsing ≥ 5/8 dichotomous items was indicative of Internet addiction	- Internet addiction incidence = 22.8% - Internet addicts spent more time online than non-addicts and used two-way communication functions (i.e., chat rooms) - More male Internet addicts
Bakken et al. (2009)	<i>N</i> = 3,399 Norwegian adults (1,598 male, age range 16-74 years)	- Young Diagnostic Questionnaire (YDQ) (Young, 1998b) - Subjective mental illness assessed with 1 question each over last 12 months (i.e., sleep disorders, depression, suicidal ideation, anxiety, obsession and compulsions, alcohol/substance abuse)	- Scoring 5/8 on YDQ = Internet addicts, scoring 3-4 = at risk users	- Prevalence of Internet addiction 1.0%, 5.2% at risk users - Highest prevalence in young males - Male gender, young age, university level education, and unsatisfactory financial situation increased odds of problematic Internet use - YDQ score associated with online time, sleeping disorders, depression, and other psychological problems
Huang et al. (2009)	<i>N</i> = 4,400 college students in Wuhan, China (54.3% male, mean age = 20.19, <i>SD</i> = 1.26 years, range = 16-30 years)	- Young's Diagnostic Questionnaire for Internet Addiction (YDQ) (Young, 1998b)	- Scoring ≥ 5/8 on YDQ = Internet addiction	- 9.58% with problematic Internet use - Heavy Internet use, poor academic achievement, lack of family love,

		- Zung Self-Rating Depression Scale (Kitamura, Sugawara, Shima, & Toda, 1999) - Demographic questions	- Problematic Internet users scored $\geq 4$ on YDQ	depression, male gender associated with PIU
Lin et al. (2011)	Nationally representative sample of college students in Taiwan ( $N = 3,616$ , no information about age provided)	- Chen Internet Addiction Scale-Revised (CIAS-R) (Ko, Yen, Chen, Chen, & Yen, 2005; Ko et al., 2009) - Positive Outcome Expectancy of Internet Use Questionnaire (Lin, Ko, & Wu, 2008) - Refusal Self-Efficacy of Internet Use Questionnaire (Lin, Ko, et al., 2008) - Ko's Depression Inventory (KDI) (Chiu, Ko, & Wu, 2007) - Barratt Impulsiveness Scale Short-Form (Li, Ko, Weng, Liau, & Lu, 2002) - Chinese Version of the Relationship Questionnaire (Bartholomew & Horowitz, 1991) - Social Support Scale (Yeh, Ko, Wu, & Cheng, 2008a)	- Internet addiction measured via 26 items: scoring $>67$ on CIAS-R	- Internet addiction prevalence 15.3% - Internet addiction correlated with depressive symptoms, Internet use positive outcome expectancy, time spent online, low refusal self-efficacy of Internet use, impulsivity, low academic performance satisfaction, male gender, insecure attachment style
Yen et al. (2011)	$N = 2,262$ college students (47.5% males, mean age = 20.77, $SD = 1.83$ years) in Taiwan	- Chen Internet Addiction Scale (Chen, Weng, Su, Wu, & Yang, 2003) - Center for Epidemiological Studies' Depression Scale (Chien & Cheng, 1985a; Radloff, 1977) - Questionnaire for online activity - Buss-Durkee Hostility Inventory, Chinese version short form (Lin et al., 2008)	Scoring $\geq 67/104$ classified as Internet addicts	- No prevalence reported - Hostility in real world and online higher in Internet addicts than depressed individuals - Internet addiction associated with expressive hostility behaviours
Tsai et al. (2009)	$N = 1,360$ university freshmen in Taiwan (69.6% male)	- Chinese Internet Addiction Scale-Revised (CIAS-R) (Chen, et al., 2003) - Chinese Health Questionnaire (CHQ-12) (Chong & Wilkinson, 1989)	Scoring $>63/84$ indicated Internet addiction	- 17.9% Internet addicts - Male gender, neuroticism, habit of skipping breakfast, mental health morbidity, deficient social support, and CHQ scores increased odds for Internet addiction

		<ul style="list-style-type: none"> <li>- Measurement of Support Functions (MSF) (Berkman &amp; Glass, 2000)</li> <li>- Neuroticism subscale of the Maudsley Personality Inventory (MPI) (Eysenck &amp; Eysenck, 1975)</li> <li>- Lifestyle habits</li> </ul>		
Yen et al. (2009)	<i>N</i> = 2,793 students (33.5% male, mean age = 20.46, <i>SD</i> = 2.07 years, age range = 18-48 years) in Taiwan	<ul style="list-style-type: none"> <li>- Chen Internet Addiction Scale (Chen, et al., 2003)</li> <li>- Adult ADHD Self-Report Scale (Kessler et al., 2005)</li> <li>- Demographic questions</li> </ul>	Internet addiction when scoring $\geq$ 68/104 on CIAS	<ul style="list-style-type: none"> <li>- 12.9% addicted to the Internet</li> <li>- Attention deficit and impulsivity most strongly related to Internet addiction</li> <li>- Attention deficit among females more strongly related to Internet addiction</li> </ul>
Yen et al., 2009	<i>N</i> = 1,992 college students (29.2% male, mean age = 20.45, <i>SD</i> = 2.16 years) in Taiwan	<ul style="list-style-type: none"> <li>- Chen Internet Addiction Scale (Chen, et al., 2003)</li> <li>- Behavior Inhibition System and Behavior Approach Scale (BIS/BAS) (Gray, 1991)</li> <li>- Alcohol Use Disorders Identification Test (AUDIT) (Babor, Fuente, Saunders, &amp; Grant, 1989)</li> </ul>	Scoring $\geq$ 67 on CIAS were classified as addicted to the Internet	<ul style="list-style-type: none"> <li>- 12.3% Internet addicts</li> <li>- Internet addiction related to harmful alcohol use</li> <li>- Internet addicts scored more highly on BIS and BAS fun-seeking subscales</li> </ul>
Lin et al. (2008)	<i>N</i> = 4,456 college students in Taiwan (46.7% male, mean age = 19.87, <i>SD</i> = 1.62 years)	<ul style="list-style-type: none"> <li>- Chen Internet Addiction Scale (Chen, et al., 2003)</li> <li>- Outcome Expectancy Questionnaire</li> <li>- Refusal Self-Efficacy of Internet Use Questionnaire (RSEIUQ)</li> </ul>	No information about cut-off provided	<ul style="list-style-type: none"> <li>- No prevalence reported</li> <li>- Refusal self-efficacy of Internet use negatively, and positive outcome expectancy positively predicted Internet addiction, negative outcome expectancy predicted Internet addiction via refusal self-efficacy of Internet use</li> </ul>
Yeh et al. (2008)	<i>N</i> = 3,477 college students in Taiwan (45% male, mean age = 22.45, <i>SD</i> = 1.56 years)	<ul style="list-style-type: none"> <li>- Chen Internet Addiction Scale (Chen, et al., 2003)</li> <li>- Social Support Scale</li> <li>- Virtual Social Support Scale</li> <li>- Ko's Depression Inventory (Ko, 1989)</li> </ul>	No information about scoring provided	<ul style="list-style-type: none"> <li>- No prevalence reported</li> <li>- Actual and virtual social support predicted Internet addiction and were mediated by depressive symptoms in females</li> <li>- Virtual social support mediated and not mediated by depressive symptoms predicted Internet addiction in males</li> </ul>

Meerkerk et al. (2009)	Representative samples of heavy Dutch Internet users ( $n_s = 447$ at T1 (49.4% male, mean age = 38.5, $SD = 12.5$ years) and 229 at T2) and a convenience sample of regular Internet users ( $n = 16,925$ , 77.4% male, mean age = 25.3, $SD = 10.0$ years)	<ul style="list-style-type: none"> <li>- Compulsive Internet Use Scale (CIUS)</li> <li>- Online Cognition Scale (OCS) 14</li> <li>- Time spent online</li> <li>- Subjective problems</li> </ul>	Internet addiction labelled "compulsive Internet use" because addicted to certain activities not Internet use per sé, leading to compulsive use	<ul style="list-style-type: none"> <li>- No prevalence reported</li> <li>- CIUS with good internal consistency, good concurrent and criterion validity</li> </ul>
Thatcher et al. (2008)	$N = 1,399$ technologically savvy Internet users from South Africa (1,065 males, aged between 24-35 years)	<ul style="list-style-type: none"> <li>- Problematic Internet Use Questionnaire (PIUQ) (Thatcher &amp; Goolam, 2005)</li> <li>- Distraction subscale of the online cognition scale (OCS) (Davis, et al., 2002)</li> <li>- Modified version of Flow Scale (Webster, Trevino, &amp; Ryan, 1993)</li> </ul>	N/A	<ul style="list-style-type: none"> <li>- No prevalence reported</li> <li>- Strong relationship between problematic Internet use, online procrastination and online flow</li> </ul>
Demetrovics et al. (2008)	$N = 1,037$ participants in Hungary (54.1% male, mean age = 23.3, $SD = 9.1$ years)	<ul style="list-style-type: none"> <li>- Problematic Internet Use Questionnaire (PIUQ) based on Internet Addiction Questionnaire (Nyikos, Szeredi, &amp; Demetrovics, 2001) and Internet Addiction test (Young, 1998a)</li> </ul>	<ul style="list-style-type: none"> <li>- Significantly problematic Internet use = scoring <math>&gt; 2SDs</math> above the mean on PIUQ</li> <li>- Problematic Internet use = scoring between 1 and 2 <math>SD</math> above mean on PIUQ</li> </ul>	<ul style="list-style-type: none"> <li>- 4.3% with significant problems because of Internet use, 10.1% with problems</li> <li>- PIUQ with good internal consistency, test-retest reliability</li> <li>- Most problematic Internet users with high male proportion, live with restructured family, are single</li> </ul>
Cuhadar (2012)	$N = 1,235$ students at a teacher training programme in Turkey (30.0% male)	<ul style="list-style-type: none"> <li>- Problematic Internet Use Scale (Ceyhan, Ceyhan, &amp; Gürcan, 2007)</li> <li>- Social Interaction Anxiety Scale (Sübası, 2003)</li> </ul>	<ul style="list-style-type: none"> <li>- PIUS ranges between 33-165, higher score indicates less healthy Internet use, stronger negative effects, higher tendency for Internet addiction pathology</li> </ul>	<ul style="list-style-type: none"> <li>- No prevalence reported</li> <li>- Internet use more problematic for males</li> <li>- Problematic Internet use correlated with time spent online</li> <li>- Social interaction anxiety predicted problematic Internet use</li> </ul>
Huang et al. (2007)	$N = 1,029$ Chinese undergraduate students in Beijing split into two: $n_1 = 516$ (47.5% male, mean age = 20.5, $SD = 1.47$ , range = 17-24 years), $n_2 = 513$ (46.2% males, mean age = 20.7, $SD = 1.51$ , range = 17-24 years) - $N_3 = 67$ (27 diagnosed Internet addicts; 31.3% male, mean age = 20.6, $SD = .93$ years, range = 19-25 years)	<ul style="list-style-type: none"> <li>- Chinese Internet Addiction Inventory (CIAI) based on Young's Internet Addiction Test</li> </ul>	Classification of Internet addiction based on 5+3 criteria (Beard & Wolf, 2001) (i.e., endorsing preoccupation, tolerance, impulse control, mood modification, and increasing usage, and min. one of conflicts, lying to others, escaping from problems)	<ul style="list-style-type: none"> <li>- Subscale items with high internal consistency and acceptable test-retest reliability, criterion validity</li> </ul>



Bergmark et al. (2011)	N = 1,147 participants in Sweden (50.4% male, mean age = 45, range = 15-94 years)	<ul style="list-style-type: none"> <li>- Demographics</li> <li>- Internet related problems</li> </ul>	Internet related problems	<ul style="list-style-type: none"> <li>- 5% spend &gt;30hours/week online at home</li> <li>- 40% experience <math>\geq 1</math> problem because of Internet use</li> <li>- 1.8% experience all problems</li> </ul>
Beutel et al. (2011)	Representative survey of German population aged between 14 and 94 years (N = 2,512, 44.2% male, mean age = 49.5 years)	<ul style="list-style-type: none"> <li>- Leisure time Internet use</li> <li>- Negative consequence of Internet use</li> <li>- Use of Internet for emotional coping</li> <li>- Cambridge Depersonalization Scale (CDS-2) (Michal et al., 2010)</li> <li>- Hospital Anxiety and Depression Scale (HADS) (Hinze &amp; Schwarz, 2001)</li> </ul>	<ul style="list-style-type: none"> <li>- Problematic Internet use based on experience of <math>\geq 1</math> problem due to Internet use (i.e., work, school, family, partnership, finances, recreational activities, health-related)</li> </ul>	<ul style="list-style-type: none"> <li>- 9.3% experienced <math>\geq 1</math>, and 3.5% &gt;1 negative consequence because of Internet use</li> <li>- Problematic use associated with time online, negative emotion avoidance, preference for gaming, gambling, online sex, depersonalization</li> </ul>

### ***What are the associated factors?***

#### *Factors associated with Internet addiction in adolescents*

In addition to the prevalence estimates reported, the studies found that in adolescents, Internet addiction was associated with the following sociodemographic variables: higher family income levels (Ak, Koruklu, & Yilmaz, 2013; Cao, et al., 2011), male gender (Ak, et al., 2013; Cao, et al., 2011; Choi et al., 2009; Ko, Yen, Yen, Chen, & Wang, 2008; Lam, et al., 2009b; Poli & Agrimi, 2012; Siomos, Dafouli, Braimiotis, Mouzas, & Angelopoulos, 2008; Xu, et al., 2012; Yen, Ko, Yen, Chang, & Cheng, 2009), female gender (Liu, et al., 2011), being left behind (i.e., abandoned), and migrant (Guo et al., 2012), living in rural areas (Yen, Ko, Yen, Chang, et al., 2009), being in senior high school, and having a monthly spending over 100 RMB (Xu, et al., 2012). The discrepancy between findings concerning associations between Internet addiction and gender can possibly be explained by the measures utilised, i.e., Liu et al. (2011) found that a higher percentage of girls reports excessive usage behaviours, which might be indicative of their increased problem awareness relative to boys.

Moreover, the following Internet use variables were found to be associated with Internet addiction in adolescents: age of first exposure to the Internet (Wang, et al., 2013), Internet use for mood regulation (Gamez-Guadix, et al., 2012) and entertainment purposes (Cao, et al., 2011), frequency and length of Internet use (Cao, et al., 2011; Johansson & Gotestam, 2004; Wang et al., 2011; Xu, et al., 2012), Internet access at home (Ak, et al., 2013), Internet usage at an Internet café (Siomos, et al., 2008; Wang, et al., 2013), the use of online gaming (Carbonell, et al., 2012; Siomos et al., 2012; Xu & Yuan, 2008), social applications (Carbonell, et al., 2012; Xu, et al., 2012), and other Internet applications (Siomos, et al., 2012). In addition to this, parental guidance with regards to Internet

behaviours was reported to be associated with Internet addiction, specifically little parental communication about Internet use, rules about Internet times (van den Eijnden, et al., 2010), and a lack of rules regarding Internet use (Mythily, et al., 2008).

Psychosocial factors included internal characteristics such as low life satisfaction (Cao, et al., 2011; Wang, et al., 2013), low well-being (van der Aa, et al., 2009), loneliness (Ang, et al., 2012; Cao, et al., 2011), lack of confidants (Mythily, et al., 2008), preference for online social interaction, negative life outcomes (Gamez-Guadix, et al., 2012). Moreover, the following personality characteristics were reported: novelty seeking, harm avoidance, and low reward dependence (Ko, et al., 2006), low self-esteem (Wang, et al., 2013), frustration intolerance (particularly for males; Ko, Yen, Yen, Chen, & Wang, 2008), introversion, low agreeableness, and low emotional stability (van der Aa, et al., 2009). In addition, social variables were social adaptation (Cao, et al., 2011), stress (Lam, et al., 2009b), low academic achievement (Mythily, et al., 2008; Xu, et al., 2012), poor relations with school (Lam, et al., 2009b; Yen, Ko, Yen, Chang, et al., 2009), leisure boredom (Lin, Lin, & Wu, 2009), breadth of extracurricular activities (Wang, et al., 2013), and peers and siblings who drink alcohol (Yen, Ko, Yen, Chang, et al., 2009; Yen, Yen, et al., 2007). Furthermore, a variety of family variables were associated with Internet addiction. These included family conflict and dissatisfaction (Lam, et al., 2009b; Wang, et al., 2011; Yen, Ko, Yen, Chang, et al., 2009; Yen, Yen, et al., 2007), parental bonding (Siomos, et al., 2012), perceived parental monitoring (Lin, et al., 2009), and perceived positive attitude to adolescent substance use by parents (Yen, Ko, Yen, Chang, et al., 2009; Yen, Yen, et al., 2007).

Comorbid symptoms included alcohol and substance use (Choi, et al., 2009; Fisoun, Floros, Geroukalis, et al., 2012; Gong et al., 2009; Ko, Yen, Yen, Chen, Weng, et al., 2008; Ko, et al., 2006; Lam, et al., 2009b; Liu, et al., 2011; Sun,

et al., 2012; Sung, et al., 2013), proneness for problem behaviours (Ko, Yen, Yen, Chen, Weng, et al., 2008), depression (Guo, et al., 2012; Ha, et al., 2006; Kim, Ryu, et al., 2006; Ko, Yen, Yen, Chen, & Wang, 2008; Liu, et al., 2011; Mythily, et al., 2008; Wang, et al., 2013; Yen, Ko, Yen, Chang, et al., 2009; Yen, Ko, et al., 2007), suicidal ideation (Kim, Ryu, et al., 2006), ADHD (Ha, et al., 2006; Ko, Yen, Chen, et al., 2009; Yen, Ko, et al., 2007), social phobia and phobic anxiety (Ko, Yen, Chen, et al., 2009; Yen, et al., 2008; Yen, Ko, et al., 2007), schizophrenia, obsessive-compulsive disorder (Ha, et al., 2006), psychoticism (Fisoun, Floros, Geroukalis, et al., 2012), and antisocial/aggressive behaviours (Fisoun, Floros, Siomos, et al., 2012; Ko, Yen, Chen, et al., 2009; Ko, Yen, Liu, et al., 2009; Ko, Yen, Yen, Chen, & Wang, 2008; Liu, et al., 2011; Yen, Ko, et al., 2007). Finally, a number of psychosomatic problems have been linked to problematic Internet use, such as a poor health condition, excessive daytime sleepiness (Choi, et al., 2009), lack of energy, physiological dysfunction, weakened immunity (Cao, et al., 2011), obesity, and poor vision (Bener, et al., 2011).

#### *Factors associated with Internet addiction in adults*

A number of factors were found to be associated with Internet addiction in adults. With regards to sociodemographic variables, male gender (Bakken, et al., 2009; Canan, et al., 2012; Cuhadar, 2012; Demetrovics, et al., 2008; Huang et al., 2009; Kheirkhah, et al., 2010; Lin, Ko, & Wu, 2011; Morrison & Gore, 2010; Tsai, et al., 2009), younger age (Bakken, et al., 2009; Morrison & Gore, 2010), city residence (Ni, Yan, Chen, & Liu, 2009), single parent and restructured family (Demetrovics, et al., 2008; Ni, et al., 2009), being single (Demetrovics, et al., 2008), financial difficulties, university level education (Bakken, et al., 2009), as well as Asian ethnicity (Yates, Gregor, & Haviland, 2012) were reported.

Various Internet use variables were found to be associated with Internet addiction. These included increased time spent online (Bakken, et al., 2009; Bergmark, et al., 2011; Beutel, Braehler, et al., 2011; Cuhadar, 2012; Kheirkhah, et al., 2010; Lin, et al., 2011), early Internet exposure (Ni, et al., 2009), positive outcome expectancy, low refusal self-efficacy of Internet use (Lin, et al., 2008, 2011), online flow and online procrastination (Thatcher, et al., 2008). Furthermore, the usage of a number of different Internet applications has been linked to Internet addiction. These include social applications (Kheirkhah, et al., 2010; Morrison & Gore, 2010), online gaming and other applications (Beutel, Braehler, et al., 2011; Morrison & Gore, 2010).

Moreover, psychological variables included impulsivity (Lin, et al., 2011; Yen, Yen, et al., 2009), neuroticism (Tsai, et al., 2009), low self-concept (Yates, et al., 2012), escapism (Whang, et al., 2003), loneliness (Whang, et al., 2003), fun-seeking (Yen, Ko, Yen, Chen, et al., 2009), and negative emotion avoidance (Beutel, Braehler, et al., 2011). Social variables were low satisfaction with academic performance (Lin et al., 2011; Huang et al., 2009), an insecure attachment style (Lin, et al., 2011), child maltreatment experiences (Yates, et al., 2012), low social support (Tsai, et al., 2009; Yates, et al., 2012), lack of family love (Huang, et al., 2009), homesickness (Ni, et al., 2009), virtual social support directly and indirectly via depressive symptoms, and low actual social support directly and indirectly via depressive symptoms (Yeh, Ko, Wu, & Cheng, 2008). In addition to this, dysfunctional social behaviours and vulnerability to interpersonal dangers (Whang, et al., 2003) were reported. Moreover, a behavioural factor, i.e., a habit of skipping breakfast (Tsai, et al., 2009) was statistically associated with Internet addiction.

In terms of comorbid symptoms, the following factors were found: depression (Huang, et al., 2009; Lin, et al., 2011; Morrison & Gore, 2010; Ni, et al., 2009; Whang, et al., 2003; Yeh, et al., 2008), anxiety (Bakken, et al., 2009; Ni,

et al., 2009), harmful alcohol use (Yen, Ko, Yen, Chen, et al., 2009), compulsivity (Whang, et al., 2003), sleeping disorders (Bakken, et al., 2009), ADHD (Yen, Yen, et al., 2009), hostility (Yen, Yen, Wu, Huang, & Ko, 2011), dissociative experiences and depersonalisation (Beutel, Braehler, et al., 2011; Canan, et al., 2012), psychological problems and high psychopathology in general (Bakken, et al., 2009; Tsai, et al., 2009; Yates, et al., 2012).

### **Discussion**

The aim of this paper was to review and describe epidemiological Internet addiction research since the millennium. The conceptualisation of Internet addiction was assessed by inquiring into commonly utilised assessment tools. Based on this, the prevalence rates in the studies to date have been identified, and the associated factors highlighted. Overall, this literature review supports conclusions about the Internet addiction research field that have been made previously (Beard, 2005; Byun, et al., 2009; Widyanto & Griffiths, 2006), indicating that Internet addiction assessment is inauspiciously varied. This literature review has highlighted that to date, no gold standard for Internet addiction diagnosis and assessment exists. However, it has recently been suggested that a convergence of instruments for Internet addiction assessment is occurring, so that a number of core symptoms appear to be relevant, namely compulsive use, negative outcomes and salience (Lortie & Guitton, 2013), which corresponds to the findings of the current review. Presumably, the relevance of these symptoms over additional symptoms both assimilates Internet addiction and other addictive disorders and also differentiates it, implying a conceptualisation as syndrome with similar etiology and components, but different expressions of addictions (Griffiths, 2005b; Shaffer et al., 2004).

A sum total of 20 different Internet addiction questionnaires have been identified in this review, some of which use criteria as indistinctive as the number of problems experienced by individuals (e.g., Beutel, Braehler, et al., 2011), or the number of hours spent on the Internet as being suggestive of Internet addiction problems (Bener, et al., 2011; Mythily, et al., 2008). Moreover, other studies (Ang, et al., 2012; Gamez-Guadix, et al., 2012; Meerkerk, et al., 2009) used dimensional measures that do not allow for the assessment of prevalence rates. If Internet addiction research aims to run parallel to actual clinical assessment, standardised cut-offs need to be implemented so that findings can be compared and disseminated (First, 2005). The label “Internet addiction” inherently refers to a psychopathology, a diagnosable clinical entity, which is capable of distinguishing individuals that are not affected (i.e., not addicted) from those that are addicted to using the Internet, thus denoting diagnostic sensitivity and specificity (Kraemer, 2007). If the nosology of addiction is used, its usage must be justified against actual presenting problems in clinical settings and thus clinical utility is called for in assessment scales.

In addition to the wide variability in diagnostic tools used for Internet addiction assessment, the most commonly used scales (Chen, et al., 2003; Young, 1998b, 1998a) suffer from a variety of shortcomings. First of all, none of Young’s (1998b, 1998a) measures include a time criterion. If Internet addiction was to be treated as a behavioural analogue to substance dependence (American Psychiatric Association, 2000), a minimum number of symptoms need to be present simultaneously over the same 12-month period. Using Young’s criteria, an individual would be classed as Internet addict when he or she experienced five of eight symptoms altogether over their lifetime, evidently questioning the clinical validity of the diagnostic construct. Moreover, the binary response format in the IADQ (Young, 1998a) is very limited with regards to the amount of information utilised relative to a dimensional assessment of

symptom presence (Watson, 2005). The lack of a temporal dimension and binary scoring is likely to lead to inflated prevalence rates of Internet addiction (Widyanto & Griffiths, 2006). A dimensional approach to symptom evaluation can offer a “more valid description of psychopathology” (Widiger & Samuel, 2005, p. 496) as it overcomes the limitations of categorical approaches. The CIAS (Chen, et al., 2003), on the other hand, includes items of time management to assess the severity of Internet use-related problems. It is questionable to what extent variables like time management constitute a criterion that is relevant for diagnosis, and therefore, the Internet addiction prevalence rates reported using the CIAS may be an overestimate.

In this literature review, it has been found that prevalence rates are particularly diverse across samples and across measurement instruments, indicating a relatively low validity across studies. The prevalence rates for adolescents ranged between 0.8% in Italy (Poli & Agrimi, 2012) and 13.8% in South Korea (Ha, et al., 2006) assessed via the IAT, between 1.4% in Finnish girls (Kaltiala-Heino, et al., 2004) and 26.7% of adolescents in Hong Kong (Shek & Yu, 2012) using the IADQ, and between 10.8% in Southern Taiwan (Ko, Yen, Chen, et al., 2009) and 22.5% of boys under 15 in Taiwan (Yen, Ko, Yen, Chang, et al., 2009) assessed via the CIAS. Using miscellaneous criteria and instruments, the Internet addiction prevalence varied between 3.0% in South Korea (Sung, et al., 2013) and 17.1% in Singapore (Mythily, et al., 2008). Similar divergence was found in the adult samples. Prevalence rates varied between 1.2% of Internet users in the UK (Morrison & Gore, 2010) and 9.7% of College students in Turkey (Canan, et al., 2012) assessed via the IAT, between 1.0% in Norwegian adults (Bakken, et al., 2009) and 22.8% of Iranian Internet users (Kheirkhah, et al., 2010) as evaluated using the IADQ, and between 12.3% and 17.9% of college first-years in Taiwan (Tsai, et al., 2009; Yen, Ko, Yen, Chen, et al., 2009) using the CIAS. Finally, the usage of miscellaneous criteria in adults



revealed that between 1.8% of Swedish adults (Bergmark, et al., 2011) and 4.3% of Hungarian adults (Demetrovics, et al., 2008) experience significant problems because of their Internet use.

Taken together, the dissimilar prevalence rates reported can thus partially be attributed to different classification criteria used, more so than differences between age groups (i.e., adolescents and adults). Internet addiction (or Internet-use related symptoms) appears to be prevalent across the age spectrum, as both adolescent and adult groups seem to experience associated problems. Another reason for different prevalence rates concerns the population studied, as conceivably there may exist differences between general populations and Internet users specifically. Moreover, the cultural context of the studies must be attended to as measurement instruments are not universal and mental problems are experienced and reported in different ways across various cultures (Church & Lonner, 1998).

In addition to this, although in some studies the same scales have been used, different cut-off criteria have been adopted. Presumably, the severity of Internet-addiction related symptoms in a person scoring 50 on a 100-point scale is lower than for a person scoring 80 on the same scale. This needs to be borne in mind when evaluating actual prevalence. The use of cut-off points is common practice in clinical evaluation of patients. The diagnostic manuals used in clinical practice today, i.e., the DSM IV-TR (American Psychiatric Association, 2000) and the ICD-10 (World Health Organization, 1992) use cut-offs based on which the presence of symptoms can be evaluated from a clinical point of view. The usage of commonly agreed upon cut-off points for mental disorder diagnosis primarily serves the purpose of clinical utility by facilitating diagnosis, medical record keeping, and clinical research (such as meta-analyses) relative to a potential dimensional approach (First, 2005).

Various additional factors have been specified as statistically related to Internet addiction, namely sociodemographic, Internet use, and psychosocial variables, as well as comorbid symptoms and disorders. The most common sociodemographic variable associated with Internet addiction was male gender both in adolescents (e.g., Lam, Peng, Mai, & Jing, 2009; Yen, Ko, Yen, Chang, & Cheng, 2009) as well as in adults (e.g., Bakken, et al., 2009; Lin, et al., 2011). Research suggests that the link between male gender and Internet addiction may be mediated by other variables, such as the type of online application used. For instance, males have a preference for online activities that are more frequently dysfunctional, such as online games (Chou, et al., 2005). Moreover, the higher prevalence reported in males could be mediated by individual differences in personality traits, such as low self-control, impulsivity and sensation seeking (Billieux et al., 2012; Waldeck & Miller, 1997). Results of the National Comorbidity Survey indicated that adolescent males have been identified to be 30% to 80% more at risk for developing substance-related disorders than adolescent females (Kessler et al., 2012), suggesting that they might be more vulnerable to addictions generally.

Internet use variables have been investigated with the most commonly identified link being between Internet addiction and time spent online (e.g., Kheirkhah, et al., 2010; Lin, et al., 2011; Xu, et al., 2012) and the use of specific online applications, notably gaming and social applications (Carbonell, et al., 2012; Morrison & Gore, 2010; Xu, et al., 2012). The time spent online may be a tentative indicator of an increasing tolerance to using the Internet, which is a core criterion for substance dependence (American Psychiatric Association, 2000). The studies presented however mainly used cross-sectional data, which do not provide for an evaluation of a potential progression of online times. This indicates that the statistical associations between time spent online and Internet addiction symptoms appear as short-cut for appraising the presence of

tolerance. In addition to this, time spent online is time not spent offline, i.e., engaging in alternative recreational activities, and spending time with friends and significant others, which can lead to significant problems and potential impairment. Nevertheless, it still appears relatively unclear what individuals get addicted to as online, they can engage in a multitude of behaviours, possibly with different consequences. Chapters two and three will specifically deal with online gaming addiction as research indicates that the excessive engagement in online gaming may lead to symptoms associated with addiction (e.g., Hussain, Griffiths, & Baguley, 2012b), suggesting certain behaviours on the Internet might be more problematic than others. This furthermore highlights one of the aims of this doctoral research, namely to assess the extent to which the engagement in specific behaviours on the Internet increases the risk to developing Internet addiction. Chapters four, five and seven will assess this relationship in two independent large-scale samples.

This review has moreover shown that certain psychosocial problems associated with Internet addiction may prove fruitful in distinguishing between adolescent and adult Internet related problems. For instance, in some studies using adolescents, various forms of family conflicts and problems have been noted (e.g., Lam, et al., 2009b; Wang, et al., 2011; Yen, Ko, Yen, Chang, et al., 2009), indicating that stressors in the realm of family may reinforce the excessive engagement with the Internet as a form of dysfunctional coping. A secure and supportive family environment thus appears to be particularly relevant for adolescents as the lack of it increases the risk for Internet addiction. In addition to this, poor academic achievement was noted in a variety of studies as risk factor for Internet addiction (e.g., Huang, et al., 2009; Lin & Tsai, 2002; Mythily, et al., 2008). Scholastic and academic pressures (particularly in Asian countries) appear to have a negative influence on the adolescents' and young adults' adjustment and life satisfaction which again may lead them to seek

refuge in online worlds by applying a dysfunctional coping strategy. In light of this, the empirical Chapters four to seven will use an adolescent and a university student sample as these groups have been shown to be particularly at risk for developing Internet addiction (Kandell, 1998; Lam, et al., 2009b).

Certain personality characteristics (e.g., impulsivity, neuroticism) may put individuals at risk for developing Internet addiction. That is, specific individual factors may increase the vulnerability for Internet addiction, which, particularly in the presence of external stressors such as poor family function and/or insufficient academic achievement. This may increase the risk for Internet addiction relative to individuals with none or fewer such predisposing factors. In order to investigate this further, Chapters four, five and seven will assess the extent to which certain personality traits increase the risk for Internet addiction.

The presence of a variety of comorbid symptoms and disorders as well as psychosocial and psychosomatic problems indicates that Internet addiction does not occur in a vacuum. Presumably, the Internet is used in order to cope with problems (e.g., loneliness, family conflict, depressive symptoms), which in turn may exacerbate potential Internet addiction symptoms (e.g., Billieux et al., 2013; Kuss, Louws, & Wiers, 2012). Similar relationships between alcohol use for coping purposes and alcohol abuse have been established (Cooper, Russell, & George, 1988), suggesting the link between everyday problems and Internet use as coping mechanism appear viable. It could be possible that in some cases, rather than being a psychopathology per sé, the excessive use of the Internet could be used as (dysfunctional) coping mechanism to deal with primary disorders, such as depression or Post-Traumatic Stress Disorder. Future research is required to pay attention to these potentialities and to establish a theoretical framework for Internet addiction.

Moreover, research indicates that gaming addiction can appear as both, a primary and a secondary disorder (Gentile et al., 2011), suggesting the same may hold true for other forms of addictive online behaviours. In general, the comorbidity between mental disorders and addiction is high (Drake, McLaughlin, Pepper, & Minkoff, 1991), with individuals suffering from mental health problems being three times more likely to be addicted relative to healthy populations (Regier et al., 1990). The widely reported co-existence of Internet addiction and substance use/abuse suggests addictions share etiological mechanisms, such as neurobiological and psychosocial factors (Griffiths, 2005b), supporting the syndrome model of addiction (Shaffer, et al., 2004). Overall, investigating associated factors allows for the identification of populations at risk for developing Internet addiction. These can be specifically targeted by prevention campaigns as well as specialised health care initiatives.

As regards the different classifications adopted in the studies reviewed, one could argue the construct of Internet addiction has been created from an atheoretical perspective. Scholars have conceptualized the problematic use of the Internet in the framework of substance abuse a priori following the DSM-IV-TR criteria (American Psychiatric Association, 2000), and developed assessment tools based on these criteria. This approach to Internet addiction classification and assessment is problematic as it lacks a theoretical basis and may oversimplify the issue. In light of this, research is required to assess the biopsychosocial processes that contribute to the development of addictive behaviours on the Internet. Discerning similarities in brain activity and structural abnormalities across addictions including Internet addiction seems to be a first step on the way towards understanding Internet addiction more fully (Kuss & Griffiths, 2012c). Although the reported prevalence rates vary, they suggest an Internet-use related disorder exists.

In sum, the present literature review of epidemiological empirical Internet addiction research has highlighted problems in the assessment of Internet addiction. No clear gold standard exists based on which the status and severity of Internet addiction symptoms can be evaluated, and neither is the usage of current tools standardised in such a way that cross-study comparisons are facilitated. In light of this, Chapters six and seven will establish a theoretical framework based on the empirical data gathered from two independent samples. Internet addiction has been named an “important global mental health problem” (Ko, et al., 2012, p. 1), as Internet use-related problems and associated addiction symptoms have been reported on a global scale throughout adolescence and adulthood. Clearly, there is a need for nosological precision so those in need can be helped by translating the scientific evidence established in the context of Internet addiction into actual clinical practice. The American Psychiatric Association has recently come to the decision to include *Internet Gaming Disorder* as research diagnosis in the DSM-5 (Herold, Connors, & Moore, 2012), indicating online gaming appears as particularly problematic relative to the engagement in other online behaviours. In the subsequent two chapters, Internet gaming addiction will be specifically shed light upon by thoroughly reviewing the extant literature.

## CHAPTER 2

### **Internet Gaming Addiction in Children and Adolescents: A Review of Empirical Research**

#### **Introduction**

Play is an innate human drive that begins in very early childhood (Caillois, 1961). Today, much game play has been transferred from the real (i.e., the embodied world) to the online world. This is best illustrated by software sales. In 2010, both video and PC game software retail sales amounted to approximately \$15.5 (US) billion (Johnson, 2011). The general preference with regards to online games is *The Sims 3* followed by *World of Warcraft's Wrath of the Lich King*. This suggests that 'Simulation Games' and 'Massively-Multiplayer Online Role-Playing Games' (MMORPGs) are favoured by gaming communities (The NPD Group, 2010). These games allow players to (i) inhabit massive game worlds concurrently, (ii) develop virtual alter egos, namely avatars, and (iii) play with others all over the world anytime and anywhere (Kuss, et al., 2012). Furthermore, they enable immersion in a reality that is both simultaneously fantastic and poignantly real. Therefore, these games can be seen as "system[s] in which reality itself [...] is entirely captured, fully immersed in a virtual image setting, in the world of make believe, in which appearances are not just on the screen through which experience is communicated, but they become the experience" (Castells, 1996).

The manifold possibilities online games offer for aficionados and novices alike clearly highlight the wide appeal of these games. According to the latest report of the Entertainment Software Association (ESA), 25% of the computer and video game players are under the age of 18 years and 60% are male. The

ESA also reported that 25% of parents do not impose time limits on their children's Internet use and 17% of parents do not impose time limits on video and computer game playing (ESA, 2010). From these statistics, it appears that gaming, and particularly online gaming, is an integral element of children and adolescents' leisure time activities.

Whilst gaming is a pleasurable pastime activity, research suggests excessive online gaming may in extreme cases lead to symptoms commonly experienced by substance addicts, namely salience, mood modification, craving, and tolerance (Hsu, Wen, & Wu, 2009; Ko et al., 2009; Mehroof & Griffiths, 2010; Wölfling, Grüsser, & Thalemann, 2008; Young, 2009). A recent systematic literature review (presented in Chapter 3) suggests it is particularly excessive engagement with MMORPGs that can lead to addiction in a small minority of players (Kuss & Griffiths, 2012a). Since online and offline video and computer games are particularly appealing to children and adolescents (ESA, 2010), it appears reasonable to suggest these groups may be particularly at risk (i.e., more vulnerable and susceptible) of developing gaming addiction. Furthermore, it has been argued because of the 24/7 nature and almost mandatory excessive play required in playing MMORPGS (such as *World of Warcraft* and *EverQuest*), online gaming may be more problematic for 'at risk' individuals than offline gaming (Griffiths & Meredith, 2009).

Assessing online gaming addiction in children and adolescents is relevant for several reasons. With regards to developmental psychopathological findings, it appears addictions tend to have precursors within the period of adolescence (Hawkins & Fitzgibbon, 1993). Also, it is relatively common that substance dependencies develop in early adulthood (American Psychiatric Association, 2000). Therefore, prevention efforts must be established that target adolescents who have their first experiences with addictive substances and behaviours during their pubescence. During this period of time, the adolescent



is confronted with a variety of cumulated stressors, such as physical and hormonal changes, as well as shifts in personal value and belief systems. Parental influence is diminished whereas the peer group gains more importance. Peer pressure may lead to a variety of problems (Silbereisen & Kastner, 1998) that may eventuate in the development of pathological behaviours, such as substance-related and behavioural addictions (Wölfling & Müller, 2009).

Adolescents may use online games as a way of coping with stressors and gaming can become a dysfunctional media-focused coping strategy (Thalemann, 2009). Similarly, relationships between problematic gaming and the ways in which adolescents cope with stressors and frustrations have been reported (Wölfling, Thalemann, & Grüsser, 2008). For instance, problematic gamers play games significantly more frequently than non-problematic gamers as a reaction to anger and frustration. Thus, they appear to use gaming as a strategy for emotion regulation in order to decrease negative feelings. This seems particularly problematic because those adolescents who play online games excessively are likely to get little chance to actually develop healthy ways of coping with stressors because they are constantly occupied with playing online games instead. Therefore, their psychosocial development may be significantly impaired. The consistent blocking out of and passive coping with stressful experiences is a strategy that may be successful in the short-term. However, viewed from a long-term perspective, it may limit the potential to have fundamental experiences that are necessary for developing a protective way to cope. In this case, it appears more likely that once new stressors appear, adolescents continue to use escapist and media-focused coping mechanisms. This results in a vicious circle (Wölfling & Müller, 2009).

A wide variety of empirical and prospective studies have investigated the negative consequences of stressors upon psychological and physiological

parameters when the former are inadequately dealt with. Accordingly, a repertoire of coping strategies that is deficiently developed may be seen as a risk factor for the development of a variety of negative psychological and psychosomatic problems. These entail direct effects on the immune system (Charlton, 2002) as well as negative affectivity (Kim, Ryu, et al., 2006) and psychosomatic problems (Batthyány, Müller, Benker, & Wölfling, 2009). Moreover, patients including adolescents aged 17-19 years treated for their pathological gambling and online gaming addiction at a specialized treatment centre have been found to suffer from depressive symptoms, anxiety, and somatization (Wölfling & Müller, 2009). Such clinical observations hint at the importance of assessing excessive and potentially pathological online gaming behaviour more specifically in children and adolescents.

### *Clinical diagnosis*

Behavioural addictions, such as online gaming addiction, have typically been categorized either within the frameworks of impulse control disorders or substance dependencies (Grüsser & Thalemann, 2006). To date, criteria developed for the diagnosis of online gaming addiction in empirical studies have been based on either the criteria for pathological gambling or the criteria for substance dependence. According to the American Psychiatric Association's (APA) official diagnosis (2000), pathological gambling is an impulse control disorder not otherwise specified (see Table 1). The main characteristic of impulse control disorders is the "failure to resist an impulse, drive, or temptation to perform an act that is harmful to the person or to others" (American Psychiatric Association, 2000, p. 663).

Table 1  
*Diagnostic Criteria for Pathological Gambling*

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A. Persistent and recurrent maladaptive gambling behaviour as indicated by five (or more) of the following:

- (1) is preoccupied with gambling (e.g., preoccupied with reliving past gambling experiences, handicapping or planning the next venture, or thinking of ways to get money with which to gamble)
- (2) needs to gamble with increasing amounts of money in order to achieve the desired excitement
- (3) has repeated unsuccessful efforts to control, cut back, or stop gambling
- (4) is restless or irritable when attempting to cut down or stop gambling
- (5) gambles as a way of escaping from problems or of relieving a dysphoric mood (e.g., feelings of helplessness, guilt, anxiety, depression)
- (6) after losing money gambling, often returns another day to get even (“chasing” one’s losses)
- (7) lies to family members, therapist, or others to conceal the extent of involvement with gambling
- (8) has committed illegal acts such as forgery, fraud, theft, or embezzlement to finance gambling
- (9) has jeopardized or lost a significant relationship, job, or educational or career opportunity because of gambling
- (10) relies on others to provide money to relieve a desperate financial situation caused by gambling

B. The gambling behaviour is not better accounted for by a Manic Episode.

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*Note.* The criteria presented originate from the APA’s taxonomy (2000, p. 674), which is similar to the World Health Organization’s classification of pathological gambling within the category of “habit and impulse disorders, F63.0” (1992).

An alternative approach to assessing online gaming addiction is the reliance on the official criteria for substance dependence or the dependence syndrome (American Psychiatric Association, 2000; World Health Organization, 1992). The discriminative features of substance dependence are “a cluster of cognitive, behavioural, and physiological symptoms indicating that the individual continues use of the substance despite significant substance-related problems” (American Psychiatric Association, 2000, p. 192). The

relevant diagnostic items for substance dependence are presented below in Table 2.

Table 2  
*Diagnostic Criteria for Substance Dependence*

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A maladaptive pattern of substance use, leading to clinically significant impairment or distress, as manifested by three (or more) of the following, occurring at any time in the same 12-month period:

- (1) tolerance, as defined by either of the following:
  - (a) a need for markedly increased amounts of the substance to achieve intoxication or desired effect
  - (b) markedly diminished effect with continued use of the same amount of the substance
- (2) withdrawal, as manifested by either of the following:
  - (a) the characteristic withdrawal syndrome for the (respective) substance
  - (b) the same (or a closely related) substance is taken to relieve or avoid withdrawal symptoms
- (3) the substance is often taken in larger amounts or over a longer period than was intended
- (4) there is a persistent desire or unsuccessful efforts to cut down or control substance use
- (5) a great deal of time is spent in activities necessary to obtain the substance (e.g., visiting multiple doctors or driving long distances), use the substance (e.g., chain-smoking), or recover from its effects
- (6) important social, occupational, or recreational activities are given up or reduced because of substance use
- (7) the substance use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance (e.g., current cocaine use despite recognition of cocaine-induced depression, or continued drinking despite recognition that an ulcer was made worse by alcohol consumption)

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*Note.* The criteria presented originate from the APA's classification of "substance dependence" (2000, p. 197), which is similar to the World Health Organization's classification of the "dependence syndrome" (1992).

Unlike pathological gambling, a diagnosis for substance dependence requires the presence of the respective criteria within the period of 12 months. Thus, it adds a time criterion to diagnosis that is relevant for the identification of genuine pathology. Moreover, another main distinguishing feature is the

absence of a withdrawal criterion in the case of pathological gambling relative to substance dependence. Therefore, for pathological gambling, the actual activity of engaging in the potentially maladaptive behaviour takes a prime role over any other possible negative consequences the engagement may result in. Typically, the reliance on substance dependence criteria is used for the classification of behavioural addictions (Batthyány & Pritz, 2009; Grüsser & Thalemann, 2006). With behavioural addictions such as online gaming addiction, no psychotropic substances are ingested. Instead, the psychotropic effect results from biochemical changes in the body. These are triggered by rewarding activities that are then engaged in excessively (Holden, 2001).

Given the variety of potential classification frameworks for online gaming addiction, it appears to be crucial to evaluate each one individually. For this purpose, a literature review was undertaken. The specific aims of this review were to (i) present the classification basis of online gaming addiction using frameworks of officially recognized mental disorders as outlined in the current versions of the Diagnostic and Statistical Manual for Mental Disorders IV-TR (DSM IV-TR; American Psychiatric Association, 2000) and the International Classification of Mental and Behavioral Disorders-10 (ICD-10; World Health Organization, 1992), (ii) identify contemporary empirical studies that assess online gaming addiction in children and adolescents, and (iii) present and evaluate their findings against the background of the established official criteria. For this purpose, the empirical studies identified from the current scientific knowledge base will be delineated and evaluated subsequently.

## **Methods**

The database *Web of Knowledge* was used to identify all empirical studies published up to October 31, 2011. *Web of Knowledge* not only contains peer-

reviewed articles and conference proceedings from various social sciences (e.g., medicine and psychology), but it also makes use of papers in the natural sciences and arts and humanities. Therefore, it can be considered to be considerably more comprehensive than other commonly used databases, such as *Psycinfo* or *Pubmed*. For the purpose of broad coverage, further studies were accessed via *Google Scholar*. The search terms utilized to detect the relevant studies were “online gam\*”, “Internet gam\*”, “computer gam\*”, “video gam\*”, “addict\*”, “dependen\*”, “excess\*”, and “patholog\*”. The inclusion criteria upon which the studies were selected were: (i) the inclusion of empirically collected data, (ii) an assessment of online gaming addiction in some form, (iii) the inclusion of children and adolescents (aged 8-18 years) in the sample, (iv) publication in peer-reviewed journals, (v) full text availability, (vi) publication after the year 2000, and (vii) written in either English or German language as these are the native languages of the authors. This timeframe was applied because studies that were published earlier than 2000 were assumed to have a focus different from online games (i.e., they specifically assessed console or arcade video games without an equivalent on the Internet). Following the comprehensive literature search, 30 empirical studies were identified as meeting the inclusion criteria.

## Results

Following a thorough review of the current empirical studies, the latter were classified in accordance with the diagnostic framework that the authors’ utilized to identify potentially pathological online game use. Internet gaming addiction in these 30 studies was assessed using different classification schemes. These included those based on the criteria for pathological gambling ( $n = 18$ ), those based on the criteria for substance dependence ( $n = 3$ ), those based on a combination of both pathological gambling and substance dependence ( $n$

= 3), those based on parental referral ( $n = 2$ ), and those based on other miscellaneous classification criteria ( $n = 4$ ). Each of these will be described and subsequently evaluated. An overview is presented in Table 3.

### *Internet gaming addiction based on the criteria for pathological gambling*

Based on the database literature search, 18 studies were identified that assessed Internet gaming addiction by means of using adapted diagnostic criteria for pathological gambling and impulse control disorders not otherwise specified. In order to assess online gaming addiction, six studies (Chan & Rabinowitz, 2006; Han et al., 2009; Han et al., 2007; Kwon, Chung, & Lee, 2011; Rau, Peng, & Yang, 2006; Thomas & Martin, 2010) used an adapted version of Young's (1998b) Internet Addiction Scale (Widyanto & McMurrin, 2004; Young, 1998b; Young, 1996). More specifically, the IAS assesses the following addiction components: (i) salience, (ii) excessive use, (iii) neglecting work, (iv) anticipation, (v) lack of control, and (vi) neglecting social life. The scale was found to have good internal consistency, reliability and validity (Widyanto & McMurrin, 2004). In three studies, pathological gaming was measured by means of the Game Addiction Scale for Adolescents (Lemmens, Valkenburg, & Peter, 2009, 2011a, 2011b). The scale has good reliability and good concurrent, convergent and criterion validity, and measures the following addiction symptoms: salience, tolerance, mood modification, relapse, withdrawal, conflict, and problems (Lemmens, et al., 2009).

Table 3  
*Overview of Included Empirical Studies*

Study	Sample and design	Instruments	Addiction criteria, symptoms & prevalence
Allison et al. (2006)	<ul style="list-style-type: none"> <li>- N = 1 male adolescent playing computer games excessively (age = 18)</li> <li>- Participant underwent multidisciplinary assessment for 3 days at a psychiatric clinic</li> </ul>	<ul style="list-style-type: none"> <li>Variety of psychological tests incl. WAIS, MMPI, psychiatric interviews, and social work evaluation of his family</li> </ul>	<ul style="list-style-type: none"> <li>- "Game addiction"</li> <li>- No specific diagnostic tool used</li> <li>- 12-16h gameplay/day</li> <li>- No sleep, limited real-life social contacts</li> <li>- Escapism motivation, obsession with gaming</li> <li>- Symptoms: gaming "overshadowed" participant's life, continuously missed classes at school, diminished energy, poor concentration, fatigue, muscle tension</li> </ul>
Batthyány et al. (2009)	<ul style="list-style-type: none"> <li>- N = 1231 students (grades 3-5) in Vienna (46% female)</li> <li>- Survey</li> </ul>	<ul style="list-style-type: none"> <li>- Assessment of Computer Game Addiction in Children – Revised (CSVK-R) (Thalemann, Albrecht, Thalemann, &amp; Grüsser, 2004)</li> </ul>	<ul style="list-style-type: none"> <li>- "Excessive computer game play" found in 12% (n = 1068; 10% abusive, 3% dependent behavior)</li> <li>- Based on criteria of substance dependence (DSM IV-TR and ICD-10)</li> <li>- Distinction between normal, salient, abusive and addicted</li> </ul>
Chan & Rabinowitz (2006)	<ul style="list-style-type: none"> <li>- N = 72 adolescents (8 &amp; 9th grades) recruited from high school and N = 72 parents</li> <li>- Survey with sections for adolescents and their parents</li> </ul>	<ul style="list-style-type: none"> <li>- Young's Internet Addiction Scale, modified for VGs (YIAS-VG) (Widyanto &amp; McMurrin, 2004) with good internal consistency, reliability and validity</li> <li>- Time spent playing VGs, watching TV, using the Internet</li> <li>- Conners' Parent Rating Scale (CPRS; Conners, Sitarenios, Parker, &amp; Epstein, 1998) incl. sections on oppositional, hyperactivity, inattention, and ADHD categories</li> </ul>	<ul style="list-style-type: none"> <li>- "Excessive console and Internet video game use"</li> <li>- 6 components of addiction: salience, excessive use, neglecting work, anticipation, lack of control, neglecting social life</li> </ul>



Chiu et al. (2004)	<ul style="list-style-type: none"> <li>- <math>N = 1,228</math> students in grades 5–8, sampled from 20 primary and junior high schools in Northern Taiwan</li> <li>- Survey</li> </ul>	<ul style="list-style-type: none"> <li>- Game Addiction Scale (based on Buchman &amp; Funk, 1996; Clymo, 1996)</li> <li>- demographics including academic achievement</li> <li>- sensation seeking (including being assertive, bold, and ambitious)</li> <li>- Boredom Inclination Scale (based on Farrell, 1990)</li> </ul>	<ul style="list-style-type: none"> <li>- “Video game addiction”, unspecified</li> <li>- 9-item self-devised scale that assesses 2 factors: game addiction and game concern; <math>\alpha = 0.86</math></li> <li>- Female, lower function, higher sensation seeking, and higher boredom inclination predict game addiction</li> </ul>
Cultrara & Har-El (2002)	<ul style="list-style-type: none"> <li>- <math>N = 1</math> 17-year old boy with suprahyoid muscular hypertrophy caused by video game play</li> <li>- Case report</li> </ul>	<ul style="list-style-type: none"> <li>- Medical examinations</li> <li>- Patient’s history, physical, radiologic, intraoperative, and pathologic findings</li> </ul>	<ul style="list-style-type: none"> <li>- “Excessive video game play”</li> <li>- No specific diagnostic tool used</li> <li>- Muscle hypertrophy secondary to increased activity</li> <li>- Patient stopped video game play and within 4 months, submental mass decreased in size</li> </ul>
Gentile et al. (2011)	<ul style="list-style-type: none"> <li>- <math>N = 3,034</math> children in grades 3 (<math>n = 743</math>), 4 (<math>n = 711</math>), 7 (<math>n = 916</math>), 8 (<math>n = 664</math>) from 6 secondary schools (5 boyschools)</li> <li>- 2-year longitudinal study</li> </ul>	<ul style="list-style-type: none"> <li>- Pathological video game use (Gentile, 2009)</li> <li>- Problematic gaming (Charlton, 2002)</li> <li>- General Media Habits Questionnaire (Anderson, Gentile, &amp; Buckley, 2007; Gentile, Lynch, Linder, &amp; Walsh, 2004)</li> <li>- Barratt Impulsiveness Scale (Patton, Stanford, &amp; Barratt, 1995)</li> <li>- Personal Strengths Inventory II (Liau, Chow, Tan, &amp; Senf, 2011)</li> <li>- Children’s Empathic Attitudes Questionnaire (Funk, Fox, Chan, &amp; Curtiss, 2008)</li> <li>- Normative beliefs about aggression (Huesmann &amp; Guerra, 1997)</li> <li>- Hostile attribution bias (Crick, 1995)</li> <li>- Aggressive fantasies (Huesmann &amp; Eron, 1986; Nadel, Spellmann, Alvarez-Canino, Lausell-Bryant, &amp; Landsberg, 1996)</li> <li>- Self-report of aggression (Linder, Crick, &amp; Collins, 2002)</li> <li>- Parent-family connectedness (Resnick et al., 1997)</li> <li>- ADHD screen (University of Massachusetts Medical School, 2007)</li> <li>- Asian adolescent depression scale (Woo et al., 2004)</li> <li>- Anxiety (Birmaher et al., 1997)</li> <li>- Social phobia (Connor, Davidson, Churchill, Sherwood, &amp; Weisler, 2000)</li> <li>- School performance</li> </ul>	<ul style="list-style-type: none"> <li>- “Pathological gaming”</li> <li>- Definition based on APA criteria: min. 5/10 items endorsed for pathology classification</li> <li>- Pathological gaming prevalence: 9%</li> <li>- Risk factors for pathological gaming: much gaming, low social competence, greater impulsivity</li> <li>- Outcomes of pathological gaming: depression, anxiety, social phobias, lower school performance</li> </ul>

Grüsser et al. (2005)	<ul style="list-style-type: none"> <li>- <math>N = 323</math> children, age range = 11-14 years, <math>M = 12</math> years, <math>SD = 1</math>; 54% males</li> <li>- Questionnaire distributed in school</li> </ul>	<ul style="list-style-type: none"> <li>- Assessment of Computer Game Addiction in Children – Revised (CSVK-R) (Thalemann, et al., 2004)</li> </ul>	<ul style="list-style-type: none"> <li>- “Excessive computer/ video game play” present in 9% of sample</li> <li>- Based on criteria of substance dependence (DSM IV-TR and ICD-10)</li> <li>- Distinction between normal, salient, abusive and addicted</li> </ul>
Han et al. (2009)	<ul style="list-style-type: none"> <li>- <math>N = 62</math> children with ADHD (52 males; mean age = 9 years, <math>SD = 2</math>)</li> <li>- Questionnaire &amp; visual continuous performance test</li> </ul>	<ul style="list-style-type: none"> <li>- Internet Addiction Scale (Young, 1996; Korean version) with good internal consistency</li> <li>- ADHD rating scale (So, Noh, Kim, Ko, &amp; Koh, 2002)</li> <li>- Computerized Neurocognitive Function Test (Kim, Shin, et al., 2006)</li> </ul>	<ul style="list-style-type: none"> <li>- 52% comorbidity between “Internet video game addiction” and ADHD</li> </ul>
Han et al. (2007)	<ul style="list-style-type: none"> <li>- <math>N = 79</math> male EIGPs and 75 healthy controls recruited from high schools in South Korea (mean age = 16 years, <math>SD = 1</math> year)</li> <li>- Self-report questionnaires and genotyping</li> </ul>	<ul style="list-style-type: none"> <li>- Internet Addiction Scale (Young, 1998b) with good internal consistency</li> <li>- reward dependence (RD) scale of Cloninger’s Temperament and Character Inventory</li> <li>- Frequencies of 3 dopamine polymorphisms</li> <li>- SCID I (First, Gibbon, Spitzer, &amp; Williams, 1996)</li> </ul>	<ul style="list-style-type: none"> <li>- “Excessive Internet game players” have higher prevalence of Taq1A1 and low activity (COMTL) alleles</li> </ul>
Kim & Kim (2010)	<ul style="list-style-type: none"> <li>- Phase 1: <math>N = 1422</math> 5th graders (47% females, mean age = 12 years) recruited from 7 private elementary schools in South Korea</li> <li>- Phase 2: <math>N = 199</math> 8th graders (mean age = 15 years) from private junior high school</li> <li>- Phase 3: <math>N = 393</math> 11th graders (50% females, mean age = 18 years) from 2 public high schools</li> <li>- Survey</li> </ul>	<ul style="list-style-type: none"> <li>Problematic Online Game Use Scale (based on Armstrong, Phillips, &amp; Saling, 2000; Caplan, 2002; Charlton &amp; Danforth, 2007; Lee &amp; Ahn, 2002; Young, 1999) with good reliability, convergent and discriminant validity</li> </ul>	<ul style="list-style-type: none"> <li>- “Problematic online game use”</li> <li>- Criteria assessed: euphoria, health problem, conflict, failure of self-control, preference for virtual relationship</li> </ul>

King & Delfabbro (2009a)	<ul style="list-style-type: none"> <li>- <math>N = 38</math> (23 adolescents (15 males, mean age = 16years, <math>SD = 1</math>; video game playing = 15 hrs/week, <math>SD = 12</math> hours); 15 adults (11 males, mean age = 30years, <math>SD = 7</math>; video game playing = 18hrs/week, <math>SD = 11</math>))</li> <li>- Pilot interview study with 7 semi-structured group interviews</li> </ul>	<p>Questions on playing motivations, and psychosocial context of excessive video game playing behavior</p>	<ul style="list-style-type: none"> <li>- "Excessive video game play"</li> <li>- No specific diagnostic measure used</li> <li>- Online Role-Playing Games more rewarding than casual games → more addictive</li> </ul>
Lemmens et al. (2011a)	<ul style="list-style-type: none"> <li>- <math>N = 851</math> Dutch adolescents (543 gamers; age range 11-17 years, <math>M = 13.9</math>, <math>SD = 1.4</math>; 51% male)</li> <li>- 2-wave panel study including a paper-and pencil survey distributed in schools</li> </ul>	<ul style="list-style-type: none"> <li>- Pathological gaming (Lemmens, et al., 2009) with good convergent validity &amp; criterion validity</li> <li>- Time spent on games</li> <li>- UCLA Loneliness Scale (Russell, 1996)</li> <li>- Satisfaction with Life Scale (Diener, Emmons, Larsen, &amp; Griffin, 1985)</li> <li>- Social competence (based on Buhrmester, Furman, Wittenberg, &amp; Reis, 1988; Inderbitzen &amp; Foster, 1992)</li> <li>- Self-Esteem Scale (Rosenberg, Schooler, &amp; Schoenbach, 1989)</li> </ul>	<ul style="list-style-type: none"> <li>- "Pathological gaming"</li> <li>- Criteria: salience, tolerance, mood modification, relapse, withdrawal, conflict, problems</li> <li>- Social competence, self-esteem, and loneliness predicted pathological gaming six months later</li> <li>- Low psychosocial well-being is antecedent and loneliness is consequence of pathological gaming</li> </ul>
Lemmens et al. (2011b)	<ul style="list-style-type: none"> <li>- <math>N = 851</math> Dutch adolescents (age range 11-17 years, <math>M = 13.9</math>, <math>SD = 1.4</math>; 51% male; 540 game players, 30% female)</li> <li>- 2-wave panel study including a paper-and pencil survey that was distributed in schools</li> </ul>	<ul style="list-style-type: none"> <li>- Pathological gaming (Lemmens, et al., 2009) with good convergent validity &amp; criterion validity</li> <li>- Time spent on games</li> <li>- Violent game play (games played analyzed for violent content using Pan-European Game Information database using weighted measure of time spent on violent games)</li> <li>- Physical Aggression Subscale of Aggression Questionnaire (Buss &amp; Perry, 1992)</li> </ul>	<ul style="list-style-type: none"> <li>- "Pathological gaming"</li> <li>- Salience, tolerance, mood modification, relapse, withdrawal, conflict, problems</li> <li>- More gaming predicted more time spent on gaming six months later</li> <li>- Pathological gaming increased physical aggression in boys</li> </ul>
Lemmens et al. (2009)	<ul style="list-style-type: none"> <li>- 2 independent samples of Dutch game-playing adolescents (<math>N = 352</math> and 369) recruited from 6 schools of secondary education (32% girls; age range: 12-18 years, mean age = 15 years, <math>SD = 1.5</math>)</li> <li>- 2 surveys</li> </ul>	<ul style="list-style-type: none"> <li>- Game Addiction Scale for Adolescents with good reliabilities and concurrent validity</li> <li>- time spent on games</li> <li>- UCLA Loneliness Scale (Russell, 1996)</li> <li>- Satisfaction with Life Scale (Diener, et al., 1985)</li> <li>- social competence (based on Buhrmester, et al., 1988; Inderbitzen &amp; Foster, 1992)</li> <li>- Physical Aggression Subscale of Aggression Questionnaire (Buss &amp; Perry, 1992)</li> </ul>	<ul style="list-style-type: none"> <li>- "Game addiction"</li> <li>- Criteria measured: salience, tolerance, mood modification, relapse, withdrawal, conflict, problems</li> <li>- Game addiction correlated with use, loneliness, life satisfaction, social competence, and aggression</li> </ul>

Rau et al. (2006)	<ul style="list-style-type: none"> <li>- <math>N = 64</math>, age range: 9-20; <math>n = 26</math> expert players (only males), <math>n = 38</math> novices (16 females); education levels: from elementary to graduate school</li> <li>- Experimental study</li> </ul>	<ul style="list-style-type: none"> <li>- Internet Addiction Self-test (IAT; based on Young, 1998a)</li> <li>- Experiment: Participants were playing Diablo in cybercafe</li> </ul>	<ul style="list-style-type: none"> <li>- "Internet addiction" found in 8%</li> <li>- Discrepancy between self-report and questionnaire scores</li> </ul>
Rehbein et al. (2010)	<ul style="list-style-type: none"> <li>- <math>N = 44,910</math> German 9th graders (mean age = 15 years, <math>SD = 1</math>; 51% male; mean VG usage/day = 2hrs)</li> <li>- German nationwide survey, conducted by Criminological Research Institute of Lower Saxony (KFN)</li> </ul>	<ul style="list-style-type: none"> <li>- Video Game Dependency Scale based on Internet Addiction Scale (Hahn &amp; Jerusalem, 2001) adapted for video game dependency (Rehbein &amp; Borchers, 2009) with good discriminatory power</li> </ul>	<ul style="list-style-type: none"> <li>- "Video game dependency": diagnosed in 3% of male, 0.3% of females</li> <li>- 3% classified as at risk and 2% as dependent on video games (mainly boys: 5% at risk and 3% dependent; girls: 0.5% are at risk and 0.3% are dependent)</li> <li>- 90% of youths at risk, 91% of dependents are males</li> <li>- Based on ICD-10 criteria of dependency</li> <li>- Criteria: preoccupation/ salience, conflict, loss of control, withdrawal symptoms, tolerance</li> </ul>
Salguero & Moran (2002)	<ul style="list-style-type: none"> <li>- <math>N = 223</math> Spanish adolescents (age range: 13-18 years, mean age = 15 years, <math>SD = 1</math>; 53% male)</li> <li>- Questionnaires distributed during tutorials in school</li> </ul>	<ul style="list-style-type: none"> <li>- Problem Video Game Playing Scale (PVP; self-devised scale, unidimensional, acceptable internal consistency, good construct validity)</li> <li>- Severity of Dependence Scale (Gossop et al., 1995)</li> <li>- Demographics</li> </ul>	<ul style="list-style-type: none"> <li>- "Problem video game playing"</li> <li>- Self-devised questionnaire (9 items) assessing problem video game playing based on DSM criteria for substance dependence and pathological gambling present in previous year cross-validated with results of Severity of Dependence Scale (Gossop et al., 1995)</li> </ul>
Skoric et al. (2009)	<ul style="list-style-type: none"> <li>- <math>N = 333</math> elementary school video gamers from Singapore (age range = 8-12 years, mean age = 10 years, <math>SD = 1</math>; 54% males, 57% Chinese, 34% Malay)</li> <li>- Two survey studies</li> </ul>	<ul style="list-style-type: none"> <li>- Assessment of addiction tendencies (based on American Psychiatric Association, 2000; Danforth, 2003) with good internal reliability</li> <li>- Assessment of engagement tendencies (based on Brown, 1991)</li> <li>- Demographics</li> <li>- Amount of time spent playing video games</li> <li>- School grades</li> </ul>	<ul style="list-style-type: none"> <li>- "Video game addiction"</li> <li>- Criteria: behavioural salience, conflict, withdrawal symptoms (based on Brown, 1991, 1993) and further unspecified DSM-IV items</li> </ul>

Thomas & Martin (2010)	<ul style="list-style-type: none"> <li>- <math>N = 1.326</math> students (990 secondary and 335 college students, 657 females, grades 7-13) and <math>N = 705</math> (509 female, mean age = 22years, <math>SD = 7</math>, 84% Australian) university students</li> <li>- Questionnaire distributed in schools</li> </ul>	<ul style="list-style-type: none"> <li>- Addiction (adapted from Fisher, 1994; Young, 1998b)</li> <li>- Participation habits</li> </ul>	<ul style="list-style-type: none"> <li>- “Video-arcade/ computer game/ Internet addiction”</li> <li>- Salience, mood modification, tolerance, withdrawal, loss of control, conflict, relapse, and escape (min. 5/8 met for addiction classification)</li> <li>- Addiction to video-arcade games (4%), computer games (5%) and the Internet (5%)</li> <li>- Prevalence of social computer game users (55%) and Internet addiction (56%)</li> </ul>
Van Rooij et al. (2011a)	<ul style="list-style-type: none"> <li>- <math>N = 3048</math> Dutch adolescent online gamers (first four classes of Dutch secondary school, age range: 13-16)</li> <li>- Sample stratified according to region, urbanization, and education level</li> <li>- Repeated cross-sectional survey study with a longitudinal cohort based on Dutch Monitor Study Internet and Youth including a 1 hour questionnaire completed in schools</li> </ul>	<ul style="list-style-type: none"> <li>- Compulsive Internet Use Scale (Meerkerk, et al., 2009) with good concurrent, construct validity, and internal consistency</li> <li>- Weekly hours online gaming</li> <li>- Rosenberg’s Self-Esteem Scale (Rosenberg, et al., 1989)</li> <li>- UCLA Loneliness Scale (Russell, Peplau, &amp; Cutrona, 1980)</li> <li>- Depressive Mood List (Engels, Finkenauer, Meeus, &amp; Dekovic, 2001; Kandel &amp; Davies, 1986; Kandel &amp; Davies, 1982)</li> <li>- Revised Social Anxiety Scale for Children (La Greca &amp; Stone, 1993)</li> </ul>	<ul style="list-style-type: none"> <li>- “Online video game addiction” found in 3%, representative of 1.5% of 13-16 year old Dutch children</li> <li>- Loss of control, preoccupation, conflict, withdrawal symptoms, and coping</li> </ul>
Van Rooij et al. (2010)	<ul style="list-style-type: none"> <li>- <math>N = 4920</math> (in 2007) and 4753 (in 2008), mean age = 14, <math>SD = 1</math>; 78% Dutch adolescents</li> <li>- Survey study</li> <li>- Data obtained from Monitor Study Internet and Youth</li> </ul>	<ul style="list-style-type: none"> <li>- Compulsive Internet Use Scale (Meerkerk et al., 2009) with good concurrent, construct validity, and internal consistency</li> <li>- Online communications, games, and other Internet functions</li> </ul>	<ul style="list-style-type: none"> <li>- Loss of control, preoccupation, conflict, withdrawal symptoms, and coping</li> <li>- Online gaming have strongest association with “Compulsive Internet Use”</li> </ul>
Wan & Chiou (2006a)	<ul style="list-style-type: none"> <li>- Study 1: <math>N = 177</math> Taiwanese adolescents (age range: 16-24)</li> <li>- Study 2: <math>N = 182</math> frequent MMORPG players (age range: 16-22)</li> <li>- Survey studies</li> </ul>	<ul style="list-style-type: none"> <li>- Internet Addiction Scale for high schoolers in Taiwan with good internal consistency, construct and discriminatory validity (adapted from Lin &amp; Tsai, 1999)</li> <li>- Optimal experience/flow state (Choi, Kim, &amp; Kim, 2000)</li> <li>- Self-developed Two-factor Evaluation on Needs for Online Games (TEN0) to measure intensity of psychological needs on satisfaction and dissatisfaction dimensions</li> </ul>	<ul style="list-style-type: none"> <li>- “Online game addiction”</li> <li>- Compulsive use/ withdrawal, tolerance, related problems of family, school, and health, and related problems of peer interaction and finance</li> </ul>

Wan & Chiou (2006b)	<ul style="list-style-type: none"> <li>- N = 10 Taiwanese adolescents with online game addiction (6 chosen from Internet cafés, 4 were referred), 7 male, 8 students, all spent &gt;48hrs/week in game</li> <li>- In-depth interviews</li> </ul>	<ul style="list-style-type: none"> <li>- Internet Addiction Scale for high schoolers in Taiwan with good internal consistency, construct and discriminatory validity (adapted from Lin &amp; Tsai, 1999)</li> <li>- Sentence completion test and semi-structured interviews, four realms: (1) surface motivations, (2) source motivations, (3) self-conception, and (4) interpersonal relationships in real life</li> </ul>	<ul style="list-style-type: none"> <li>- “Online game addiction”</li> <li>- Emergent themes: (1) addicts’ psychological needs and motivations; (2) online games as the everyday focus of the addicts; (3) the interplay of real self and virtual self; (4) online games as the compensatory or extensive satisfaction for addicts’ needs; and (5) addicts’ self-reflections</li> </ul>
Wan & Chiou (2007)	<ul style="list-style-type: none"> <li>- Study 1: N = 199 adolescents (age range: 16-23)</li> <li>- Study 2: N = 426 adolescents (age range: 17-24)</li> <li>- Survey studies</li> </ul>	<ul style="list-style-type: none"> <li>- Internet Addiction Scale with good internal consistency, construct and discriminatory validity (adapted from Lin &amp; Tsai, 1999)</li> <li>- Online Gaming Motivation Scale (based on Choi &amp; Kim, 2004; Chou &amp; Hsiao, 2000a; Ng &amp; Wiemer-Hastings, 2005)</li> </ul>	<ul style="list-style-type: none"> <li>- “Online game addiction”</li> </ul>

In three other studies (Choo et al., 2010; Gentile, 2009; Gentile, et al., 2011), pathological gaming was assessed using the Pathological Video Game Use Scale (Gentile, 2009). This scale uses the DSM-IV-TR criteria for pathological gambling and diagnoses addiction when at least five (of ten) symptoms are met. Similarly, in another study (Dongdong, Liau, & Khoo, 2011), the Pathological Video Gaming Scale (Choo, et al., 2010) was used. It is yet another measure utilizing the official DSM-IV criteria for pathological gambling and includes ten items. Moreover, two studies have used the Compulsive Internet Use Scale (Meerkerk, et al., 2009) to assess online video game addiction (van Rooij, et al., 2010; van Rooij, Schoenmakers, Vermulst, van den Eijnden, & van de Mheen, 2011b). The scale measures symptoms that relate particularly to the compulsive and impulse control elements of the behaviour, including loss of control, preoccupation, conflict, withdrawal symptoms and coping. It was found to have good concurrent and construct validity, as well as good internal consistency (Meerkerk et al., 2009). Finally, three studies (Wan & Chiou, 2006a, 2006b, 2007) used the adapted version of the Internet Addiction Scale<sup>3</sup> (Lin & Tsai, 1999). This scale measures compulsive use and withdrawal, tolerance, related problems of family, school, and health, and related problems of peer interaction and finance. It was found to have good internal consistency, construct and discriminatory validity (Lin & Tsai, 1999).

The samples used in these 18 studies included 72 adolescents in grades eight and nine (mean age = 15, *SD* = 1 year) as well as their parents (Chan & Rabinowitz, 2006), 62 children (*M* = 9, *SD* = 2 years) with Attention Deficit Hyperactivity Disorder (ADHD) (Han, et al., 2009), 154 male adolescents (*M* = 16, *SD* = 1 year), half of which were excessive Internet game players (Han, et al., 2007), 161 secondary school students in Singapore with MMO experience (*M* =

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<sup>3</sup> Lin and Tsai's scale (1999) is loosely based on Young's original Internet Addiction Test (1998b), it is an the former is a self-devised scale that shares the same name since it measures a similar phenomenon.

14,  $SD = 0.7$  years) (Dongdong, et al., 2011), large samples (between 800 and 5000 participants) of Dutch adolescents ( $M = 14$ ,  $SD = 1$  year) (Lemmens, et al., 2011a, 2011b; van Rooij, et al., 2010) and adolescent Dutch online game players ( $N_s = 721$  and 3048; age range = 13-17 years) (Lemmens, et al., 2009; van Rooij, et al., 2011b), American youths ( $N = 1,178$ , age range = 8-18 years with equal gender and age distribution) (Gentile, 2009), Korean adolescents ( $N = 1136$ ,  $M = 14$ ,  $SD = 0.5$  years; 61% male) (Kwon, et al., 2011), and Singaporean youth ( $N = 2,998$ ,  $M = 11$ ,  $SD = 2$  years; 73% male), 64 children and adolescents (age range = 9-20 years) (Rau, et al., 2006), 3,034 secondary school children ( $M = 11$ ,  $SD = 2$  years) (Gentile, et al., 2011), 1,326 secondary school and college students ( $M = 22$ ,  $SD = 7$  years) (Thomas & Martin, 2010), 177 Taiwanese adolescents and young adults (age range = 16-24 years) (Wan & Chiou, 2006a, 2007), and 182 Taiwanese adolescent and young adult MMORPG players (age range = 16-22 years) (Wan & Chiou, 2006a), and ten Taiwanese adolescents with no explicit age specification with online game addiction (Wan & Chiou, 2006b).

With regards to classification, van Rooij et al. (2010) contend that compared to using the Internet for other applications (e.g., downloading, social networking, using messenger, chatting, blogging, etc.), online gaming has the strongest association with compulsive Internet use. This indicates a subgroup of compulsive Internet users should be classified as compulsive online gamers. Based on these assessments, a prevalence estimate of compulsive Internet use in secondary school (age range = 9-16 years) and college students ( $M = 21$ ,  $SD = 6$  years) was provided by four studies (Choo, et al., 2010; Gentile, et al., 2011; Thomas & Martin, 2010; van Rooij, et al., 2011b). Internet video game addiction was found to be present in 3% of Dutch adolescent online gamers, which is representative of 1.5% of 13-16 year old Dutch adolescents (van Rooij, et al., 2011b). Pathological gaming was found in 8.5% of US youth online gamers (Gentile, 2009) and in 9% of secondary school children in Singapore (Choo, et



al., 2010; Gentile, et al., 2011). Finally, 4%, 5%, and 5% of secondary school and college students were found to be addicted to video-arcade games, computer games, and the Internet, respectively. In addition, lifetime participation, frequency, and duration of playing games as well as the prevalence of addiction was found to be larger for Internet and computer games relative to video-arcade games (Thomas & Martin, 2010).

In terms of play patterns and motivations, in comparison to a healthy control group, adolescent excessive Internet game players in South Korea were reported to play more, play longer, and to have higher reward dependence (Han, et al., 2007). Similarly, children and adolescent expert online game players were reported to have started playing online games earlier and to play longer than novice players (Gentile, 2009; Rau, et al., 2006). Also, the expert players underestimated the time they spent playing online games (Rau, et al., 2006). Similarly, more time spent on games predicted gaming addiction (Choo, et al., 2010; Gentile, 2009; Gentile, et al., 2011; Lemmens, et al., 2009, 2011b). Moreover, it has been reported that 'flow' state<sup>4</sup> during game play was not predictive of addiction. Similarly, the absence of playing online games generated dissatisfaction (Wan & Chiou, 2006a, 2006b). Furthermore, Taiwanese adolescent online game addicts indicated that playing online games was a focus in their lives and the interplay between their real and their virtual selves was important to them (Wan & Chiou, 2006b). In addition, another study of Taiwanese adolescent and young adults reported online game addicts exhibited higher intrinsic motivation to play games rather than an extrinsic motivation compared to non-addicted adolescents (Wan & Chiou, 2007). Finally, escapism appeared as the most important factor predicting Internet gaming addiction (Kwon, et al., 2011) and pathological gaming (Dongdong, et

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<sup>4</sup> According to Csikszentmihalyi (1990), the flow state is characterized by an optimal experience, where the level of challenge of a task is matched with the person's skill.

al., 2011), followed by perceived parent hostility, real-ideal self-discrepancy, and parental supervision (Kwon, et al., 2011), and actual-ideal self-discrepancy and depression (Dongdong, et al., 2011).

With respect to psychosocial characteristics, it has been reported that low social competence was related to pathological gaming (Choo, et al., 2010; Lemmens, et al., 2011a), and that psychosocial well-being and self-esteem predicted pathological gaming six months later, with the same being true for high loneliness (Lemmens, et al., 2011a). Moreover, low psychosocial well-being was found to be an antecedent, whereas loneliness was a consequence of pathological gaming (Lemmens, et al., 2011a). Similarly, studies have shown that game addiction correlates with loneliness (Lemmens, et al., 2009; van Rooij, et al., 2011b), low self-esteem (van Rooij, et al., 2011b), low life satisfaction (Lemmens, et al., 2009), and low social competence (Choo, et al., 2010; Gentile, et al., 2011; Lemmens, et al., 2009) and that pathological gamers are significantly more likely to have decreasing social contacts compared to non-pathological gamers (Choo, et al., 2010). So far, however, no study has assessed the link between certain personality traits and the usage of specific Internet applications such as gaming in elevating the risk for Internet addiction, which is a major shortcoming in research. With regards to aggression, ambivalent findings were reported. In one study, no association was found between playing video games and oppositional and/or aggressive behaviour (Chan & Rabinowitz, 2006). In two other studies, time spent gaming and pathological gaming increased physical aggression in boys (Lemmens, et al., 2009, 2011b) and was found to be related to having more hostile cognitions (Choo, et al., 2010), and greater impulsivity was reported to be a risk factor for pathological gaming (Choo, et al., 2010; Gentile, et al., 2011). Moreover, Internet gaming addiction was found to be associated with lower grade point average and school performance (Chan & Rabinowitz, 2006; Choo, et al., 2010; Gentile, 2009; Gentile, et al., 2011).

Regarding comorbidity, findings indicate a significant association between time spent playing games for more than one hour per day and Internet addiction, inattention, and number and intensity of ADHD symptoms (Chan & Rabinowitz, 2006; Gentile, 2009). Similarly, it was reported that 52% of children who had previously been diagnosed with ADHD were diagnosed with Internet video game addiction as well (Han, et al., 2009). Moreover, the outcomes of pathological gaming included depression (Dongdong, et al., 2011; Gentile, et al., 2011; van Rooij, et al., 2011b), anxiety, and social phobias (Gentile, et al., 2011; van Rooij, et al., 2011b), as well as physical health problems, such as hand and wrist pain (Choo, et al., 2010; Gentile, 2009), and neglect of self-care (i.e., skipping meals, and insufficient personal hygiene) (Choo, et al., 2010).

With regards to pathophysiology, one study has reported that adolescent excessive Internet game players had a significantly higher number of Taq1A1 and low activity alleles (COMTL) relative to a healthy control group (Han, et al., 2007). This suggests genetic polymorphisms (i.e., variations in the expression of genes) may contribute to Internet gaming addiction. Overall, the presented studies suggest that Internet gaming addiction has similarities with pathological gambling. Research indicates children and adolescents who use online games in a way that is clinically noticeable experience symptoms typically experienced by those suffering from pathological gambling. Nevertheless, a number of pathological gambling symptoms are not entirely commensurate with online gaming addiction. These include the involvement of money increased throughout the gambling career as well as borrowed from family members and friends, the chasing of losses, and engaging in illegal acts. In light of pathological gambling, these symptoms appear to clearly demarcate excessive engagement from addiction. Since this does not hold true for Internet gaming addiction, it appears questionable in how far an exclusive reliance on

pathological gambling criteria for the classification of online gaming addiction is appropriate, particularly considering the monetary involvement.

However, some evidence suggests that rather than playing for money, gamblers play for the excitement and get aroused by taking risks (American Psychiatric Association, 2000). Risk taking, in this regard, may include making larger bets. Similarly, gamers can take risks when they play online games, such as choosing to fight high-level opponents and working together with new group members. Similarly, they often pay monthly subscription fees to participate in the game, and often buy in-game items. Therefore, even the criterion of monetary involvement for pathological gambling appears to have a near equivalent in gaming addiction. Nevertheless, the chasing of losses appears to be unique to pathological gambling. As a consequence of this it follows that first, Internet gaming addiction is closely related to pathological gambling due to symptom similarity. Second, Internet gaming addiction cannot entirely be equated with pathological gambling because it appears to manifest itself reasonably differently. Accordingly, exclusively basing a diagnosis of Internet gaming addiction on pathological gambling criteria is not sufficient.

#### *Internet gaming addiction based on the criteria for substance dependence*

Three studies were identified that adapted the criteria for substance dependence in order to classify online gaming addiction. The basis of assessment were the official criteria for substance dependence and the dependence syndrome as based on the international classification manuals (WHO, 1992; American Psychiatric Association, 2000). More specifically, in two studies (Batthyány, et al., 2009; Grüsser, et al., 2005), excessive computer game play was diagnosed with the Assessment of Computer Game Addiction in Children – Revised (Fragebogen zum Computerspielverhalten bei Kindern,

CSVK-R; Thalemann, et al., 2004). Using this instrument, computer game play is classified as pathological when children and adolescents score a minimum of seven out of 27 points on the scale. The psychometric qualities of the scale have been validated (Thalemann, et al., 2004). Moreover, video game dependency was diagnosed with the Video Game Dependency Scale (Rehbein & Borchers, 2009) that was adapted from the Internet Addiction Scale<sup>5</sup> (Hahn & Jerusalem, 2001). It assesses the following addiction criteria: preoccupation and salience, conflict, loss of control, withdrawal symptoms, and tolerance. Its discriminatory power was found to be good (Rehbein & Borchers, 2009).

The studies' samples included 1,231 Austrian students in grades three to five ( $M = 14$ ,  $SD = 1$  year) (Batthyány, et al., 2009), 323 children in Germany with a mean age of 12 years ( $SD = 1$  year) (Grüsser, et al., 2005), and a representative sample of 44,910 German ninth-graders with a mean age of 15 years ( $SD = 1$ ) (Rehbein & Borchers, 2009). The German nationwide study indicated that 3% of the entire sample was classified as at risk and 2% was classified as being dependent on video games. Also, there appeared a clear gender trend, with 91% of those with dependence being male. More specifically, 3% of male adolescents and 0.3% of female adolescents were diagnosed as dependent on playing video games, with 5% of males and 0.5% of females at risk of developing dependence (Rehbein, et al., 2010). Furthermore, using the cut-off point of 7 which includes both computer game abuse and addiction (i.e., dependence), it was reported that 9% of German children (Grüsser, et al., 2005) and 12% of Austrian children (Batthyány, et al., 2009) played computer games excessively. Of the latter, 10% were abusing computer games, whereas 3% were classed as dependent.

The primary motivation for playing video games was for coping with daily stressors (Batthyány, et al., 2009; Grüsser, et al., 2005). Psychosocial

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<sup>5</sup> Similar to Lin and Tsai's scale (1999) Hahn and Jerusalem's Internet Addiction Scale (2001) is a self-devised measurement instrument that is not identical to Young's Internet Addiction Test (1998b).

problems that were found to be related to excessive computer game use included increased social conflict, stress (Batthyány, et al., 2009), lower school achievement, increased truancy, and limited leisure time activities (Rehbein, et al., 2010). Moreover, related psychopathological problems and comorbidities comprised concentration deficits, psychosomatic challenge, school phobia (Batthyány, et al., 2009), reduced sleep time and increased thoughts of committing suicide (Rehbein, et al., 2010).

From these studies, it appears the symptoms of online gaming addiction in children and adolescents are commensurate with the official symptoms for substance dependence. The only distinguishing feature is the lack of the ingestion of a psychoactive substance for people suffering from Internet gaming addiction. Moreover, the only nationwide prevalence study conducted in Germany (Rehbein & Borchers, 2009) suggests that 2% of adolescents are addicted to playing online games. This demonstrates Internet gaming addiction appears to be a genuine health problem for youth on a relatively large scale. Furthermore, this is emphasized by the deleterious effect Internet gaming addiction has on adolescent health, including anxiety, psychosomatic, psychosocial and academic problems, and suicidal ideation.

*Internet gaming addiction based on the criteria for both pathological gambling and substance dependence*

Three studies made use of a classification framework based on self-devised scales combining both pathological gambling and substance dependence adapted criteria in order to diagnose potentially addictive Internet gaming behaviours. Salguero and Moran (2002) designed a 9-item scale that they cross-validated with results from the Severity of Dependence Scale (Gossop, et al., 1995) in a sample of 223 Spanish adolescents aged 13-18 years. They reported

that their Problematic Video Game Playing Scale measured a unidimensional construct, and had an acceptable internal consistency and good construct validity. Moreover, the authors concluded problem video game play is similar to the dependence syndrome (Salguero & Moran, 2002).

Similarly, Skoric et al. (2009) developed a scale based on the APA's (2000) criteria for pathological gambling and substance dependence as well as Danforth's classification of online game addiction (2003). The specific criteria included were behavioural salience, conflict, and withdrawal symptoms (based on Brown, 1991, 1993), as well as further unspecified DSM-IV symptoms (Skoric, et al., 2009). They used a sample of 333 elementary school video gamers from Singapore aged 8-12 years. The findings indicated Internet gaming addiction correlated negatively with performance in school. However, neither time spent playing games nor the engagement in games correlated with poor school performance (Skoric, et al., 2009), compromising predictive validity.

Bear et al. (2011) also created a scale that investigates both adolescents' and their parents' reports. It is based on criteria for Internet addiction for adolescents as proposed by Ko et al. (2005) and it includes the official criteria for impulse control and substance abuse disorder. The items specifically assessing addiction criteria include (i) a preoccupation with computer/gaming-station activities, (ii) a failure to resist the impulse to use, (iii) tolerance, (iv) withdrawal, (v) longer than intended use, (vi) unsuccessful efforts to cut down, (vii) excessive efforts put into trying to use, and (viii) continued use despite the knowledge that it causes problems. Bear et al.'s Computer/Gaming-station Addiction Scale (CGAS) (2011) investigates these criteria on a continuum with addiction scores ranging from 8 to 40 points. In order to assess the patterns of computer and gaming station use in youth, they surveyed 102 adolescents aged between 11 and 17 years and their parents. The results indicated the addiction score significantly correlated with higher difficulties experienced in life as well

as less prosocial behaviour as reported by both adolescents and their parents. Furthermore, the addiction score significantly correlated with functional impairments across multiple life domains, namely family, learning, life skills, self-concept, and social activity (Bear, Bogusz, & Green, 2011).

The studies included in this section highlight two important facts. First, although in all three cases the authors relied on both substance dependence and pathological gambling criteria in order to assess Internet gaming addiction, from the information provided it appears their focus was indeed on diagnostic criteria for substance dependence. To be more precise, Salguero and Moran (2002) specifically point out that Internet gaming addiction in adolescents is similar to the dependence syndrome, which indicates the former is a genuine addiction worthy of clinical management. Second, the studies were conducted in Singapore, Spain and Canada and therefore the results may have varied because of the sociocultural embedding of the participants in their respective home country. Consequently, it appears important to assess Internet gaming addiction in children and adolescents against the respective cultural context. Depending on the sociocultural context in which Internet gaming occurs, in addition to the connotations Internet gaming has, gaming practices, the prevalence of Internet gaming addiction, and Internet gaming addictions symptoms may differ. Internet gaming addiction assessment in children and adolescents requires assessment instruments commensurate with an official clinical diagnosis of the disorder, and pay respect to the cultures they are used in.

### *Internet gaming addiction based on parental reports*

In two studies, the psychopathological status of two cases of male adolescents addicted to Internet gaming was based on their parents' reports. Allison et al.



(2006) reported the case of an 18-year old male adolescent whose life, according to his parents, had been taken over by playing online role-playing games. The adolescent was sectioned into a psychiatric hospital by his parents where he underwent a variety of psychological and psychiatric assessments for three days, including an intelligence test, a personality test, and diagnostic and psychosocially based interviews. It was reported that he played online games for up to 16 hours a day. His primary motivation was to escape real life problems. His gaming resulted in a variety of psychosocial (limited real life social contacts, missing classes at school), psychosomatic (poor concentration, muscle tension), and psychopathological problems (diminished energy, fatigue) (Allison, et al., 2006). Similar results have been noted in case studies of adult excessive gamers (Griffiths, 2010b).

In a more unusual case, Cultrara and Har-El (2002) reported the account of a 17-year old male adolescent who, during video game play, continuously moved his lower jaw up and down, repeatedly grimaced and swallowed, and protruded and retracted his tongue. This resulted in muscle hypertrophy that was found to be secondary to the actual activity of his excessive video game playing. Once he stopped playing video games, the sub-mental mass that he had developed decreased in size (Cultrara & Har-El, 2002).

The above studies are significant for at least two reasons. First, they provide a qualitative account of how adolescents experience Internet gaming addiction as well as the symptoms associated with it. These in-depth insights not only provide a more elaborate description of individual experience, but they aid researchers in discerning what it actually means for adolescents to be addicted to playing online games. Second, the studies highlight the fact that for many children and adolescents, it is their parents who initially realize that their children's online gaming moves beyond pure enjoyment of playing and can become problematic. In fact, a recent study suggests contact with a specialised

treatment centre was initiated by mothers of potentially addicted adolescents in 86% of the cases (Beutel, Hoch, Wölfling, & Müller, 2011). This indicates parental referral is important for some adolescents who have not yet discerned that their behaviour may indeed be problematic. It also hints at the significance of social support particularly for young people because (i) they find themselves in critical periods of cognitive, behavioural, and social development in this specific stage of their lives, and (ii) they cannot overcome their problems by themselves and are thus in need of both social and professional assistance. Notwithstanding this, a professional evaluation of the situation and the adolescents' addiction status is an essential second step that may potentially lead to clinical treatment of Internet gaming addiction.

*Internet gaming addiction based on other miscellaneous classification criteria*

Four studies could not be categorized in any of the aforementioned frameworks. Each of these is addressed in turn. Chiu et al. (2004) aimed to assess video game addiction in 1,228 children and adolescents in grades 5-8 in Taiwan. They used the self-devised Game Addiction Scale (based on Buchman & Funk, 1996; Clymo, 1996) comprising a 9-item scale that assesses two factors, namely game addiction and game concern. The reported internal consistency has a Cronbach's alpha of 0.86. Unfortunately, from the information the authors provide in their paper, it is unclear how their term "video game addiction" was defined and what kinds of symptoms it included. Moreover, none of the referenced articles specifically addresses addiction and pathology. Nevertheless, they found video game addiction correlated negatively with academic achievement and positively with hostility. Furthermore, lower function, higher sensation seeking, and higher boredom inclination predicted game addiction. Counter-intuitively, female gender predicted game addiction (Chiu, et al., 2004).

Kim and Kim (2010) aimed to develop a measure of problematic online game use by identifying factors that underlie problematic online game use and to test the external validity of their scale by having three independent samples of 5<sup>th</sup>, 8<sup>th</sup> and 11<sup>th</sup>-graders in South Korea ( $N = 2,014$ ) participating in their survey. They devised the Problematic Online Game Use Scale (based on Armstrong, et al., 2000; Caplan, 2002; Charlton & Danforth, 2007; Lee & Ahn, 2002; Young, 1999) that assessed the following criteria: euphoria, health problem, conflict, failure of self-control, and preference for virtual relationships. They reported their scale had good reliability, and both convergent and discriminatory validity. Moreover, problematic online game use negatively correlated with academic self-efficacy and satisfaction with daily life and it positively correlated with anxiety and loneliness (Kim & Kim, 2010).

King and Delfabbro (2009a) investigated the psychological and social context of video game playing in order to understand excessive video game play using pilot group interviews with a sample of 23 adolescents ( $M = 16$ ,  $SD = 1$  year) and 15 adults. Their findings indicated online role-playing games were more rewarding and hence more addictive than casual games. In their paper, video game playing was defined as excessive when it “create[d] adverse personal and social consequences in a person’s life” (p. 62). As hypothesized, they found excessive video game players experienced a variety of problems, such as conflicts with important life responsibilities, they neglected their social relationships, their scholastic and professional productivity suffered, they ignored their household duties and they had irregular sleeping patterns (King & Delfabbro, 2009a).

Finally, Ko, Yen, Chen, Chen, and Yen (2005a) assessed gender differences and related factors affecting online gaming addiction among 221 Taiwanese adolescents aged 13 to 15 years ( $M = 13.8$ ,  $SD = 0.7$  years) by a survey. They used the Chinese Internet Addiction Scale (Chen, et al., 2003), a continuous measure

that includes 26 items to assess five dimensions of problems related to Internet use, adapted to measure online gaming experiences exclusively. Investigated Internet-related problems include compulsive use, withdrawal, tolerance, interpersonal relationships, health, and time management. Originally, the scale was found to have a good internal consistency with a Cronbach's alpha of 0.96 (Chen, et al., 2003). The findings indicate that males are significantly more likely to be addicted to playing online games. Moreover, for males, several other factors predicted online gaming addiction, namely older age, lower self-esteem, and lower daily life satisfaction (Ko, Yen, et al., 2005a).

Due to the fact that the aforementioned studies used miscellaneous classification frameworks, they will be evaluated in turn. As mentioned previously, Chiu et al.'s (2004) study suffered from a variety of methodological and conceptual problems, such as the omission of defining video game addiction. Moreover, the finding that female gender predicted addiction appears questionable since numerous studies indicate the opposite (e.g. Rehbein & Borchers, 2009). This suggests there may be some flaw in the analysis possibly related to the lack of sensitivity and specificity in the measure used. Alternatively, one could argue that female gender is likely to be a better predictor of certain aspects of addiction because it is less commonly associated with addiction. When male sex is commonly associated with addiction, it fails to discriminate features of addiction. In either case, these findings require further investigation.

Next, the particularly insightful aspect of Kim and Kim's study (2010) was their reliance on game-imminent factors. They designed a scale that specifically assessed Internet gaming addiction, such as a preference for virtual relationships. Although their scale has been validated in different samples, its utility as clinical assessment tool to clearly demarcate Internet gaming addiction from mere engagement (Charlton, 2002) has not been established yet.

With regards to the symptoms it assesses, it also appears questionable in how far euphoria can be used as an addiction symptom from a conceptual point of view. Specifically, it has been asserted that healthy enthusiasm adds to life whereas addiction takes away from it (Griffiths, 2002). This suggests that euphoria does not necessarily have to feature within an addiction framework, as suggested by Charlton and Danforth (2007). In sum, although Kim and Kim's study (2010) takes a definite approach with regards to the specifics of Internet game addiction as being entirely based on the virtual world, the respective criteria used for classifying online gaming addiction may prove less useful in a clinical context.

King and Delfabbro's interview study (2009a) indicated that adolescents that play online games excessively experience a variety of problems because of their game play. Nevertheless, in this study, no validated measurement tool was utilized to actually validate the participants' addiction status. Therefore, it appears relatively problematic to deduce implications for online gaming addiction and mental health status in adolescents from their study.

Finally, Ko et al.'s survey study (Ko, Yen, et al., 2005a) did not use an assessment instrument based on officially established diagnostic criteria. The criteria their measurement instrument uses were only loosely commensurate to substance dependence because criteria such as tolerance and withdrawal were included. It is unclear on what basis the other criteria haven been chosen and how online gaming addiction has been defined. No cut-off values are provided. Therefore, clinical diagnosis is not possible. The authors however contend that "[b]efore constructing specific diagnostic criteria, it would be practical to measure levels of addiction to Internet use with a multidimensional and continuous questionnaire such as the CIAS" (Ko, Yen, et al., 2005a, p. 277). However, they do not offer a reasonable explanation for why utilizing a continuous measure would make sense in the first place. Therefore, their logic

seems flawed and puts the use of the CIAS into question. Ultimately, assessments of online gaming addiction must go beyond the purpose of furthering research endeavors in the area by specifically targeting potential clinical practices. Only then can the individuals who suffer from a potentially debilitating mental disorder be heard and helped.

### **Discussion**

This systematic literature review provides important insights into the state of current knowledge of Internet gaming addiction in children and adolescents. From the identified empirical studies, it appears different classification schemes have been adopted, typically based on the official criteria for pathological gambling, substance dependence, or a combination of the two. Additionally, parents' reports and other miscellaneous criteria and assessment instruments have been used to determine Internet gaming addiction. The large majority of studies adapted pathological gambling criteria in order to assess the extent to which Internet gaming addiction is present in samples of children and adolescents. This appears acceptable since online gaming and online gambling share a variety of similar characteristics that have been extensively discussed in the psychological literature for over 20 years (Griffiths, 2005a; Johansson & Götestam, 2004). This indicates that monetary reward is not necessary in order to classify an excessive engagement with games as potential addiction and could potentially be substituted by a higher likelihood for risk-taking. Similarly, traditionally land-based gambling is gradually moving towards Internet portals (Kuss & Griffiths, 2012d) and there are now a number of overviews highlighting the convergence between Internet, gaming and gambling (e.g., Griffiths, 2008; King, Delfabbro, & Griffiths, 2010a). This suggests that the (potentially pathogenetic) Internet and gaming activities are progressively converging.

On the other hand, some researchers claim that the classification of behavioural addictions within the framework of pathological gambling appears relatively insufficient and it can have negative consequences for actual treatment when no use is made of therapy elements for patients suffering from substance dependence (Poppelreuter & Gross, 2000). In light of the diagnostic criteria for pathological gambling, impulsivity is the main distinguishing characteristic. However, this seems relatively inadequate because a deficiency in impulse control is also considered to be one of the main features of substance dependence (Volkow & Fowler, 2000). This indicates that applying knowledge from substance dependence treatments to treatments of behavioural addictions may actually be beneficial over and above treatment as usual for pathological gamblers. Similarly, the framework of behavioural addictions as based on its similarities with substance dependence seems particularly appealing as it entails the craving of behavioural addicts for engaging in their behaviour and it also includes the physical and psychological discomfort and irritability they experience when they cannot engage in the behaviour, which mirror both the symptoms of craving as well as withdrawal (Holden, 2001; Orford, 2001).

Furthermore, with behavioural addictions, it appears tolerance is another criterion not accounted for by a classification based on pathological gambling. However, tolerance seems to play an important role in behavioural addictions because addicts need to increase their engagement (i.e., the time and effort they invest in engaging in the activity) over the course of time in order to experience pleasurable effects, which may be seen as a homeostatic restoration of balance within the body (Grüsser & Thalemann, 2006). Thus, online gaming is used as a form of self-medication (Han, et al., 2009). With regards to excessive online gamers, both individual accounts of behaviours as well as empirical quantitative findings show as their addiction develops, Internet gaming addicts spend increasing amounts of time preparing for, organizing, and actually

gaming (Chan & Rabinowitz, 2006; Kim & Kim, 2010; King & Delfabbro, 2009a; Lemmens, et al., 2011b).

There is further evidence to suggest problematic online gaming be conceptualized as a behavioural addiction rather than a disorder of impulse control. From a clinical perspective, patients suffering from behavioural addictions present with problems that are similar to those experienced by people suffering from substance dependencies (Poppelreuter & Gross, 2000; Shaffer & Kidman, 2003). In comparison to the phaseology model of alcoholism (Jellinek, 1946), it appears those addicted to certain behaviours progress through different phases in their addiction as well, which was found to be true for pathological gamblers (Custer, 1987). This does not mean a behavioural addiction, such as Internet gaming addiction, should be classified in the same way pathological gambling is, namely within the spectrum of impulse control disorders. Instead, both Internet gaming addiction and pathological gambling appear to fit better within the classification akin to substance dependencies, namely behavioural addictions. This is furthermore supported by the APA's decision to include 'Gambling Disorder' in the category of substance-related and addictive disorders rather than impulse control disorders in the upcoming DSM-5 (Herold, et al., 2012). Viewing pathological gambling as an addictive disorder (i.e., a behavioural addiction) can therefore be seen as the first step towards a reconceptualization of both substance-related and substance-unrelated addictions as spectrum disorders, as suggested by Shaffer et al. (2004).

Another argument in favour of this conjecture relates to the high comorbidity rates of behavioural addictions with substance dependencies and vice versa (Poppelreuter & Gross, 2000). Similarly, comorbidities frequently experienced by substance users, such as affective and anxiety disorders as well as ADHD, are experienced by pathological online gamers (Kuss & Griffiths,



2012a). These comorbidities do not occur with persons who suffer from obsessive-compulsive disorders (Blanco, Moreyra, Nunes, Saiz-Ruiz, & Ibanez, 2001). Also, there are further similarities between substance dependence and several behavioural addictions, namely with regards to gender distribution as well as neuropsychology and neurocognition (Bechara, 2003; Rugle & Melamed, 1993). In terms of psychophysiology, there are additional analogies between substance dependence and pathological gambling (Reuter et al., 2005) and online gambling addiction (Han, Hwang, & Renshaw, 2010; Hoeft, Watson, Kesler, Bettinger, & Reiss, 2008; Ko, Liu, et al., 2009). With regards to molecular genetics, polymorphisms in the D2 dopamine receptor genes and the Val158Met in the Catecholamine-O-Methyltransferase (COMT) genes have been found in pathological gamblers (Blum, Wood, Sheridan, Chen, & Comings, 1995) and those addicted to online gaming (Han, et al., 2007). These findings clearly substantiate the contention that Internet gaming addiction may indeed be viewed as behavioural addiction.

Additionally, it has been reported that pathological gamblers and alcoholics share an “excessive attachment” to their addiction of choice (Orford, Morison, & Somers, 1996). Furthermore, Shaffer et al. (2004) contend that both behavioural and substance-related addictions share the same etiology, which is supported by Griffiths’ addiction components model (2005b), indicating that addictions develop as a consequence of biopsychosocial processes. That is, antecedents for addiction include neurobiological (i.e., genetic risk) and psychosocial elements (i.e., psychological and sociological risk factors) that all contribute to the vulnerability for developing addiction. In addition to this, exposure and interaction with the substance/behaviour of choice as well as a desirable shift in subjective state (i.e., the mood-modifying properties of the substance/behaviour) serve as further antecedents. Once biopsychosocial

events occur and the substance/behaviour is paired with a desirable shift repeatedly, addiction may be developed (Shaffer, et al., 2004).

The manifestations and sequelae shared between different addictions are related to the biological cluster (i.e., tolerance, withdrawal, neuroanatomical changes, and genetic expression), the psychological cluster (i.e., psychopathology and comorbidity), the social cluster (i.e., deviant behaviours, social drift), natural history (i.e., exposure, relapse, sequencing of recovery), treatment non-specificity (i.e., psychopharmacological or cognitive-behavioural therapy), and object substitution (i.e., replacing the addiction of choice with another addiction). On the other hand, addictions differ in their expression (i.e., substance-related versus behavioural) and their unique manifestations and sequelae. For instance, drinking alcohol can lead to liver cirrhosis, whereas pathological gambling can lead to financial debt. In sum, the similar etiology of addictions indicates that instead of viewing respective addictions as separate pathological entities, they are better viewed as a syndrome (Shaffer, et al., 2004). This gives strong support to the conjecture that pathological Internet gaming should be understood as behavioural addiction rather than an impulse-control disorder.

With regards to children and adolescents who are potentially vulnerable to becoming addicted to playing online games, classification is essential because it will help to develop and initiate prevention efforts. Only when Internet gaming addiction is more clearly and comprehensively understood, can risk variables be targeted and protective factors fostered from a mental health point of view and on a large scale. Among groups of young people, prevention efforts may include both psycho-education as well as provision of information and tools that focus on developing healthy ways of coping with daily stressors. The earlier preventive efforts are initiated, the greater the chance that children and

adolescents are protected from the dangers and ramifications of Internet gaming addiction.

The included studies suffer from a variety of limitations. A major limitation is the frequent lack of sensitivity and specificity of measures used. On the one hand, it appears difficult to judge the extent to which the assessment tools utilized are sensitive enough to actually determine Internet gaming addiction status. On the other hand, it seems questionable in how far the measurement instruments identify adolescents who are not addicted to online gaming, therewith limiting their specificity. In addition to this, the almost exclusive utilization of self-report measures calls into question the accuracy of diagnosis. Psychological and psychiatric assessments as well as parental reports appear to be indispensable complements for judging whether and to what extent a child or adolescent is actually addicted to online gaming particularly in light of a variety of symptoms that are commonly experienced comorbidly.

Another problem that materialized with the majority of identified studies was the utilization of small, specified, self-selected, and/or mixed samples. Small samples are not representative of whole populations and therefore establishing representative prevalence estimates is difficult. Furthermore, if samples are particularly specified (i.e., using a limited age group in a particular country, etc.), the participants' responses cannot be generalized to larger populations either. The opposite problem occurs if samples are mixed. It is unclear to what extent the findings can be generalized to specified populations. Self-selected samples comprise only those people who were enthused enough to participate and therefore these samples are somewhat unrepresentative of most target populations. In addition, research in the field calls for studies that assess Internet and gaming addiction in different cultures because by comparing and contrasting the disorder within diverse sociocultural contexts, the differences and similarities can be discerned and treatment approaches can

be tailored to the respective needs of particular cultural groups. In order to overcome these problems, in the empirical Chapters four to seven, two independent samples from two European countries will be used.

Conclusively, establishing a nosology of Internet addiction satisfies two crucial aims. First, it enables the actual classification of the disorder within the classification systems. Second, it allows for the appropriate choice of relevant psychotherapeutic and/or psychopharmacological treatments (Du, Jiang, & Vance, 2010; Griffiths & Meredith, 2009; Lee & Mysyk, 2004). As long as there is no coherent diagnostic framework upon which to base Internet addiction diagnosis, not only does conceptual confusion ensue, but both further research endeavours as well as potential treatment plans are seriously complicated. Prevention efforts may be developed that specifically target children and adolescents who appear to be particularly at risk for developing Internet addiction as well as associated developmental problems and disorders. Moreover, awarding Internet addiction with an official status as mental disorder will enable diagnosis, communication about, study, treatment and prognosis of this psychopathology (Kemper, 2008; Springer, 2009; te Wildt, 2009). Having shed light upon the extant literature on Internet gaming addiction in children and adolescents, in the next section, the adult literature will be paid particular attention to.

## CHAPTER 3

# Internet Gaming Addiction in Adults: A Systematic Review of Empirical Research

### Introduction

As the previous chapters have indicated, in the last decade, research on Internet addiction and Internet gaming addiction has proliferated. A relatively large number of studies were published, addressing topics as diverse as classification, etiology, and phenomenology of this behavioural addiction. There have also been recent reviews on whether the concept of Internet gaming addiction is even a valid concept (e.g., Griffiths, 2010b), but such debate is not the focus of this chapter. Because the current scientific knowledge of Internet gaming addiction is copious in scope and appears relatively complex, this literature review attempts to reduce this confusion by providing an innovative framework by which all the studies using adult samples to date can be categorized.

### Methods

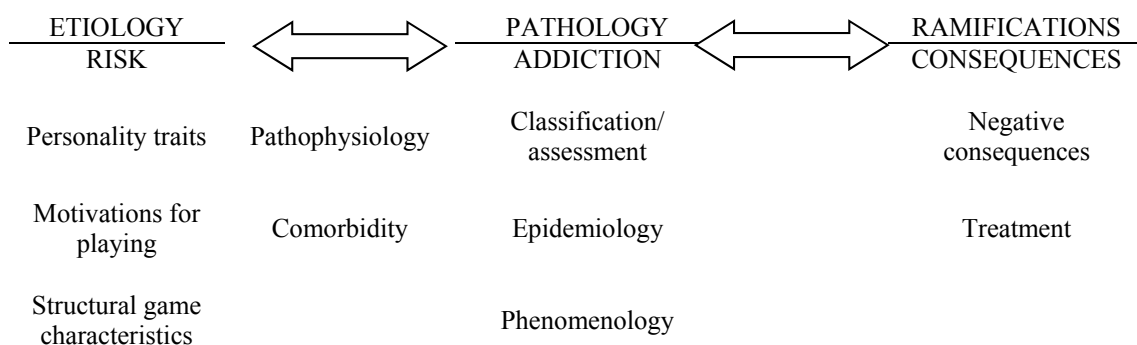
A comprehensive literature search was conducted using the database *Web of Knowledge*. The following search terms (and their derivatives) were entered in relation to online video gaming: 'excessive', 'problematic', 'compulsive', and 'addictive'. In addition, further studies were identified from supplementary sources, such as *Google Scholar*, and these were added in order to generate a more inclusive literature review. Studies were selected in accordance with the following inclusion criteria. Studies had to (i) contain empirical data (including

everything from case studies through to surveys with thousands of participants), (ii) use adult samples, (iii) have been published after 2000 (as there were no studies on this topic prior to that date), and (iv) contain some kind of analysis relating to Internet gaming addiction. If studies referred to gaming addicts without specifying whether these were online and/or offline gamers, due to online games' popularity it was assumed that at least some of the participants were online gamers and therefore these studies were included in the review.

### Results

Three main categories of studies were identified, namely those concerned with (i) etiology, (ii) pathology and (iii) ramifications of Internet gaming addiction. Each of these also contained sub-topics that are conceptualized in the schematic framework in Figure 1. The findings within each of these categories are described. This is followed by an evaluation of these studies in the final section of the paper.

Figure 1  
*The Continuum of Internet Gaming Addiction*



Based upon the scientific empirical literature, it is argued that Internet gaming addiction appears to follow a continuum, with antecedents in etiology and risk

factors, through to the development of a “full-blown” addiction, followed by ramifications in terms of negative consequences and potential treatment. These stages are interdependent as the risk factors influence the pathogenesis of addiction and the latter may similarly reinforce the former. Likewise, addiction leads to clinically significant negative consequences for the individual, which in turn may augment the pathological status of the former, requiring the individual to seek professional treatment.

This conceptual framework is further developed by drawing upon the relevant studies identified from the empirical literature. It should also be noted that only a small number of the studies exclusively fell within only one of the main categories and the associated sub-categories. Accordingly, many of the studies listed below are included in more than one of the sub-categories. Likewise, the sub-categories of psychophysiology and comorbidity were not placed in one of the main three categories, because they appeared to more closely resemble the intersection between the etiology and pathology of Internet gaming addiction.

### *Etiology/risk*

A number of studies have focused on illuminating the etiology of, and specifying risk factors for, Internet gaming addiction. These include internal factors, namely personality traits and motivations for playing, as well as an external factor, the structural game characteristics. Each of these is dealt with below.

*Personality traits*

The first internal risk factor identified in the review was personality traits of gamers, which has been investigated in eight studies. The methodologies employed ranged from a case study of an 18-year old gamer (Allison, et al., 2006) over undergraduate students (Chumbley & Griffiths, 2006; Mehroof & Griffiths, 2010), to large samples of MMORPG players (Caplan, Williams, & Yee, 2009; Kim, Namkoong, Ku, & Kim, 2008; Peters & Malesky, 2008), and an unspecified sample of video gamers (Porter, Starcevic, Berle, & Fenech, 2010).

Personality traits were assessed using a variety of measures, including the Minnesota Multiphasic Personality Inventory (Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989), the Eysenck Personality Questionnaire (Eysenck & Eysenck, 1996), the NEO Personality Inventory (Costa & McCrae, 1985), the Buss-Perry Aggression Questionnaire (Buss & Perry, 1992), the Narcissistic Personality Disorder Scale (Hwang, 1995), the Self-Control Scale (Tangney, Baumeister, & Boone, 2004), self-efficacy (based on Muris, 2001; Sherer et al., 1982), and the Arnett Inventory of Sensation-Seeking (Arnett, 1994).

In terms of the results, the following personality traits were found to be significantly related to Internet gaming addiction: avoidant and schizoid interpersonal tendencies (Allison, et al., 2006), loneliness and introversion (Caplan, et al., 2009), social inhibition (Porter, et al., 2010), aggression and hostility (Caplan, et al., 2009; Kim, Namkoong, et al., 2008; Mehroof & Griffiths, 2010), sensation-seeking (Mehroof & Griffiths, 2010), diminished self-control and narcissistic personality traits (Kim, Namkoong, et al., 2008), neuroticism (Mehroof & Griffiths, 2010; Peters & Malesky, 2008), state and trait anxiety (Mehroof & Griffiths, 2010), and diminished agreeableness (Peters & Malesky, 2008). In summation, Internet gaming addiction appears to be accompanied with a variety of personality traits, which can be subsumed under the key characteristics of introversion, neuroticism and impulsivity. However, it must



be noted that the personality traits that appear to have an association with Internet gaming addiction may not be unique to the disorder (i.e., they might be relevant for addictions to other online applications), and therefore until further research has been undertaken, it is hard to assess the etiological significance of such findings. The empirical studies in Chapters four, five and seven will therefore specifically address the relationship between the usage of specific Internet applications, personality traits and Internet addiction risk.

#### *Motivations for playing*

A number of motivations for playing that put a player at risk for Internet gaming addiction were identified from the literature. In total, ten studies were identified. These included qualitative studies of MMORPG players (Beranuy, Carbonell, & Griffiths, 2012), and both adolescent and adult gamers (King & Delfabbro, 2009a). Quantitative studies included large samples of MMORPG players (Caplan, et al., 2009; Hussain & Griffiths, 2009b; Ng & Wiemer-Hastings, 2005), online game players (Lu & Wang, 2008), video game players (King & Delfabbro, 2009b; King, Delfabbro, & Griffiths, 2011), both adolescents and MMORPG players (Wan & Chiou, 2006a), and college students (Hsu, et al., 2009). Apart from the specification of MMORPGs as game genre a number of participants were playing as mentioned above, in the other studies no explicit reference to game type was discernible.

Motivations for playing were assessed by the following means: semi-structured interviews (Beranuy, et al., 2012; King & Delfabbro, 2009a) as well as theoretical frameworks (Choi, et al., 2000; Myers, 1990; Williams, Yee, & Caplan, 2008). In addition to this, a number of assessment instruments were used, namely an adapted version of the Exercise Addiction Inventory (Terry, Szabo, & Griffiths, 2004), the Video Game Playing Motivation Scale (PVGT; based on

Young, 1998b), and the Two-Factor Evaluation on Needs for Online Games (TEN0; Wan & Chiou, 2006a).

The results of the studies indicated that Internet gaming addiction is related to the following motivations for playing: coping with negative emotions, stress, fear and escape (Hussain & Griffiths, 2009b; King & Delfabbro, 2009b; Ng & Wiemer-Hastings, 2005; Wan & Chiou, 2006a), dissociation (Beranuy, et al., 2012), virtual friendship/relationships (Beranuy, et al., 2012; Caplan, et al., 2009; Hsu, et al., 2009; King & Delfabbro, 2009b; Ng & Wiemer-Hastings, 2005), entertainment (Beranuy, et al., 2012), playfulness and loyalty (Lu & Wang, 2008), empowerment, mastery, control, recognition, completion, excitement and challenge (King & Delfabbro, 2009a; King, Delfabbro, & Griffiths, 2011), curiosity and obligation (Hsu, et al., 2009), reward (Hsu, et al., 2009; King, Delfabbro, & Griffiths, 2011), and immersion (Caplan, et al., 2009). In summation, it appears that it is particularly motivations related to dysfunctional coping, socialization and personal satisfaction that serve as risk factors for developing Internet gaming addiction.

#### *Structural characteristics of the game*

Certain structural characteristics of the game itself are thought to make playing online games particularly appealing to persons who play excessively. A total of four studies were identified that have analysed such characteristics. The samples included in the studies were MMORPG players (Smahel, Blinka, & Ledabyl, 2008), video game players (King, Delfabbro, & Griffiths, 2011), and students within different stages in their education (Chumbley & Griffiths, 2006; Thomas & Martin, 2010). Again, for the last two participant groups, no specification with regards to game genre was referred to.

The methods employed to investigate structural characteristics of the game included: high and negative reinforcement of play via the game's structural characteristics as based on the skill for playing required and investigated via self-report, as well as affective and playability measurements scored on Likert scales (Chumbley & Griffiths, 2006), the Video Game Structural Characteristics Survey (King, Delfabbro, & Griffiths, 2011), questions about the relationship of the gamers to their virtual characters (Smahel, et al., 2008), and game addiction with regards to different game genres (Thomas & Martin, 2010).

The results indicated that structural characteristics of games appear to be related to addiction. More specifically, Internet games and arcade games were found to be more addictive than offline video games although these three different types of games were inadequately defined by the authors particularly in relation to Internet games (Thomas & Martin, 2010). Moreover, it has been found that structural characteristics affect players' mood. That is, negative reinforcement led to frustration, whereas positive reinforcement resulted in game persistence, hypothetically allowing to link positive reinforcement to addiction (Chumbley & Griffiths, 2006). In addition to this, particular game features were enjoyed significantly more by addicted players, namely adult content, finding rare in-game items, and watching videogame cut-scenes (King, Delfabbro, & Griffiths, 2011). Finally, addicted players appeared to be particularly proud of their avatars, i.e., they wanted to be like their virtual characters, and viewed the latter as superior compared to themselves (Smahel, et al., 2008). In summation, certain structural characteristics of Internet games appear to put players at risk for developing an addiction to these games. Most notably, Internet games constructed in such a way so as to reinforce playing by various means appear to have a higher addictive potential than those that do not contain these structures, such as offline games.

### *Pathophysiology*

Pathophysiology is one of the sub-categories that falls between etiology and pathology of Internet gaming addiction and thus it represents an aspect of the intersection between risk factors and the actual development of pathological behaviours and cognitions. Several studies have assessed the relationship between Internet gaming addiction and physiology. In total, four such studies were identified. With regards to methods and participants, these studies included gaming addicts and healthy controls (Han, et al., 2010; Ko, Liu, et al., 2009; Thalemann, Wölfling, & Grüsser, 2007), as well as a student sample (Hoeft, et al., 2008).

The associations between Internet gaming addiction and physical problems were assessed by functional Magnetic Resonance Imaging (fMRI; Han, et al., 2010; Hoeft, et al., 2008; Ko, Liu, et al., 2009), and electroencephalography (EEG; Thalemann, et al., 2007). The results of the fMRI studies conducted revealed that during computer game cue presentation, gaming addicts showed similar neural processes and increased activity in brain areas associated with substance-related addictions and other behavioural addictions, such as pathological gambling. Significantly stronger activation in addicts relative to healthy controls was found in the left occipital lobe, parahippocampal gyrus, dorsolateral prefrontal cortex, nucleus accumbens, right orbitofrontal cortex, bilateral anterior cingulate, medial frontal cortex, and the caudate nucleus (Han, et al., 2010; Hoeft, et al., 2008; Ko, Liu, et al., 2009). Moreover, the gaming addicts' emotional processing of game-relevant cues was found to be increased relative to that of casual gamers (Thalemann, et al., 2007).

However, it must also be noted that although gaming addicts displayed stronger activation compared to non-addicts in these studies, the question

remains as to whether this is specific to gaming addiction, or general to any Internet activity that generates arousal, and whether these findings reflect causes or effects. Based on the studies presented here, it cannot be proved that the findings reported attest to the severity of the mental health problem if effects found are the result of exposure, anymore than differences in dopaminergic activity between drug and non-drug users attest to the severity of mental health problems for society at large. Despite such limitations, these studies appear to show that neither the causes nor the consequences of Internet gaming addiction are restricted to psychosocial factors. More specifically, the results of scientific studies demonstrate that Internet gaming addiction is associated with a wide variety of physiological, biochemical and neurological aberrations from the norm. This attests to the apparent severity of this mental health problem for society at large.

### *Comorbidity*

Comorbidity was found to be one of the two categories that the current scientific literature focuses on that cannot adequately be subsumed under one of the main categories presented in the framework. The occurrence of further (sub)clinical symptoms can be a risk factor for Internet gaming addiction as well as an accompanying condition in such a way that they are interdependent. Therefore, in this review no claims regarding the direction of relationship are made.

Two studies assessing Internet gaming addiction and its comorbidity were identified using the case of an 18-year old gamer (Allison, et al., 2006), and online gamers (Peng & Liu, 2010). Internet gaming addiction was found to be associated with symptoms of generalized anxiety disorder, panic disorder, depression, social phobia, and ADHD (Allison, et al., 2006; Peng & Liu, 2010). These results reflect some of the findings of the section concerned with

personality traits in that some of the latter may demarcate premorbid levels of diagnosed pathology.

### *Pathology/addiction*

Several studies have assessed pathological characteristics of addiction to Internet gaming. This section is subdivided into three sub-categories, namely the classification and assessment, epidemiology and phenomenology of Internet gaming addiction.

#### *Classification/assessment*

A total of four studies focusing on the classification and assessment of Internet gaming addiction were identified. In terms of methodology, two case studies of male online gamers were included (Griffiths, 2010b), large samples of adult MMORPG players (Charlton & Danforth, 2007), student and non-student video game players (King, Delfabbro, & Zajac, 2011), and high school students (Kim & Kim, 2010).

In each of the studies, different terminologies were applied for similar phenomena, ranging from problem video game playing (King, Delfabbro, & Zajac, 2011) and problematic online game use (Kim & Kim, 2010) to online gaming addiction (Charlton & Danforth, 2007; Griffiths, 2010b). Similarly, a variety of measurement instruments was used in order to assess the specified problematic/addictive behaviours, namely the Problematic Video Game Playing Test (adapted from Young, 1998b), the Problematic Online Game Use Scale (Kim & Kim, 2010), the Addiction-Engagement Questionnaire (modified from Charlton, 2002), and the Game Addiction Scale (based on Lemmens, et al., 2009).

The results of the studies indicate that Internet gaming addiction appears to be a viable construct worthy of individual and independent investigation. Furthermore, it was emphasized that addiction cannot be equated with problematic use. Some of the studies suggest that problematic game playing lies on a continuum towards addiction, as it can result in addiction symptoms, namely salience, mood modification, tolerance, withdrawal, conflict, and relapse (Griffiths, 2010b; King, Delfabbro, & Zajac, 2011). Others adopt more detailed approaches to classification, claiming that problematic use is characterized by investing much time and energy in the game, euphoria, tolerance, denial, and a preference for online relationships (Kim & Kim, 2010). This finding is in line with the result that addiction core criteria (conflict, withdrawal symptoms, relapse, reinstatement, and behavioural salience) must be distinguished from peripheral criteria (cognitive salience, tolerance, and euphoria), for only the former were found to load on an addiction factor (Charlton & Danforth, 2007). In a similar vein, it was found that addiction does not equal excessive engagement: Only when significant negative consequences of excessive gaming occur can one speak of an addiction (Griffiths, 2010b). A more detailed evaluation of this finding will take place in the discussion.

### *Epidemiology*

From the literature, six studies were identified assessing the prevalence of Internet gaming addiction. The following samples were included: 2,031 secondary, college and university students (Thomas & Martin, 2010), 7,069 gamers with a mean age of 21 years (Grüsser, Thalemann, & Griffiths, 2007), 91 MMORPG and offline game players (Ng & Wiemer-Hastings, 2005), 1,945 video gamers predominantly below thirty years (Porter, et al., 2010), and 30,000 MMORPG players (Yee, 2006a, 2006b). The prevalence of Internet gaming

addiction was assessed with the measures referred to in the sections on motivations for playing and classification/assessment.

The results of the studies indicate that approximately four percent of students met the criteria for addiction to video arcade games, and 5% for computer games and the Internet respectively (Thomas & Martin, 2010). The studies including gamers specifically reveal higher prevalence rates. Problematic gaming behaviours were present in 8% of video gamers (Porter, et al., 2010). Other researchers claimed that 12% of online gamers met at least three criteria for addiction (Grüsser, Thalemann, et al., 2007). In addition to this, the findings suggest that 12% of MMORPG players preferred to talk to people in game rather than in real life and were happier in game than anywhere else (Ng & Wiemer-Hastings, 2005). Furthermore, 8% of MMORPG players spent a minimum of 40 hours in game per week, 61% spent a minimum of ten hours in game continuously, 30% stayed in game although they did not enjoy it, 18% experienced academic, health, financial or relationship problems, and 50% considered themselves to be addicted (Yee, 2006a, 2006b). Nevertheless, although a number of studies have assessed the prevalence of Internet gaming addiction, they used dissimilar assessment instruments as well as cut-offs and included diverse participant groups. This may explain the large variability in prevalence percentages. Therefore, the quoted results do not allow for making definite overall claims with regards to epidemiology at this point in time.

### *Phenomenology*

Nine studies have investigated the experience of Internet gaming addiction from a phenomenological perspective. The methodologies used were qualitative, including a case study of an adolescent excessive MMORPG player (Allison, et al., 2006), and 12 *Everquest* players (Chappell, Eatough, Davies, &



Griffiths, 2006), and quantitative, including 442 adult MMORPG players (Charlton & Danforth, 2007), adults (Chou & Ting, 2003; Hussain & Griffiths, 2009a), adult and teenage online gamers (Rau, et al., 2006), students (Seah & Cairns, 2007; Wood & Griffiths, 2007), and 16-24-year old adolescents and MMORPG players (Wan & Chiou, 2006a).

The experiences of different aspects of Internet gaming addiction were assessed using different methodologies, such as psychiatric interviews (Allison, et al., 2006), and in-depth interviews assessed with interpretative phenomenological frameworks (Chappell, et al., 2006). In addition to this, several studies have assessed flow experience (Chou & Ting, 2003; Wan & Chiou, 2006a), immersion (Seah & Cairns, 2007) and associated time loss (Rau, et al., 2006; Wood & Griffiths, 2007) during game-play quantitatively, as based on Csikszentmihalyi's conceptualization of flow (1990). Finally, the Addiction-Engagement Questionnaire (modified from Charlton, 2002) has also been used.

The results suggest that Internet gaming addiction is associated with large amounts of time, i.e., up to 16 hours per day, spent in game, lack of sleep and a shortage of social and romantic contacts (Allison, et al., 2006). Moreover, it is experienced similarly to any other substance-related addiction (Hussain & Griffiths, 2009a), in such a way that salience, mood modification, conflict, withdrawal symptoms, cravings and relapse occurred (Chappell, et al., 2006; Charlton & Danforth, 2007). In terms of flow and associated experiences, the studies found that the experience of flow and in-game immersion was associated with addiction (Chou & Ting, 2003; Seah & Cairns, 2007). Another study found that it was game novices who experienced more flow when playing for about one hour, whereas for expert players it took longer to experience flow (Rau, et al., 2006). In line with this and contrary to the results of the above mentioned studies, it was also found that flow negatively correlated with addictive inclination (Wan & Chiou, 2006a). Furthermore, it has also been found

that the experience of time loss does not necessarily precipitate addiction (Wood & Griffiths, 2007). These findings will be evaluated in the discussion.

### *Ramifications*

Several studies have assessed the ramifications of Internet gaming addiction. These can be summarized primarily as negative consequences that may require professional treatment. These topics are dealt with below.

#### *Negative consequences*

Twelve studies have highlighted the negative consequences of Internet gaming addiction beyond the comorbidities outlined earlier. These have been investigated in teenagers and adults (Allison, et al., 2006; King & Delfabbro, 2009a), MMORPG players (Griffiths, Davies, & Chappell, 2004; Grüsser, Thalemann, et al., 2007; Hussain & Griffiths, 2009b, 2009a; Liu & Peng, 2009; Peng & Liu, 2010; Peters & Malesky, 2008; Yee, 2006b, 2006a), and epilepsy patients (Chuang, 2006). The negative consequences were assessed via a variety of psychological tests and psychiatric interviews, academic achievement, EEG, MRI, asking what was sacrificed for gaming, the psychosocial context of gaming behaviour, social competence, preference for a virtual life, relationship formation, the Questionnaire for Differentiated Assessment of Addiction (Grüsser, Wölfling, Duffert, & et al., 2007), UCLA Loneliness Scale (Russell, 1996), the Exercise Addiction Inventory (adapted from Terry et al., 2004), the Negative Life Consequences Scale (Liu, Ko, & Wu, 2008), the Generalized Problematic Internet Use Scale (Caplan, 2002), the social control subscale of the Social Skill Inventory (Riggio, 1989), and the CES Depression Scale (Mirowsky & Ross, 1992).

The results of these studies show that Internet gaming addiction can lead to a wide variety of negative consequences. These include psychosocial problems, namely an obsession with gaming, no real life relationships (Allison, et al., 2006), maladaptive coping (Hussain & Griffiths, 2009b, 2009a), sacrificing hobbies, sleep, work, education, socializing, time with partner/family as well as associated problems (Griffiths, et al., 2004; King & Delfabbro, 2009a; Liu & Peng, 2009; Peng & Liu, 2010; Peters & Malesky, 2008; Rehbein, et al., 2010; Yee, 2006b, 2006a), dissociation (Hussain & Griffiths, 2009a), and maladaptive cognitions (Peng & Liu, 2010). Moreover, psychosomatic problems were found to be consequences of Internet gaming addiction. These included seizures (Chuang, 2006), and sleep abnormalities (Allison, et al., 2006). Altogether, the relatively long list of potential negative consequences clearly indicates that Internet gaming addiction is a phenomenon that cannot be taken lightly and deserves more extensive recognition.

#### *Treatment*

Two studies have particularly assessed the treatment of Internet gaming addiction. These studies included a qualitative analysis of nine male MMORPG addicts aged 16-26 years (Beranuy, et al., 2012), and a comparative study of video game addicts and healthy controls between 17 and 29 years of age (Han, et al., 2010). With regards to methodology, one investigation (Beranuy, et al., 2012) was a descriptive analytic-relational study using semi-structured interview protocols including questions on sociodemographics, family, reasons for therapy, relationships, game usage, and symptom exploration. Its aim was to explore addictive playing of MMORPGs in players undergoing treatment for their gaming addiction. Another study (Han, et al., 2010) was experimental, using fMRI for assessing brain activation during game cue exposure in addicts compared to healthy controls, as well as psychometric measurements,

including the Internet Addiction Test (Young, 1998b), Beck's Depression Inventory (Beck & Steer, 1993), and the structured clinical diagnostic interview (First, et al., 1996; First, Gibbon, Spitzer, Williams, & Benjamin, 1997). Its aim was to investigate the effects of bupropin sustained release treatment on Internet video game addicts.

The results demonstrated that Internet gaming addiction develops as playing times increase significantly, as loss of control, a narrow behavioural focus and serious life conflicts appear. Moreover, the addiction symptoms were similar to those experienced by persons addicted to substances, including salience, mood modification, loss of control, craving, and serious adverse effects, and a variety of further psychosocial problems (Beranuy, et al., 2012). Furthermore, following a six-week period of psychopharmacological treatment, craving for Internet video game play as well as brain activities associated with addictions in Internet video game addicts were significantly decreased, while daily life functioning was increased (Han, et al., 2010). The efficacy of psychopharmacological treatment for treating Internet gaming addiction once again highlights the biochemical underpinnings of this disorder. This demonstrates not only that Internet gaming addiction is a potential mental health concern worthy of treatment, but also that this treatment may alleviate a wide variety of psychosocial problems as a result of the addiction to playing these games.

### **Discussion**

This systematic review has demonstrated that research into Internet gaming addiction has proliferated over the last few years. From the published studies, it appears that the current scientific knowledge of Internet gaming addiction can be categorized into etiology, pathology, and associated ramifications. In

terms of etiology, it would appear that personality traits, motivations for playing, and the structural characteristics of the games are of particular importance. Furthermore, pathophysiology and comorbidity appear to be intersections between risk factors and the actual development of pathological behaviours and cognitions. The analysis of pathology itself can be furthermore subclassified into its assessment and addiction classification, as well as epidemiology and phenomenology. Finally, the ramifications of Internet gaming addiction were found to be negative consequences, which allow for the behaviour to be classified as pathological as based on established clinical standards (American Psychiatric Association, 2000). In line with this, Internet gaming addiction may require professional treatment.

On a neuronal and biochemical level, Internet gaming addiction appears to be similar to other substance-related addictions, thus supporting the assumption that it is an addiction, albeit a behavioural one, like gambling addiction (Batthyány & Pritz, 2009; Grüsser & Thalemann, 2006). Firstly, the studies presented suggest that Internet gaming addicts' brains react to game-relevant cues the way that substance addicts' brains react to rewards associated with substance-related addictions (Kalivas & Volkow, 2005; Knutson & Cooper, 2005). Secondly, the efficacy of psychopharmacological interventions that may alleviate Internet gaming addiction symptoms support its biochemical, cognitive, and behavioural basis. To summarize, Internet gaming addiction is a behavioural addiction that appears to be similar to substance-related addictions and thus it supports the idea of a syndrome model of addiction. Put simply, Shaffer et al. (2004) suggest that each addiction – whether it be to gambling, drugs, sex, or the Internet – might be a distinctive expression of the same underlying syndrome (i.e., addiction is a syndrome with multiple opportunistic expressions). These findings emphasize the pathological status of Internet

gaming addiction and demarcate the latter as a mental health concern that is increasingly gaining recognition.

Another aspect that deserves closer scrutiny is the dissimilarity of findings with regards to whether (and in how far) flow experience is associated with addiction to Internet games. Studies are ambiguous in suggesting that flow correlates with addiction, as some seem to suggest a relationship (Chou & Ting, 2003; Seah & Cairns, 2007), whereas other findings imply the opposite (Wan & Chiou, 2006b; Wood & Griffiths, 2007). From a theoretical perspective, flow is characterized as an optimal experience (Csikszentmihalyi, 1990). No one would disagree with the fact that addiction is anything but optimal. Therefore, being addicted to the flow state experienced during Internet gaming may carry with it the problems that addiction implies. The dissimilarity between the findings may be explained by different conceptualizations of addiction employed in such a way that excessive engagement is equated with pathology. However, it has been shown that a distinction between excess and addiction makes sense from a scientific point of view (Charlton & Danforth, 2007; Griffiths, 2010b).

Against this background, it seems likely that excessive players experience flow because their game playing is principally characterized by excitement and challenge (Wan & Chiou, 2006b), which lies at the heart of flow experience. Flow occurs when a person is absorbed by a task in which the task's level of challenge and the individual's skill are matched (Csikszentmihalyi, 1990). Contrary to this, it seems unlikely that addicted players experience flow, for they tend to continue playing although they do not enjoy it (Yee, 2006b, 2006a), which attests to the compulsiveness of their behaviours. Therefore, it appears probable that addicts have already left the flow experience behind. This provides additional support to the idea that some players who engage in Internet gaming excessively can develop a full-blown addiction to it.

From the studies reviewed, it furthermore appears that MMORPG players particularly experienced symptoms associated with addiction, such as tolerance, mood modification, and negative psychosocial consequences, and half of them acknowledged that they were addicted to playing these games. In comparison to the general population of youth and young adults, it may be deduced that the prevalence of Internet gaming addiction is relatively high in the collective population of the MMORPG players that were included in the studies referenced. It has also been claimed that “MMOGs are particularly good at simultaneously tapping into what is typically formulated as game/not game, social/instrumental, real/virtual. And this mix is *exactly* what is evocative and hooks many people” (Taylor, 2006, pp. 153-154). This emphasizes the importance of the particular game genre’s structural characteristics in the etiology of Internet gaming addiction, which may necessitate further scientific exploration, particularly in light of other Internet applications which might offer similar or alternative benefits. In line with this, Chapters four and five will assess the risk the excessive engagement in various Internet applications poses with regards to the potential development of Internet addiction.

It should also be noted that there are different cultural and social factors associated with the environment that participants were recruited from in various studies that are outlined in this review. This could be highly relevant given that many studies on Internet gaming have been conducted in South East Asian countries where the social infrastructure fosters the promotion of professional competitions located in large venues that include social interactions among players, or where strong ego and image identities are derived from public recognition of gaming skills.

With regards to psychopathological status, it seems fruitful to distinguish between excessive engagement and addiction as suggested by past research (Charlton & Danforth, 2007). This is a requirement particularly when taking

into consideration the context of the APA's definition of what constitutes a mental disorder worthy of professional treatment. According to the APA, a mental disorder is a "clinically significant behavioural or psychological syndrome or pattern that occurs in an individual and that is associated with present distress (...) or disability (i.e., impairment in one or more important areas of functioning) or with a significantly increased risk of suffering death, pain, disability, or an important loss of freedom" (American Psychiatric Association, 2000, p. xxxi). Accordingly, only when the condition is experienced as significantly impairing can one speak of an addiction, which is clearly not the case for excessive gamers who enjoy themselves while playing their games and for whom their gaming does not result in significant negative consequences. In line with this, researchers must be cautious in deploying the label "addiction" for it does not merely denote the extreme utilization of substances or engagement in certain behaviours, but it demarcates a genuine mental health problem. For that reason, research must properly investigate addiction in order to make sure that the identification of pathology is commensurate with clinical parlance. In order to situate Internet addiction within the context of clinical practice, the final empirical chapter, Chapter eight, will investigate the clinical practitioner's experience of the presenting problem of Internet addiction.

Throughout the three introductory chapters, it has been highlighted that there exists a lack in our current knowledge about Internet addiction. No study has yet assessed the interplay between certain personality traits and the usage of specific Internet applications in contributing to an elevated risk of Internet addiction. Moreover, no research has as yet explored the experience of the presenting problem of Internet addiction as viewed from the perspective of the psychotherapist. This doctoral research project therefore aims to address these



issues, by providing answers to the following questions and aims in the respective empirical chapters:

1. How common is it? The aim is to assess the prevalence of Internet addiction (Chapters 4 and 5).

2. Who has it? The aim is to discern the risk factors associated with Internet addiction (Chapters 4 and 5).

3. How can it be conceptualised? The aim is to develop and test a model for Internet addiction (Chapters 6 and 7).

4. How does it present itself? The aim is to explore how experts experience the presenting problem of Internet addiction (Chapter 8).

Accordingly, the empirical part of this thesis is subdivided into three sections. Section one will investigate the prevalence and risk factors of Internet addiction in two independent large samples of adolescents and adults, respectively. Section two is concerned with establishing a theoretical framework for Internet addiction and developing a nomological network to establish its construct validity as based on the empirical data collected. The third and final section will then shed light upon the psychotherapist's experience of the presenting problem of Internet addiction in the context of therapy.

Chapters 2 and 3 have specifically outlined the literature base for Internet gaming addiction as this particular Internet usage has been considered as particularly problematic time and again, leading the APA to include *Internet Gaming Disorder* in the DSM-5 (American Psychiatric Association, 2013). However, individuals can engage in a number of activities online, some of which might have an addictive potential. In order to be inclusive of various Internet activities, in this research various Internet usages will be assessed, including, but not limited to, online gaming.

Together, the empirical chapters will provide an empirically funded and comprehensive picture of Internet addiction by integrating quantitative and

qualitative methods. This will allow presenting a complete research project of high external and ecological validity. First, the results from the quantitative studies can be generalised to the broader populations the samples were derived from. Second, the results from the qualitative study will present an in-depth thick description of highly skilled and experienced professionals' view of Internet addiction as psychopathology requiring psychotherapeutic assistance. Following the empirical part, a discussion will synthesize the findings and place them in light of the current scientific literature as well as the recent developments in diagnostic assessments.

## PART II: EMPIRICAL STUDIES

### CHAPTER 4

#### Internet addiction in adolescents: Prevalence and risk factors

##### Introduction

With the availability and mobility of new media, Internet addiction has emerged as a potential problem in young media-savvy generations. Based on a growing research base (Young, 2010), the APA has decided to include *Internet Gaming Disorder* in the appendix of the fifth edition of the DSM (2012a) for the first time, acknowledging the problems arising from this type of addictive disorder. Adolescents are a population at risk for developing Internet addiction (Leung, 2007) due to variability in developing their cognitive control (Casey, Tottenham, Liston, & Durston, 2005) and boundary setting skills (Liu & Potenza, 2007).

With regards to the prevalence of Internet addiction in adolescents, estimates vary widely across countries. Using Young's Internet Addiction Test (1999), 1.5% of Greek (Kormas, Critselis, Janikian, Kafetzis, & Tsitsika, 2011) and 1.6% of Finnish adolescents (Kaltiala-Heino, et al., 2004) were found to be addicted to using the Internet. Using a modified version of the Minnesota Impulsive Disorders Inventory, 4% of US high school students were identified as addicted to using the Internet (Liu, et al., 2011). Higher prevalence rates have been reported in South East Asian countries (e.g., Taiwan, Singapore, South Korea and China). For example, using Young's Internet Addiction Test (1998a)

8% of adolescents in China (Cao, et al., 2011). and 10.7% of adolescents in South Korea (Park, Kim, & Cho, 2008) were found to be addicted to using the Internet. In comparison and unsurprisingly, prevalence estimates in youth psychiatric settings are reported to be considerably higher. For instance, the prevalence of Internet addiction among minors using the Assessment of Internet and Computer Game Addiction Scale (Wölfling, Müller, & Beutel, 2010) was found to be 11.3% in Germany (Müller, Ammerschläger, Freisleder, Beutel, & Wölfling, 2012), and assessed via the Internet Addiction Test (Young, 1998b), 11.6% of adolescent outpatients in Latin America were classed as being Internet addicts (Liberatore, Rosario, Colon-De Marti, & Martinez, 2011). A detailed outline of the reported studies can be found in Table 1.

Overall, in the reported studies to date, a variety of measurement instruments have been used that do not allow for a clear-cut and comparable estimation of Internet addiction prevalence in both adolescent and adult populations. Therefore, there is a need for utilising actual clinical criteria in order to demarcate potentially pathological (i.e., addictive) behaviours from high-engagement behaviours that appear to be linked to a number of personality traits in addicted Internet users (Charlton & Danforth, 2010). In this study, clinical criteria for Internet addiction will be adopted, which will provide an indication of potential Internet addiction assessed via self-report (Meerkerk et al., 2009). The criteria are based on the official diagnoses of substance dependence and pathological gambling (American Psychiatric Association, 2000) and are integrated in the updated DSM, under a diagnosis of Internet Gaming Disorder (American Psychiatric Association, 2013). Accordingly, *Internet addiction* as adopted in this research does not refer to a clinical diagnosis, but to a potentially pathological behavioural pattern. It

Table 1 Overview of Prevalence Studies of Internet Addiction in Adolescents

Study	Aim	Sample and country	Design	Internet addiction measures	Prevalence
Kormas et al., (2011)	To assess the determinants and psychosocial implications associated with potential problematic Internet use (PIU) and PIU among adolescents	<i>N</i> = 866 randomly selected adolescents in Greece (mean age = 14.7 years)	Cross-sectional pen-and-paper questionnaire study	Young's Internet Addiction Test (Young, 1999), scoring >50/100 indicates addiction	1.5% with problematic Internet use
Kaltiala-Heino et al. (2004)	To assess the prevalence of features suggesting a harmful Internet use among 12–18 year-olds in Finland	<i>N</i> = 7,292 representative of adolescents in Finland (4 age groups, mean ages = 12.6, 14.6, 16.6 and 18.6 years)	Cross-sectional postal survey	Pathological gambling criteria (addicted when 4/7 criteria met)	1.6% addicted
Liu et al. (2011)	To explore the prevalence and health correlates of problematic Internet use among high school students in the United States	<i>N</i> = 3,560 high school students in USA (age range = 14-18 years)	Cross-sectional pen-and-paper survey	Modified Minnesota Impulsive Disorder Inventory (Grant et al., 2005), endorsing craving, withdrawal, and abstinence attempts simultaneously indicates problematic Internet use	4% with problematic Internet use
Cao et al. (2011)	To investigate the prevalence of problematic Internet use (PIU) and its relationships with psychosomatic symptoms and life satisfaction among adolescents in mainland China	<i>N</i> = 17,599 adolescents in China sampled via stratified cluster sampling in schools (mean age = 16.1 years)	School-based cross-sectional survey	Young's Internet Addiction Test (Young, 1999), scoring >50/100 indicates addiction	8.1% with problematic Internet use
Park et al. (2008)	To explore relations between risk and protective factors and Internet addiction among adolescents in South Korea	<i>N</i> = 903 middle and high school students in South Korea (60.5% middle school seniors, 39.5% high school students (12.4% freshmen, 27.1% juniors)) randomly selected from schools in Seoul	Cross-sectional pen-and-paper survey	Modified Young's Internet Addiction Scale (IAS) (1998a), scoring $\geq 70$ indicates addiction	10.7% addicted
Müller et al. (2012)	To explore Internet addiction prevalence in a clinical context in Germany	<i>N</i> = 81 child and adolescent psychiatric patients in Germany (mean age = 13.6 years)	Cross-sectional pen-and-paper questionnaire	Assessment of Internet and Computer Game Addiction Scale (Wölfling et al., 2010), scoring >7/15.5 indicates addiction	11.3% addicted
Liberatore et al. (2011)	To study the prevalence of Internet addiction in adolescents receiving treatment for a diagnosed psychiatric illness	<i>N</i> = 71 adolescent outpatients in Puerto Rico, Latin America (age range = 13-17 years)	Cross-sectional pen-and-paper questionnaire	Internet Addiction Test (Young, 1998), scores $\geq 80/100$ indicates addiction	11.6% addicted

is denoted by the presence of the following symptoms: (i) a loss of control over the behaviour, (ii) conflict (internal and interpersonal), (iii) preoccupation with the Internet, (iv) using the Internet to modify mood, and (v) withdrawal symptoms (Meerkerk et al., 2009).

From the perspective of the engagement in specific online activities, rather than focusing on Internet addiction per sé, researchers have now identified a number of activities that can be engaged in excessively online that may lead to symptoms similar to substance-related addictions (Yellowlees & Marks, 2007). Among these, excessive online gaming as highlighted in the previous chapters (Kuss & Griffiths, 2012b), excessive online gambling (Griffiths & Parke, 2010; Kuss & Griffiths, 2012d), and the use of social media (van den Eijnden, Meerkerk, Vermulst, Spijkerman, & Engels, 2008b), such as online social networks (SNSs) (Kuss & Griffiths, 2011) appear to stand out. Their increasing diversity and usage growth among young populations (Entertainment Software Association, 2012; Lenhart, Purcell, Smith, & Zickuhr, 2012) is mirrored by the rising number of treatment studies (King, Delfabbro, Griffiths, et al., 2011; Liu, et al., 2012).

Research and clinical practice suggest the concept of Internet addiction is not to be taken lightly as a number of negative consequences of excessive Internet use in adolescents have been identified in the literature. For instance, a recent review of the neuroscientific evidence (Kuss & Griffiths, 2012c) indicates that Internet addiction in adolescence can have a negative impact on identity formation (Kim et al., 2012) and change the structure of the developing brain (Lin et al., 2012; Yuan et al., 2011). In addition to this, it may negatively affect cognitive functioning (Park et al., 2011), lead to poor academic performance and engagement in risky activities (Tsitsika et al., 2011), poor dietary habits (Kim et al., 2010), low quality of interpersonal relations (Milani, Osualdella, & Di Blasio, 2009), and self-injurious behaviour (Lam, Peng, Mai, & Jing, 2009a) in

adolescents. From the reported negative consequences, it appears Internet addiction can have a variety of detrimental psychosocial and physical outcomes for adolescents that may require professional intervention (King, Delfabbro, & Griffiths, 2012).

In addition to this, Internet addiction appears to be comorbid with clinical disorders and premorbid symptoms. In adolescents, Internet addiction has been reported to be comorbid with depression and insomnia (Cheung & Wong, 2011), suicidal ideation (Fu, Chan, Wong, & Yip, 2010), attention-deficit hyperactivity disorder, social phobia, and hostility (Ko, Liu, et al., 2009), schizophrenia, obsessive-compulsive disorder (Ha, et al., 2006), aggression (Ko, Yen, Liu, et al., 2009), drug use (Gong, et al., 2009), and problematic alcohol use (Ko, Yen, Yen, Chen, Weng, et al., 2008). These comorbidities may be suggestive of a bidirectional causality relationship and similar etiology (Ko, Yen, Chen, Chen, & Yen, 2008; Mueser, Drake, & Wallach, 1998), and increased severity of psychopathology relative to a single presenting mental health problem (de Graaf, Bijl, Spijker, Beekman, & Vollebergh, 2003). In light of this, Internet addiction in adolescents cannot be dismissed as a transitory phenomenon that will take care of itself. Instead, it appears important to establish and explore a diagnosis that may prove beneficial for young populations who experience similar and related problems (King, Delfabbro, Griffiths, & Gradisar, 2012).

The personality traits that distinguish addicted gamers from high engagement gamers are reported to be negative extraversion (i.e., introversion), emotional stability, agreeableness, negative valence (indicated by being demanding, needy, and eager to impress), and attractiveness (characterised by care about appearance, being well groomed, neat and efficient, and highly motivated) (Charlton & Danforth, 2010). Other research has indicated online gaming addiction may be related to neuroticism, anxiety, and sensation seeking (Mehroof & Griffiths, 2010). Apart from online gaming, research indicates that

adolescent Internet addicts score significantly lower on extraversion compared to non-addicted adolescents (Huang et al., 2010), have low emotional stability, low extraversion, and low agreeableness (van der Aa, et al., 2009). In summary, low emotional stability, low agreeableness, and low extraversion seem convincing candidates for increasing the risk of Internet addiction as these associations are found in multiple studies. However, to date, no study has investigated the interactions between personality and different types of potentially problematic Internet usage in increasing the risk for being addicted to using the Internet. Assessing the interactions between these variables may allow discerning both risk as well as protective factors for Internet addiction in adolescents who use the Internet frequently. Specifically, the identification of characteristics that demarcate frequent users who develop addiction symptoms from frequent users who do not may prove beneficial with regards to prevention and treatment. Behaviours and cognitions associated with the preventive character traits in the risk groups (i.e., high frequency users of specific Internet applications) can be established and maintained.

With this study, it is aimed to fill the gap in knowledge in current research by (i) assessing the prevalence of Internet addiction in a large sample of adolescents, and (ii) for the first time exploring the interactions between personality traits and the usage of particular Internet applications as risk factors for Internet addiction in adolescents. Based on previous research, the hypotheses are that (i) using online applications that enable social functions (i.e., SNSs, chatting, instant messaging, and *Twitter*) and online gaming, and (ii) specific personality traits (i.e., low emotional stability, low agreeableness, and low extraversion) increase the risk for being addicted to the Internet, and (iii) there exist interaction effects between the usage of specific Internet applications and personality traits in elevating or decreasing the chances of Internet addiction, the precise nature of which still needs to be determined.



## Methods

### *Design*

In this study, the 2011 subsample of the annual Monitor study “Internet and Youth” (Eijnden, Spijkerman, Vermulst, van Rooij, & Engels, 2010) which specifically assesses Internet usage behaviours among adolescents was utilised, including 3,173 adolescents from 13 schools in the Netherlands. The Monitor study uses school sampling stratified according to region of the school, urbanisation, and education level. A total of 3,756 questionnaires were distributed in participating classes with an overall response rate of 84%. Response rate varied mainly due to logistics, such as entire classes dropping out due to teacher absence or delay within school logistics. Of the questionnaires distributed, 3,105 were valid (i.e., students provided answers for most questions) and were used in the present study.

### *Participants*

The data of a total of 3,105 Dutch adolescents (aged 11-19 years,  $M = 14.2$ ,  $SD = 1.1$  years) were used in this study. The sample characteristics are presented in Table 2. In terms of gender distribution, 51.7% of the adolescents were females and an overwhelming majority of the participants were born in the Netherlands (96.5%). In terms of school level, 45.8% of adolescents participated in VMBO (“voorbereidend middelbaar beroepsonderwijs”, i.e., pre-professional education that incorporates ages 12 to 16), and 54.2% were in HAVO/VWO (“hoger algemeen voortgezet onderwijs”/ “voorbereidend wetenschappelijk onderwijs”, i.e., higher general and pre-university education including ages 12-18).

Table 2

Adolescents (N = 3,105)	N	Percent of total	Not addicted (n)	Percent of total	Addicted (n)	Percent of total	Overall test
<i>Age (years)</i>							
Mean (SD)	14.23 (1.07)		14.24 (1.08)		14.02 (1.00)		
11 years	2	0.1	2	0.1	0	0	
12 years	40	1.4	37	1.3	3	0.1	
13 years	725	25.2	696	24.2	29	1.0	
14 years	1061	36.9	1011	35.2	50	1.7	
15 years	721	25.1	700	24.4	21	0.7	
16 years	244	8.5	241	8.4	3	0.1	
17 years	65	2.3	63	2.2	2	0.1	
18 years	14	0.5	13	0.5	1	0	
19 years	2	0.1	2	0.1	0	0	FET=13.76
<i>Sex</i>							
Male	1501	48.3	1431	46.5	51	1.7	
Female	1604	51.7	1534	49.8	62	2.0	X <sup>2</sup> =0.43
<i>School level<sup>a</sup></i>							
VMBO	1410	45.8	1340	43.5	70	2.3	
HAVO/VWO	1668	54.2	1625	52.8	43	1.4	X <sup>2</sup> =12.31*
<i>Country of birth</i>							
Netherlands	2951	96.5	2843	93.0	108	3.5	
Suriname	5	0.2	5	0.2	0	0	
Netherlands Antilles	6	0.2	6	0.2	0	0	
Aruba	1	0	1	0	0	0	
Turkey	3	0.1	3	0.1	0	0	
Marokko	5	0.2	5	0.2	0	0	
Indonesia	2	0.1	2	0.1	0	0	
Other	85	2.8	80	2.6	5	0.2	FET=16.22

*Sociodemographics of Total Sample and Subsamples of Not Addicted and Addicted Adolescents*

Note1. Abbreviations. FET = Fisher's exact test.

Note2. A respondent is classified as "addicted user" when they scored > 27 on the CIUS.

Note3. Due to missing values, the sum total of participants may not equal 2,257 for each variable analysed.

\*  $p < .01$ .

<sup>a</sup>VMBO and HAVO/ VWO refer to pre-professional education (ages 12-16), higher general and pre-university education (ages 12-18), respectively.

### *Materials*

A paper-and-pencil survey was used that included sections on (i) sociodemographic information, (ii), Internet use, (iii) Internet addiction, and (iv) personality traits.

#### *Sociodemographics*

In this section, general sociodemographic information was inquired about, including questions about gender, date and country of birth, weight and height, and level of schooling.

#### *Internet use*

In the section on Internet use, adolescents were asked to state how frequently and where they used the Internet and whether they are supervised when using it. In addition to this, the following Internet application uses were inquired about in terms of days per week and hours per day: instant messenger (e.g., MSN), e-mail, surfing, *Twitter*, chat, social networking sites (e.g., *Facebook*), forums, *Habbo Hotel*, weblogs, *YouTube*, online poker, downloading, television and radio live streaming, as well as online, offline, and browser games. For these variables, usage hours per week were calculated in order to provide a more detailed and elaborated picture of overall usage.

#### *Internet addiction*

In order to assess Internet addiction, the Compulsive Internet Use Scale (CIUS; Meerkerk et al., 2009) was employed. It is a 14-item unidimensional self-report questionnaire rated on a 5-point ordinal scale (ranging from 0 = 'never' to 4 = 'very often') that enquires into the following addiction symptoms: loss of control, preoccupation (cognitive and behavioural), withdrawal symptoms, coping/mood modification, and conflict (inter- and intrapersonal). Total scores were calculated by summing up scores for each question. These criteria are

based on the DSM-IV TR diagnoses for substance dependence and pathological gambling (American Psychiatric Association, 2000). The CIUS was marginally adjusted for the usage in the present Dutch adolescent population, as previously used in other studies (van Rooij, et al., 2010).

At present, no definitive cut-off value for the CIUS has been established. However, using the CIUS in two adolescent samples, van Rooij et al. (2011b) located a group addicted to playing online games. It has been shown that when the CIUS scoring is divided into clusters, the average of the highest scoring cluster is 2.8/2.9 (van Rooij, et al., 2011b), which translates to a score of 28 following the adopted scoring in the present study. Based on van Rooij et al.'s study, Rumpf and colleagues adopted a minimum score of 28 out of a possible total of 56 that may be indicative of psychopathology and thus demarcates potential addiction from high engagement (Rumpf, Meyer, Kreuzer, & John, 2011). In terms of the psychometric qualities of the CIUS, its construct and concurrent validity, temporal and factorial stability/invariance, and internal consistency have been proven to be good (Meerkerk et al., 2009). In the present analysis, the internal consistency of the CIUS was found to be excellent with Cronbach's  $\alpha = .88$  (Cronbach, 1951). The CIUS is provided in Appendix III.

### *Risk*

In this context, Internet addiction risk was defined as the probability of addiction for a person possessing a particular personality trait and/or using a specific application of the Internet relative to a person who does not have the trait and/or does not use the specific application. In contrast to that, a risk ratio refers to the event of addiction relative to the risk of addiction, and can therefore reach a maximum of 1 (Sistrom & Garvan, 2004).

*Personality measure*

Personality was assessed using the short self-report measure Quick Big Five (QBF) (Vermulst & Gerris, 2009) that was based on Goldberg's personality markers (1992). It measures the big five personality traits extraversion, agreeableness, conscientiousness, emotional stability, and resourcefulness via 30 questions (six per trait) scored on a 7-point ordinal scale (ranging from 1 = 'is not completely correct' to 7 = 'is exactly correct'). Total scores were calculated by summing up the relevant response scores per personality trait. Overall, the internal consistency of the respective subscales was good, with a Cronbach's alpha of .86 for extraversion, .84 for conscientiousness, .81 for agreeableness, .82 for emotional stability, and .75 for resourcefulness. The QBF is provided in Appendix IV.

*Statistical analyses*

For the analyses, adolescents classed as addicted to using the Internet and those who were not were compared with regards to (i) the frequency of their Internet usage, (ii) the location of usage, and (iii) their CIUS scores using independent samples *t*-tests, assuming unequal variances when group sizes were unequal as indicated by significant Levene's tests, and chi-squared ( $X^2$ ) tests in the case of categorical outcomes. For the main analyses, the assumptions of linearity, independence of errors, and multicollinearity of the relevant variables were checked. Response patterns for the CIUS were checked in order to ensure adequate variability of responses. In addition to this, continuous predictors were centred at their mean by subtracting mean scores from the observed values to eliminate potential collinearity problems (Aiken & West, 1991). Next, a logistic regression analysis using the backward LR method was used including all personality traits and the following Internet applications: MSN, *Twitter*, chat, SNS, and online games, with Internet addiction status as binary outcome variable (i.e., the dependent variable was addicted versus non-

addicted). The significant predictors were then entered into a model containing interaction effects. The final model presents all significant interactions and relevant main effects. In order to follow-up the interactions in more detail, linear regression analyses per group (addicted and non-addicted) and simple effects analyses were performed. For all analyses, only significant results are reported.

### Results

Response pattern analysis revealed a total of 2,457 different response patterns in the data for the CIUS, indicating a good variability in CIUS scores. When analysing the response pattern in more detail, 191 participants answered “never” to all items, and “seldom”, “sometimes”, “often” and “very often” were endorsed on all items by one participant each. In terms of Internet use, results indicated that nearly all adolescents (99.8%) used the Internet at home or in school. In 44.9% of cases, Internet activities were not generally supervised at home, compared to a 10.2% lack of Internet supervision at school. Furthermore, 3.7% (95% CI [3.0, 4.4]) of the adolescents in this sample were classified as potentially addicted to using the Internet. In terms of sociodemographic variables, Internet addicts differed significantly from non-addicts with regards to their school level, with adolescents at VMBO being significantly more likely to be in the addicted group relative to the HAVO/VWO students ( $X^2(1) = 12.31$ ,  $p < .01$ ). More specifically, 5% of VMBO students were identified as potentially addicted to using the Internet, in comparison to only 2.6% of the HAVO/VWO students.

As presented in Table 3, compared to non-addicted adolescents, addicted adolescents used the Internet for significantly more days per week ( $M = 6.67$ ,  $SD = 0.74$  vs.  $M = 5.83$ ,  $SD = 1.55$ ;  $t(149.97) = -10.95$ ,  $p < .01$ ), and significantly

more hours per day ( $M = 4.33, SD = 1.34$  vs.  $M = 2.96, SD = 1.38; t(2782) = -8.86, p < .01$ ). In addition to this, the groups differed significantly with regards to where they used the Internet, with addicted adolescents using it more often in the kitchen ( $X^2(1) = 4.47, p < .05, 25.7\%$  vs.  $17.9\%$ ), via WiFi ( $X^2(1) = 6.20, p < .01, 65.5\%$  vs.  $53.6\%$ ) and via their mobile phones ( $X^2(1) = 16.50, p < .01, 44.2\%$  vs.  $26.9\%$ ). Finally, the addicted adolescents scored significantly higher on the CIUS ( $M = 33.37, SD = 5.66$ ) than non-addicted adolescents ( $M = 8.82, SD = 6.65; t(124.10) = 44.97, p < .01$ ).

The final model including the significant interactions and relevant main effects of Internet application usage and personality traits as presented in Table 4 predicted Internet addiction status significantly ( $X^2(10) = 148.16, p < .001$ ) and explained 23% of the variance in Internet addiction (Nagelkerke's  $R^2 = .23$ ). Table 5 presents the model classification. In terms of personality traits, agreeableness was the strongest predictor of Internet addiction ( $b = -.109, Wald X^2(1) = 13.00, p < .001$ ). Moreover, every unit increase in agreeableness decreased the odds of being addicted to using the Internet by 10.9%. Addicted adolescents scored significantly lower on agreeableness ( $M = 30.53, SD = 4.80$ ) than non-addicted adolescents ( $M = 33.12, SD = 4.85; t(2823) = 5.45, p < .001$ ).

The next personality trait predictive of Internet addiction was emotional stability ( $b = -.089, Wald X^2(1) = 17.12, p < .001$ ). Every unit increase in emotional stability decreased the odds of being addicted to the Internet by 8.9%. Addicted adolescents scored significantly lower on emotional stability ( $M = 24.48, SD = 7.23$ ) than non-addicted adolescents ( $M = 29.49, SD = 6.58; t(2876) = 7.66, p < .001$ ). The third personality trait to predict Internet addiction significantly was resourcefulness ( $b = .062, Wald X^2(1) = 6.34, p < .05$ ). Every unit increase in resourcefulness score increased the odds of being addicted to the Internet by 6.2%. Finally, conscientiousness significantly predicted Internet addiction ( $b = -.042, Wald X^2(1) = 4.45, p < .05$ ). Every unit increase in

Table 3  
*Internet Use Among Not Addicted and Addicted Adolescents*

	Not addicted ( <i>n</i> = 2,965)	Addicted ( <i>n</i> = 113)	
<i>Frequency</i>	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>T</i>
Days/week	5.83 (1.55)	6.67 (0.74)	10.95**
Hours per day	2.96 (1.38)	4.33 (1.34)	9.16**
<i>Location</i>	%	%	$\chi^2$
Living room	55.4	58.4	0.40
Own room	42.2	50.4	3.02
Kitchen	17.9	25.7	4.47*
Other room	33.8	39.8	1.78
Wi-Fi	53.6	65.5	6.20**
Mobile phone	26.9	44.2	16.50**
No Internet	0.1	0.0	0.12
<i>Internet addiction</i>	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>T</i>
CIUS score	8.82 (6.65)	33.37 (5.66)	44.97**

\*\*  $p < .01$ , \*  $p < .05$ .

Table 4  
*Logistic Regression of Internet Application Use and Personality Traits on Internet Addiction Risk*

	<i>b</i> ( <i>SE</i> )	95% CI for exp <i>b</i>		
		Lower	exp <i>b</i>	Upper
Constant	-4.029 (0.173)			
Online games* extraversion	-0.003** (0.001)	0.995	0.997	0.999
Online games*conscientiousness	0.003* (0.001)	1.001	1.003	1.006
Twitter	0.026** (0.006)	1.013	1.026	1.039
SNS	0.031** (0.007)	1.017	1.032	1.047
Online games	0.022* (0.009)	1.005	1.023	1.040
Emotional stability	-0.089** (0.021)	0.877	0.915	0.954
Resourcefulness	0.062* (0.025)	1.014	1.064	1.117
Agreeableness	-0.109** (0.030)	0.845	0.897	0.952
Conscientiousness	-0.042* (0.020)	0.922	0.959	0.997
Extraversion	-0.008 (0.22)	0.950	0.992	1.036

Note 1.  $R^2 = .06$  (Cox & Snell), .23 (Nagelkerke). Model  $\chi^2(9) = 148.16$ ,  $p < .001$ . \*\*  $p < .01$ , \*  $p < .05$ .



Table 5  
*Model Classification*

	Normal	Addicted	Percentage correct
Normal	2332	4	99.8
Addicted	82	1	1.2
Overall percentage			96.4

conscientiousness score decreased the odds of being addicted to the Internet by 4.2%. Addicted adolescents scored significantly lower on conscientiousness ( $M = 23.64$ ,  $SD = 6.21$ ) than non-addicted adolescents ( $M = 25.91$ ,  $SD = 7.04$ ;  $t(114.46) = 3.65$ ,  $p < .001$ ).

In terms of the respective online applications, the use of the social applications Twitter ( $b = .026$ , Wald  $X^2(1) = 16.16$ ,  $p < .001$ ) and social networking sites ( $b = .031$ , Wald  $X^2(1) = 18.06$ ,  $p < .001$ ) significantly predicted Internet addiction. Every additional hour of weekly Twitter and SNS use increased the odds of being addicted to the Internet by 2.6% and 3.1%, respectively. Compared to non-addicted adolescents, addicted adolescents spent significantly more hours per week on Twitter ( $M = 15.32$ ,  $SD = 22.12$  vs.  $M = 4.95$ ,  $SD = 12.67$ ;  $t(111.71) = -4.89$ ,  $p < .01$ ), and SNS ( $M = 22.10$ ,  $SD = 20.34$  vs.  $M = 9.12$ ,  $SD = 11.65$ ;  $t(111.70) = -6.65$ ,  $p < .01$ ).

Furthermore, the use of online games significantly predicted Internet addiction ( $b = .022$ , Wald  $X^2(1) = 6.47$ ,  $p < .05$ ). Every additional weekly hour playing online games increased the odds of being addicted to the Internet by 2.2%. Addicted adolescents played online games for significantly more hours per week ( $M = 11.31$ ,  $SD = 17.72$ ) than non-addicted adolescents ( $M = 3.68$ ,  $SD = 9.38$ ;  $t(114.43) = -4.55$ ,  $p < .01$ ).

In addition to the predictive main effects, two interactions appeared significant. First, the interaction between the weekly online gaming hours and extraversion predicted Internet addiction ( $b = -.003$ , Wald  $X^2(1) = 6.82$ ,  $p < .01$ ),

and decreased the odds of being addicted to the Internet by 0.3%. Following up the significant interactions with linear regression analyses in the different groups indicated that in the addicted group, extraversion did predict the extent of online gaming ( $b = -.436$ ,  $F(1) = 5.12$ ,  $p < .05$ ), whereas in the non-addicted group it did not ( $b = -.003$ ;  $F(1) = 0.01$ , *ns*).

Secondly, the interaction between weekly online gaming hours and conscientiousness predicted Internet addiction ( $b = .003$ , Wald  $\chi^2(1) = 6.14$ ,  $p < .05$ ), and increased the odds of being addicted to the Internet by 0.3%. Following up the significant interactions with linear regression analyses in the different groups indicated that in the addicted group, conscientiousness did not predict the extent of online gaming ( $b = .198$ ;  $F(1) = .51$ , *ns*), whereas in the non-addicted group, it did ( $b = -.140$ ;  $F(1) = 31.76$ ,  $p < .001$ ).

## Discussion

In the present research, the risk for Internet addiction in a large sample of Dutch adolescents was investigated by looking at the interplay between personality traits and the usage of different Internet applications. Using a validated self-report measure (Meerkerk et al., 2009), it was found that 3.7% of the adolescents included were classified as addicted to using the Internet. This appears to be at the more conservative end of estimates that range from 1.5% in Greece (Kormas, et al., 2011) to 10.7% in South Korea (Park, et al., 2008). Using a conservative threshold with the CIUS, it was possible to establish a cut-off indicative of Internet addiction as based on this validated and frequently used self-report measure. Nevertheless, it needs to be noted that in the reported studies, different measurement tools have been used that renders it difficult to compare prevalence rates across questionnaires.

In this study, the expected relationships between social application and online gaming use as predictors of Internet addiction were established. The use of both *Twitter* and SNSs increased the risk of being addicted to using the Internet by 2.6% and 3.2%, respectively. The primary motivation for using social Internet applications relates to the maintenance of established offline networks (Donath & boyd, 2004; Ellison, Steinfield, & Lampe, 2007). Previous research indicates that these motivations differ between age groups, with young adolescents expressing their identities by means of a self-display of personal information and older adolescents expressing it through connections (Lee, Lee, & Kwon, 2011). However, unlike the hypothesised relationship, the use of social applications other than SNSs and *Twitter* did not contribute to predicting Internet addiction. A variety of studies have indicated that the excessive use of online social networking sites may be problematic (e.g., Kuss & Griffiths, 2011; Leung & Lee, 2012a) as it tends to reinforce the establishment and maintenance of online, rather than offline, social networks. In a similar vein, excessive use of *Twitter* may have detrimental consequences for real life communication and is believed to activate the hedonistic dopamine system (Hofmann, Vohs, & Baumeister, 2012), that offers instantaneous gratification when using applications such as *Twitter*.

Additionally, playing online games increased the risk of being addicted to the Internet by 2.2%. Overall, previous research indicates that unlike other game forms, such as browser and offline games, online games appear to have a high addictive potential, so that vulnerable people may develop addiction as a consequence of frequent engagement (Kuss & Griffiths, 2012a). In this study, only the frequent use of online games, and neither browser nor offline games, increased the risk of being addicted to the Internet. Online games require a large amount of commitment and time investment on behalf of the player in order for him to be able to achieve game imminent goals which may in turn contribute

to the development of maladaptive behaviours and coping strategies that reinforce gaming (Kuss, et al., 2012). Taken together, and viewed from the frequency of usage and potential problems, the desire to use online media appears to be very strong. In line with this, a recent study indicates that it appears significantly stronger than the desire for tobacco, sex, coffee, alcohol, and eating, it is significantly more difficult to resist and can lead to “pathological abuse” (Hofmann, et al., 2012).

In addition to the specific usage of the Internet, a number of personality traits appeared to predict Internet addiction. As hypothesized, low emotional stability increased the risk of Internet addiction. Low emotional stability is congruent with high neuroticism (Matthews, Deary, & Whiteman, 2009) and the latter has been found to be predictive of Internet addiction and Internet gaming addiction in university students (Dong, Wang, Yang, & Zhou, 2012; Mehroof & Griffiths, 2010; Tsai, et al., 2009), and therefore the present study extends previous research by utilising an adolescent sample.

Moreover, low agreeableness was found to increase the risk of Internet addiction. Low agreeableness corresponds to *aggression-hostility* (Zuckerman, 2002). In adolescents, aggression has been associated with Internet addiction after controlling for television watching (Ko, Yen, Liu, et al., 2009). Online disinhibition (Joinson, 1998), as a consequence of online anonymity, may lead to deindividuation (Zimbardo, 1969) and can foster aggressive behaviours (Ko, Yen, Liu, et al., 2009). This process may be particularly problematic for adolescents to exit as their cognitive control capabilities may not be fully developed (Casey, et al., 2005).

In addition to the personality traits hypothesised to be linked to Internet addiction, resourcefulness was found to increase the risk of being addicted to using the Internet. Resourcefulness has been related to openness to experience

(Matthews, et al., 2009). Previous research indicates that increased novelty seeking, which is part of openness to experience, is linked to Internet addiction in college students (Ko et al., 2010). Similarly, openness to experience has been found to be associated with marijuana use (Terracciano, Löckenhoff, Crum, Bienvu, & Costa, 2008). From this, it appears that characteristics indicative of resourcefulness and openness to experience, such as creativity, imagination, and innovation may lead adolescents to engage in pleasurable activities, such as using the Internet, excessively. Alternatively, these gamers are highly creative, enthusiastic users who get carried away with their hobbies with the consequence of negative side effects that may be transitory. In order to determine these relationships in more depth, in-depth qualitative studies need to be conducted in the future.

The final personality trait that was found to increase the risk of Internet addiction was negative conscientiousness. This finding is a replication of previous research using the CIUS to assess Internet addiction in a large sample of 16,925 11 to 80-years olds (Meerkerk, Van den Eijnden, Vermulst, & Garretsen, 2007). It indicates that the less conscientious adolescents are, the more likely they are to experience problems related to Internet addiction. From an explanatory point of view, adolescents who are less conscientious would chose using the Internet over other, less pleasurable activities, such as doing their homework, and may therefore be at increased risk of using the Internet excessively.

Besides these main effects, it was found that the effect of online gaming frequency interacted with specific personality traits in increasing the risk for Internet addiction. First, the amount of online gaming (i.e., number of hours played) and low scores on extraversion predicted Internet addiction. More specifically, low scores on extraversion predicted the extent of online gaming in the adolescents who were addicted as indicated by their CIUS scores. In this

regard, higher extraversion can be viewed as personality trait that fulfils a preventive function. Of the adolescents who frequently engage in online gaming, those who are more extraverted were less likely to become addicted to using the Internet. Introversion has been implicated in Internet and online gaming addiction time and again (Huang, et al., 2010; van der Aa, et al., 2009; Young, 2009). Interestingly, in this study low extraversion (or introversion) has been found to increase the risk of Internet addiction only among online gamers. It appears that there might be a mutually reinforcing relationship between online gaming and introversion (Weaver et al., 2009) in such a way that individuals with introverted traits start playing games because they find it easier to interact virtually than in real life, which in turn exacerbates their shyness in real life and makes them turn to the game. The directionality of this relationship needs to be examined in future research.

Second, the online gaming hours and low scores on conscientiousness increased the risk of being addicted to using the Internet. Viewing this effect in more detail, it appeared that in the participants who did not meet the cut-off point for Internet addiction using the CIUS, conscientiousness appeared as predictor of weekly online gaming hours. Adolescents who engaged in playing online games frequently and who had higher conscientiousness scores were less likely to be addicted to using the Internet. Frequent online gamers who score highly on conscientiousness may feel a strong commitment to their virtual personae, guilds and high-level game content as they are organised, systematic, and thorough (Vermulst & Gerris, 2009). Rather than developing problems indicative of potential Internet addiction, they play the game world in a more healthy way and are able to switch off. Their loyalty to their guild and achievement striving may lead them to engaging in end-game content at higher levels which typically requires an increased investment of time (Ducheneaut, Yee, Nickell, & Moore, 2006). Potentially, frequent online gamers who also score

high on conscientiousness may be characterised by high engagement, but not addiction (Charlton & Danforth, 2007) relative to those online gamers who play similarly frequently, but who score low on conscientiousness. In order to explore this topic further, qualitative research is needed. From the perspective of research design, it appears important to pay close attention to the effects of interacting variables on the development of Internet addiction because this may allow us to tackle questions of etiology and risk.

Overall, the reported hours of Internet use appear somewhat different in comparison to other studies. For instance, in a sample of 136,589 13-18 year old South Korean adolescents, Do and colleagues (2013) reported a relatively low mean daily Internet use of 86 minutes for non-study related purposes, in comparison to the non-pathological group in the present study that spent an average of approximately three hours online per day and the potentially addicted group that spent a daily average of 4.3 hours on the Internet. Online research on 216 Austrian secondary school students revealed that they spent a comparatively relatively high daily average of 4.79 hours online (Appel, Holt, Stiglbauer, & Batinic, 2012). This divergence in numbers can be explained by the fact that the South Korean study only inquired into non-study related usage of the Internet, whereas another study found that nearly 90% of children and adolescents use the Internet at school (Johnson, 2010), indicating that a proportion of the online time reported in Appel et al.'s study may have been spent for educational purposes. As an alternative explanation, this study used an online collection method which may have purported technophilic adolescents to participate rather than their not so technologically inclined peers. Self-selection bias has been generally reported as a limitation in online research (Bethlehem, 2008). Consequently, it appears necessary to cross-check online usage times using similar methods while specifying usage purposes in order for comparisons across studies to be possible. Therefore, future researchers are

encouraged to be precise with regards to what kinds of Internet usage they assess.

Finally, in terms of sociodemographic variables, adolescents in different schooling types appeared to differ significantly from one another with regards to the probability of being addicted to using the Internet, with VMBO students being more likely than HAVO/VWO students. Therefore, VMBO students should be targeted as they appear to be a population at risk for developing Internet addiction (van Rooij, et al., 2010), and future research is encouraged accordingly. Widespread Internet accessibility appeared to contribute to the likelihood of being addicted to the Internet, as adolescents who used it in the kitchen, on their mobile phones, and via WiFi were more likely to be addicted to the Internet than the adolescents who did not have extensive access. In the current ubiquitous media environment, it appears that adolescents make increasing use of the Internet on the go, anytime and anywhere. The ever increasing numbers of adolescents with access to mobile Internet technology via smartphones, laptops and tablets (Lenhart, et al., 2012) appears as potential explanation for the discerned problems related to Internet use. The more adolescents are able to use their favourite applications whenever and wherever they want may increase the likelihood for the development of negative consequences due to excessive use. This contention needs to be examined in future studies.

### ***Limitations***

There are a number of limitations to the present study. First, self-report measures like the ones used here do not suffice for a clinical assessment of diagnosed psychopathology. Specifically, rather than offering a clear-cut diagnosis, the CIUS scores in this sample are an indicator of addictive behaviours. The conservative cut-off point for addiction adopted here may serve as a benchmark based on which populations can be identified that may



be particularly at risk for developing and/or experiencing problematic behaviours that may impact their lives in a variety of negative ways, without assuming that the adolescents identified as potentially addicted require professional help. Viewed from the perspective of clinical practice, self-report measures are the most commonly used tools to provide psychiatrists and psychologists with an indication of psychopathology level prior to treatment. They are pragmatic regarding the ease of administration and scoring (Ruben, 1999). In addition to this, using a scale may not only allow for the identification of pathological online behaviours, but it may aid the recognition of adolescents who may be at risk for developing Internet addiction as indicated by the number of symptoms endorsed. Second, the study used data of a cross-sectional nature. Therefore, the results of this study provide an indication of association, not causality. In order to view Internet addiction from an etiological point of view, it is necessary to investigate the present data taking into consideration the longitudinal cohort. Third, in this study, a categorical classification of potential psychopathology has been adopted at the expense of a more extensive dimensional analysis. Participants were classed into groups depending on whether they met a sufficient number of diagnostic criteria or not. This procedure is common in everyday clinical practice as the diagnostic manuals request diagnoses being made based on cut-offs (American Psychiatric Association, 2000). The advantages of this method include ease of communication, clinical decision-making, and agreement with health care and insurance providers (Brown & Barlow, 2005). Therefore, being imminently exploratory in nature, the present study has applied a concise categorical approach. Future researchers are advised to look beyond categories and investigate the matter in a dimensional fashion. Fourth, the number of hours of Internet application use used in the present paper is a very rough estimate given it is a multiplication from days per week and hours per day. Therefore, it might be prone to a number of methodological problems, such as ceiling effects, and

dividing weekdays/weekenddays might be more prudent in future studies. As such, the adopted number of hours of Internet application use provides a rough estimate.

### *Implications*

The present research has a number of implications for prevention, treatment, and research. In terms of prevention, the identification of specific variables associated with Internet addiction (i.e., the respective personality traits as well as specific usages of the Internet) allows for targeting individuals who appear to be at risk for developing Internet addiction. These adolescents and their parents may be approached by teachers and educated about the problems their Internet usage may cause. With regards to prevention, raising awareness and providing education for both adolescents and their parents appear as key themes. For instance, messages on *Twitter* would be a good place to start targeting both parties, as well as advertisements in the sidebars of social networking sites about where to get help in case of concern and/or need. Messages on *Twitter* could be re-tweeted by relevant organisations which have a readership of adolescents and/or parents, or schools with *Twitter* feeds could re-tweet. In this light, the online space in which problematic behaviours occur can be used as a preventive and educative tool which may prove beneficial in decreasing associated problems and concerns.

For the purpose of treatment, the present research may benefit mental health practitioners in their efforts to develop specific approaches that pay tribute to the respective individuals' personality and associated needs and requirements. Individuals' scores on personality scales tend to vary just like personality tends to be changing rather than being stable over the course of life (Krueger, 2005). However, the results of the current study may serve as starting point for the development of specialised treatments of Internet addiction taking into consideration the respective personality traits. For instance, an adolescent

with low conscientiousness may especially benefit from a meticulously regulated day structure in the course of treatment, whereas an adolescent who is not stable emotionally is likely to be helped by continuous encouragement and positive cognitive restructuring. The same holds true for the utilisation of different Internet applications. The excessive gamer may be aided by supporting the discovery of alternative adventurous activities (such as offline and browser games) that provide the possibility of achievement and rewards. With regards to the gamer with low agreeableness, the cultivation of social contacts may serve as form of exposure therapy whereby antagonistic attitudes towards others can be gradually unlearned. The excessive gamer with low resourcefulness may be helped by exploring creative recreational activities that may open up alternative ways of thinking and being to him. Similarly, the problematic social application user may be helped by encouraging the establishment of a real life social network with peers and maintaining it in the real world, rather than online.

So far, treatment research indicates that cognitive behavioural therapy in combination with family or group therapy appears beneficial for adolescents suffering from Internet addiction (Liu, et al., 2012), and may be used in multimodal school-based settings (Du, et al., 2010). In such a way, the present research encourages practitioners to pay attention to the actual behaviours and Internet usages as well as the individuality of their adolescent patients with the goal of symptom relief and eventual successful therapy completion. In light of research in the area, the current study paves the way for future investigations of the interplay between different factors, such as personality and specific online application use, in increasing the risk for possible Internet addiction. The next step may be to view Internet addiction from an etiological perspective, and consider relationships between these factors in a treatment population diagnosed with Internet addiction. Recommendations include verification of

results using the longitudinal Monitor Study data and further replications, which allow for prospective assessment of causality.

### **Conclusion**

In conclusion, Internet addiction appears as a mental health problem for Dutch adolescents. The results support the American Psychiatric Association's efforts to include Internet addiction in the updated version of the DSM as a psychiatric condition that requires further research (2012a). Although conservative relative to other estimates, the reported prevalence of addiction-related problems in 3.7% of the present Dutch adolescent sample is somewhat disconcerting. Internet addiction is associated with a variety of psychological and physical health problems and may impact the developing adolescent in a variety of domains. This study paves the way for future research into Internet addiction. It highlights the risk of high frequency usage of specific Internet applications, which, separately and in combination with particular personality traits, may foster the development of psychopathology. Similarly, it specifies personality traits which, in frequent users, may serve as protective factors. Accordingly, vulnerability on the one hand and resilience on the other are important aspects that need to be taken into consideration in further studies. From a mental health perspective, it is of utmost importance to identify the factors that contribute to the risk for Internet addiction and at the same time discern those that have a protective function. Ultimately, this will further a general understanding of why the excessive engagement in a behaviour leads to pathogenesis in one individual, but not in another. Following the assessment of prevalence and risk in adolescents in this chapter, the next chapter will be concerned with these questions in a sample of university students.

## CHAPTER 5

### Internet addiction in students: Prevalence and risk factors

#### Introduction

The last decade has witnessed a large increase in research on the newly emerging mental health problem of Internet addiction (e.g. Griffiths, 2000; Young, 2010). As behavioural addiction (Holden, 2001; Kuss, 2012), Internet addiction leads to symptoms traditionally associated with substance-related addictions, namely mood modification, salience, tolerance, withdrawal, conflict, and relapse (Griffiths, 2005b). The similarity with other addictions is furthermore substantiated by a multiplicity of neurobiological evidence (Kuss & Griffiths, 2012c). From a clinical perspective, Internet addiction is treated seriously and specific treatment approaches have been adopted in different countries (King, Delfabbro, Griffiths, et al., 2011), testifying to the need of professional help for those who suffer. Following the advancements in research and the increasing demand for clinical treatment, the American Psychiatric Association has decided to include *Internet Use Disorder* in the appendix of the fifth edition of the Diagnostic and Statistical Manual for Mental Disorders (DSM-5) (2012a).

Some authors (e.g., Widyanto & Griffiths, 2006) have claimed that rather than looking at Internet addiction *per sé*, researchers should focus on particular activities on the Internet that might be potentially addictive because people do not become addicted to the medium, but to the actual behaviour they engage in online. In terms of specific applications, gaming has been extensively researched as an online application with a high addictive potential (Huang, 2006; Kuss & Griffiths, 2012a; Leung, 2004), as highlighted in Chapters 2 and 3.

Moreover, the use of social applications, namely online chatting (Huang, 2006; Leung, 2004), social networking sites (SNSs) (Kuss & Griffiths, 2011; Leung & Lee, 2012a), such as *Facebook* (Kittinger, Correia, & Irons, 2012), and online instant messengers (Leung, 2004; Yuen & Lavin, 2004) have been found to be associated with Internet addiction. Furthermore, spending more time on online activities such as shopping and gaming has been linked to depressive symptoms (Morgan & Cotten, 2003). It appears that these applications may be specifically predictive of Internet addiction, however, no research has been conducted to date taking into consideration all of them in a single model.

In addition to the use of specific online activities, personality traits have been linked to Internet addiction. Higher scores on neuroticism (Dong, et al., 2012; Tsai, et al., 2009), and low scores on extraversion (van der Aa, et al., 2009; Xiuqin et al., 2010), agreeableness and emotional stability (van der Aa, et al., 2009) have been established as potentially important risk factors for Internet addiction. Internet gaming addiction specifically has been associated with neuroticism (Mehroof & Griffiths, 2010; Peters & Malesky, 2008), aggression and hostility (Caplan, et al., 2009; Kim, Namkoong, et al., 2008; Mehroof & Griffiths, 2010), introversion (Caplan, et al., 2009), social inhibition (Porter, et al., 2010), sensation-seeking (Mehroof & Griffiths, 2010), and diminished agreeableness (Peters & Malesky, 2008). In spite of the substantial evidence for the role of personality traits, far less is known about interactions between personality traits and specific uses of the Internet in increasing the risk of being addicted to the Internet.

In terms of risk populations, students have been identified (Widyanto & Griffiths, 2006) for several reasons. They have a natural affinity towards the Internet (Veen & Vrakking, 2006) and their conspicuous Internet literacy has been linked to Internet addiction (Leung & Lee, 2012a). Moreover, they typically have (i) free and unlimited access, (ii) flexible schedules, and (iii)

freedom from parental interference. Additionally, their online activities are not externally controlled, university bodies expect that they make use of the technology, and university settings can foster social intimidation and alienation (Moore, 1995; Young, 2004). Furthermore, psychological and developmental factors associated with young adulthood may contribute to the allure of the Internet for students. They do not only find themselves in the process of developing their identities, but they also start to establish intimate relationships at that particular stage of their lives. To develop one's identity means to become detached from one's parents to a certain extent leading to internal conflicts which are repeatedly resolved by the escape into addictions of all sorts, including Internet addiction (Lanthier & Windham, 2004). Accordingly, the Internet can become a source of self-medication (Castiglione, 2008).

Correspondingly, forming online relationships is more facile than doing the same in real life. On the Internet, people disclose personal information more readily because of medium's anonymity (Kandell, 1998; Mantovani, 2001). By the same token, young students may be hampered in the processes of forming an individual identity and establishing real, meaningful and intimate relationships outside of the arena of the virtual world. In addition to this, students are likely to create a new student culture which necessitates the Internet as a tool for communication, information sharing and community formation (Kandell, 1998). Some studies have shown that as many as six in ten students jeopardize their academic and professional performance because of their Internet habits (Kubey, Lavin, & Barrows, 2001; Young, 1998b), and that in order to cope, they engage in Internet activities excessively (Castiglione, 2008).

In university student populations, Internet addiction prevalence estimates range from 0.8% in Italy (Poli & Agrimi, 2012), 0.9% in Jordan (Al-Qudah, 2001), 2.8% in Iran (Ghamari, Mohammadbeigi, Mohammadsalehi, & Hashiani, 2011), 5.6% in China (Dong, et al., 2012), 9.8% in the USA (Anderson,

2001), to 15.1% in Taiwan (Lin, et al., 2011), 16.2% in Poland (Lićwinko, Krajewska-Kułak, & Łukaszuk, 2011), and 18.3% in Great Britain (Niemz, Griffiths, & Banyard, 2005). However, the wide range of prevalence estimates indicates that the variety of psychometric instruments utilized does not allow for a clear determination of actual prevalence rates for Internet addiction. None of the above studies have made use of assessment tools that allow for an identification of clinically relevant Internet addiction. Furthermore, and to the authors' knowledge, no study to date has ever assessed the interactions between the usage of specific Internet applications and personality traits as risk factors for Internet addiction. In the present study, these shortcomings will be overcome. In order to address the gaps in empirical knowledge, the aims of this study were (i) to assess the prevalence of clinically significant levels of Internet addiction in an English student sample, and to (ii) discern the interplay between personality traits and specific Internet uses in increasing the risk for Internet addiction. Based on previous research, in the present study, the hypotheses were that (i) the use of Internet applications that allow social functions (i.e., SNSs, chatting, forums, messengers) and gaming are strong risk factors for Internet addiction, and (ii) the particular personality traits (i.e, high neuroticism, low extraversion, and low agreeableness) are risk factors for Internet addiction.

## Methods

### *Design*

This study used a cross-sectional online data gathering technique. Emails were sent to students' personal email accounts and contained information about the study as well as the link to the online questionnaire. The total questionnaire contained 120 questions and required approximately 15 minutes to complete.



### *Participants*

A convenience sample comprising 2,257 students from an English university in the East Midlands participated in the study. The sample characteristics are presented in Table 1. The mean age was 22.67 years ( $SD = 6.34$  years), with a range from 18 to 64 years. In terms of gender distribution, approximately one-third of the sample was male and two-thirds female. Participants were from 94 countries, 78.1% were born in the United Kingdom, 8.7% in another European country, 7.2% in Asia, and 3.4% in Africa. The majority (82.8%) were studying for an undergraduate degree, with 14.1% and 3.1% studying for a Master's degree and a PhD degree, respectively. Most students identified humanities as their primary discipline (45.8%), with social sciences and life sciences being identified by 29.2% and 25.1%, respectively. The students had used the Internet for an average of 9.9 years ( $SD = 2.9$  years).

### *Materials*

In addition to basic demographic information, the online survey comprised a number of different psychometric tools to assess Internet addiction and personality traits.

Table 1  
Sociodemographics of Total Sample and Subsamples of Not Addicted and Addicted Students

Students (N = 2,257)	N	Percent of total	Not addicted (n)	Percent of total	Addicted (n)	Percent of total	Overall $\chi^2$	Effect size <sup>a</sup>
<i>Age (years)</i>								
Mean (SD)	22.67 (6.34)		22.69 (6.36)		22.26 (5.69)			
18-21 years	1366	62.0	1321	59.9	45	2.0		
22-25 years	473	21.5	457	20.7	16	0.7		
26-30 years	168	5.3	161	7.3	7	0.3		
31-40 years	116	5.3	115	5.2	1	0		
41-65 years	82	3.7	80	3.6	2	0.1	2.78	CV = .01
<i>Sex</i>								
Male	794	35.6	767	34.4	27	1.2		
Female	1438	64.6	1396	62.5	42	1.9	0.39	$\eta = .01$
<i>Relationship status</i>								
Yes	307	13.8	302	13.6	5	0.2		
No	1910	86.2	1848	83.4	62	2.8	2.36	$\eta = .03$
<i>Field of study</i>								
Humanities	972	45.8	944	44.5	28	1.3		
Social sciences	619	29.2	602	28.4	17	0.8		
Natural sciences	532	25.1	514	24.2	18	0.8	0.45	CV = .02
<i>Level of study</i>								
Bachelor's	1555	82.8	1505	80.1	50	2.7		
Master's	264	14.1	255	13.6	9	0.5		
Doctorate	59	3.1	59	3.1	0	0	2.00	CV = .03

Note1. A respondent is classified as "addicted user" when he or she scored >13 on the AICA-S.

Note2. Due to missing values, the sum total of participants may not equal 2,257 for each variable analysed.

<sup>a</sup>Effect size CV = Cramer's V

*Internet addiction*

In order to assess Internet addiction, the Assessment for Computer and Internet Addiction-Screener (AICA-S; Wölfling, et al., 2010) was used. The screener is a brief self-report instrument, based on the original Scale for the Assessment of Pathological Computer Gaming (Wölfling, Müller, & Beutel, 2011). The AICA-S includes questions relating to key sociodemographic data as well as structural provisions, such as Internet access and the onset of Internet use. More specifically, it targets the frequency of specific Internet usage domains, such as online games, shopping, gambling, emails, chats/forums, social networking, messengers, and information research. Additionally, it enquires into associated negative consequences and the extent to which usage is pathological from a diagnostic point of view. Fourteen out of the total sixteen main questions are used in order to accumulate a clinical score, on the basis of which the participants' online usage behaviour can be categorized in normal or addictive (from 13.5 points onwards) (Müller & Wölfling, 2011).

The individual diagnostically relevant items derive from the diagnostic criteria of substance dependence as specified by the international classification manuals, the DSM-IV-TR (APA, 2000) and the ICD-10 (Dilling, Mombour, & Schmidt, 2000). These include craving, tolerance, withdrawal, loss of control, preoccupation and negative consequences concerning poorer health, family conflicts or deteriorating achievements (Wölfling, et al., 2010). A recent literature review of empirical studies as presented in Chapter 2 that assesses online gaming addiction to date indicates that the applicability of substance dependence criteria for Internet addiction appears valid over and above other classification efforts (Kuss & Griffiths, 2012b). In addition to these addiction criteria, the AICA-S enquires into further scientifically relevant themes

associated with Internet addiction, namely mood modification<sup>6</sup> (Item 11, which asks how frequently the participant is online in order to avoid negative feelings, such as boredom or sorrow), as well as quantitative and qualitative usage measures (such as Item 1 assessing mean online hours per day, compared to Item 3, which enquires into the frequency of Internet usage on the basis of the following answer options: every day, 2-3 times a week, once a week, once a month or less than once a month). In terms of its psychometric qualities, the AICA-S is reliable in its measure of Internet addiction and it is valid in terms of assessing Internet addiction exclusively and accurately (Wölfling, et al., 2010). The AICA-S is presented in Appendix V.

#### *Personality measures*

Personality traits were assessed using the NEO Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992b). It is a valid and reliable instrument for measuring basic personality traits that stem from a variety of personality frameworks and language uses related to personality as well as statistical factor analyses. The NEO-FFI is the 60-item self-report short version of the original NEO-Personality Inventory-Revised (NEO-PI-R; Costa & McCrae, 1992a) and measures the big five personality traits. The first one, neuroticism, is associated with anxiety, angry hostility, depression, self-consciousness, impulsiveness, and vulnerability. The second, extraversion, is characterized by warmth, gregariousness, assertiveness, activity, excitement-seeking, and positive emotions. The third, openness to experience, includes fantasy, aesthetics, feelings, actions, ideas, and values. The fourth, agreeableness, relates to trust, straightforwardness, altruism, compliance, modesty, and tendermindedness. Finally, the fifth, conscientiousness, is distinguished by competence, order,

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<sup>6</sup> The relationship between behavioural addictions generally and Internet addiction specifically and mood modification is confirmed in empirical studies conducted by Grüsser and Thalemann (2006) as well as Holden (2001).

dutifulness, achievement striving, self-discipline, and deliberation (Costa & McCrae, 1992b). The NEO-FFI is presented in Appendix VI.

### *Statistical analyses*

Initially, students who were classed as addicted to the Internet and those who were not were compared regarding (i) their overall Internet use, (ii) the number of problems they experienced, and (iii) their AICA-S scores. This was done using independent samples t-tests assuming unequal variances due to the unequal group sizes. For the main analyses, the assumptions of linearity, independence of errors, and multicollinearity of the relevant variables were checked. For all analyses, weighted data were used in order to balance out the unequal gender distribution, and predictors were centered at their mean to evade multicollinearity problems of the interaction terms (Aiken & West, 1991). Following the inspection of data regarding the assumptions that yielded satisfactory results, a logistic regression analysis was performed with Internet addiction status as binary outcome variable (i.e., the dependent variable was addicted versus not addicted) and the main effects of all application uses and all personality traits as predictors. In addition to this, gender was added. Male gender has been repeatedly claimed to be a risk factor for Internet addiction (Leung & Lee, 2012a; Tsai, et al., 2009). Due to the absence of significant gender differences in the sample, gender was excluded from any further analyses. This also allowed for the development of a more parsimonious model. The significant predictors as well as all interactions between the significant personality traits and the significant Internet application uses were included in another logistic regression analysis. The final model includes all significant interactions as well as the relevant main effects predictive of Internet addiction. In order to discern the simple effects, linear regression analyses were performed.

## Results

Results indicated that 3.2% of the students (95% CI [2.5, 3.9]) in the present sample were classified as being addicted to the Internet. As presented in Table 2, the addicted students used the Internet significantly longer than the non-addicted students for leisure purposes on weekdays ( $t(53.76) = -2.10, p < .05$ ), and weekend days ( $t(55.11) = -7.28, p < .01$ ). All of the addicted students used the Internet every day, compared to 91.7% of the non-addicted students. Moreover, the addicted students experienced significantly more problems due to their Internet use compared to the non-addicted students ( $t(62.68) = -12.41, p < .01$ ). Finally, the addicted students scored significantly higher on the AICA-S than the non-addicted students ( $t(77.57) = -44.19, p < .01$ ). The baseline model including no predictors was significant ( $b = -3.340, \text{Wald } X^2(1) = 761.17, p < .01$ ), indicating that the chance for being addicted to the Internet by the overall study population was .03.

In comparison, the final model as presented in Table 3 predicted Internet addiction status significantly ( $X^2(10) = 115.53, p < .01$ ) and explained 21.5% of the variance in scores (Nagelkerke's  $R^2 = .215$ ). Table 4 presents the model classification. In terms of personality traits, neuroticism was the strongest predictor of Internet addiction ( $b = 1.20, \text{Wald } X^2(1) = 31.81, p < .01$ ). Moreover, every unit increase in neuroticism increased the odds to be addicted to the Internet by 233%. Students addicted to the Internet scored significantly higher on the NEO subscale of neuroticism ( $M = 3.44, SD = 0.69$ ) than non-addicted students ( $M = 2.90, SD = 0.70, X^2 = 170.91, p < .01$ ).

The second personality trait predictive of Internet addiction was agreeableness ( $b = -.61, \text{Wald } X^2(1) = 5.47, p < .05$ ). Every unit increase in the agreeableness score decreased the odds of being addicted to the Internet by 46%. Students addicted to the Internet scored significantly lower on the NEO subscale of agreeableness ( $M = 3.31, SD = 0.58$ ) than non-addicted students ( $M$

Table 2  
*Internet Use and Internet Addiction in Addicted and Not Addicted Students*

	Addicted ( <i>n</i> = 71)	Not addicted ( <i>n</i> = 2,160)	<i>t</i> ( <i>df</i> )
	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	
<i>Internet use</i>			
Hours/weekdays	7.79 (9.52)	5.05 (5.55)	2.10* (53.76)
Hours/weekend days	8.47 (4.05)	4.39 (3.56)	7.28** (55.11)
<i>Addiction</i>			
AICA-S score	15.66 (2.02)	4.71 (2.66)	44.19* (77.57)
Number of problems	3.61 (1.54)	1.12 (1.36)	12.41** (62.68)

\*\*  $p < .01$ ; \*  $p < .05$ .

Table 3  
*Logistic Regression of Personality and Internet Application Use on Internet Addiction*

	B (SE)	95% CI for Exp(B)		
		Lower	Exp(B)	Upper
Constant	-4.35 (.23)			
Shopping*Neuroticism	-.60* (.26)	.33	.55	.91
Games*Openness	.50* (.24)	1.01	1.64	2.64
Chats/forums	.47** (.13)	1.24	1.60	2.08
Shopping	.86** (.24)	1.48	2.35	3.74
Messengers	.42** (.14)	1.15	1.52	2.00
SNSs	.59* (.25)	1.11	1.81	2.95
Games	.18 (.14)	.91	1.20	1.56
Neuroticism	1.20** (.21)	2.10	3.33	5.05
Agreeableness	-.61* (.26)	.33	.54	.91
Openness	.41 (.26)	1.50	1.03	2.52

Note.  $R^2 = .215$  (Nagelkerke). Model  $X^2(10) = 115.53$ ,  $p < .01$ . \*\*  $p < .01$ , \*  $p < .05$ .

Table 4  
*Model Classification*

	Normal	Addicted	Percentage correct
Normal	2045	1	100.0
Addicted	63	3	4.5
Overall percentage			97.0

= 3.55,  $SD = 0.49$ ,  $X^2 = 130.10$ ,  $p < .01$ ). In addition to this, students addicted to the Internet scored significantly higher on the NEO subscale of openness ( $M = 3.47$ ,  $SD = 0.49$ ) than non-addicted students ( $M = 3.33$ ,  $SD = 0.50$ ,  $X^2 = 120.59$ ,  $p < .01$ ).

Regarding Internet application use, online shopping appeared as the strongest predictor of Internet addiction ( $b = .86$ , Wald  $X^2(1) = 13.06$ ,  $p < .01$ ). Every unit increase in online shopping increased the odds of being addicted to the Internet by 135%. Addicted students scored significantly higher on online shopping ( $M = 2.16$ ,  $SD = 0.74$ ) than not addicted students ( $M = 1.87$ ,  $SD = 0.72$ ,  $X^2 = 11.84$ ,  $p < .01$ ). Furthermore, all social applications significantly increased the odds of being addicted to using the Internet. The use of social networking sites increased the odds by 81% ( $b = .59$ , Wald  $X^2(1) = 5.62$ ,  $p < .05$ ), chat rooms and forums increased the odds by 60% ( $b = .47$ , Wald  $X^2(1) = 12.66$ ,  $p < .01$ ), and using instant messengers increased the odds by 52% ( $b = .42$ , Wald  $X^2(1) = 8.82$ ,  $p < .01$ ). Compared to non-addicted students, addicted students scored significantly higher on their use of social networking sites ( $M = 2.78$ ,  $SD = 0.57$ , vs.  $M = 2.53$ ,  $SD = 0.80$ ,  $X^2 = 10.36$ ,  $p < .05$ ), online chat rooms and forums ( $M = 1.40$ ,  $SD = 1.12$ , vs.  $M = 0.80$ ,  $SD = 0.87$ ,  $X^2 = 48.71$ ,  $p < .01$ ), and online instant messengers ( $M = 2.06$ ,  $SD = 0.99$ , vs.  $M = 1.51$ ,  $SD = 0.97$ ,  $X^2 = 40.40$ ,  $p < .01$ ).

In addition to the significant main effects, two interactions appeared as important predictors of Internet addiction. Firstly, the interaction between openness to experience and online gaming increased the odds of being addicted to the Internet by 64% ( $b = .50$ , Wald  $X^2(1) = 4.20$ ,  $p < .05$ ). On closer inspection of the simple effects (see Figure 1), it appeared that in the addicted group, openness to experience significantly predicted the extent of online gaming ( $b = .55$ ;  $F(1) = 4.43$ ,  $p < .05$ ;  $R^2 = .06$ ). No such effect was discerned in the non-addicted group ( $b = .03$ ;  $F(1) = .74$ , *ns*).



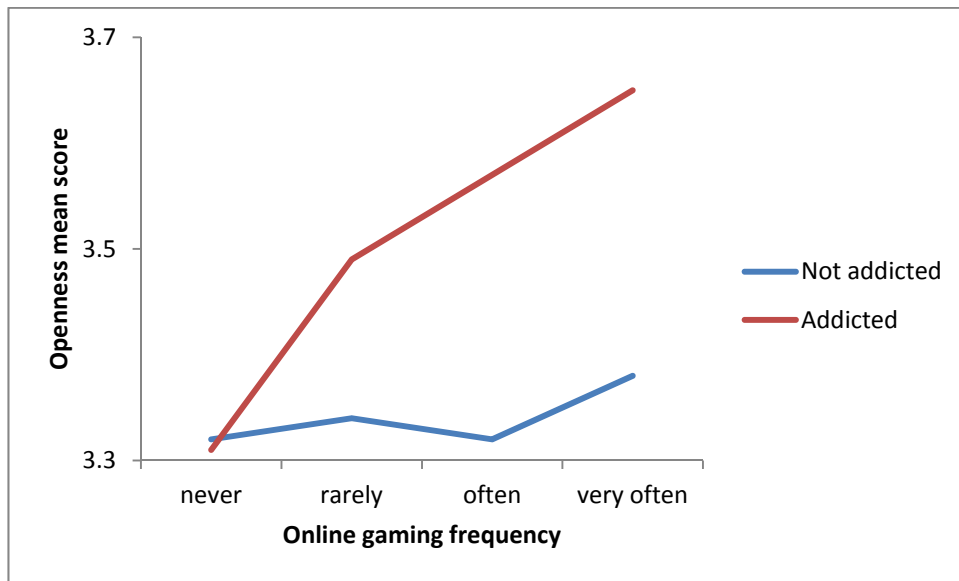


Figure 1  
*Interaction Effect of Gaming Frequency and Openness on Internet Addiction*

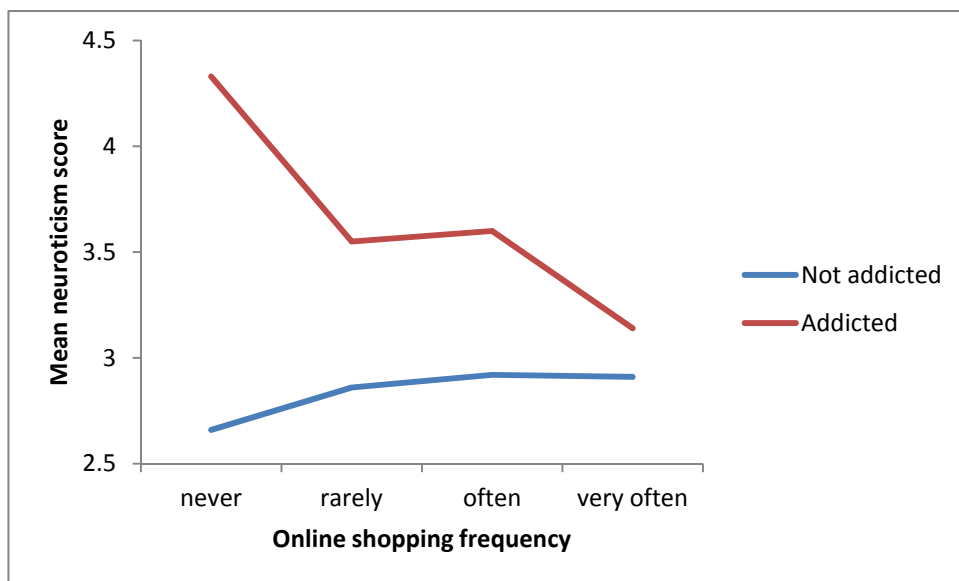


Figure 2  
*Interaction Effect of Online Shopping Frequency and Neuroticism on Internet Addiction*

Secondly, the interaction between neuroticism and online shopping decreased the odds of being addicted to the Internet by 45% ( $b = -.60$ , Wald  $X^2(1) = 5.50$ ,  $p < .05$ ). On closer inspection of the simple effects (see Figure 2), it appeared

that in the addicted group, neuroticism significantly predicted the extent of online shopping ( $b = -.30$ ;  $F(1) = 5.70$ ,  $p < .05$ ;  $R^2 = .08$ ). No such effect was discerned in the non-addicted group ( $b = .03$ ;  $F(1) = 1.38$ , *ns*).

### Discussion

In this study, the risk for Internet addiction was assessed on the basis of the interactions between personality traits and the use of specific Internet applications with an assessment tool that allowed for a determination of clinically relevant Internet addiction. To the authors' knowledge, no previous studies have done this. Based on the clinical self-report tool utilized, it was found that a total of 3.2% of the students in the present sample were classified as being addicted to the Internet. The prevalence in this student sample appears to be situated on the rather conservative end of Internet addiction estimates in students from a variety of countries that range from 0.8% (Poli & Agrimi, 2012) to 18.3% (Niemz, et al., 2005). The very high estimate of nearly 20% in Niemz et al.'s study is the only prevalence estimate available for English students so far. Rather than assessing established and validated addiction criteria as based on the diagnostic manuals, it merely inquired into problems due to extensive use. In contrast, the AICA-S assesses Internet addiction as based on actual diagnostic criteria and is used in daily clinical practice, making it the only diagnostic tool of its kind utilized to date. Consequently, rather than limiting the pathological classification to the presence of individual impairments, the AICA-S can be seen as initial indicator for real and potentially clinically relevant maladaptive behaviours. Therefore, the rather conservative prevalence of 3.2% found here appears reasonable and substantiated.

Regarding the hypotheses, it was found that the use of all social applications significantly increased the risk for being addicted to the Internet,

which is in line with the hypotheses concerning the use of specific online applications. Some previous research has indicated that communication pleasure is the strongest predictor of Internet addiction (Chou & Hsiao, 2000b), which is supportive of the present conjecture indicating that extensive use of social online applications is a risk factor for Internet addiction. Of all the online applications examined in this study, it was the use of SNSs that most increased the risk of being addicted to the Internet (i.e., 81% increased chance). In light of the empirical evidence base, this finding appears corroborated. To date, the literature base investigating SNS addiction is reasonably scarce. However, it suggests that SNSs are mostly used for the maintenance of established offline networks that are important for academic and professional opportunities, and thus might explain why some individuals become addicted to using them (Kuss & Griffiths, 2011). The most prominent SNS with more than 900 million users worldwide, *Facebook*, was in fact specifically developed as a virtual community for students (Carlson, 2010), and therefore it may not be surprising that it is students who use it excessively and in a potentially addictive manner. Interestingly, recent research indicates that females may appear to be a particular population at risk (Andreassen, Torsheim, Brunborg, & Pallesen, 2012), which indicates that further research into this aspect is required.

The next Internet application that significantly increased the risks of being addicted to the Internet was online chat/forums (i.e., increased chance by 60%). Unlike SNSs and instant messengers, chat rooms and forums are commonly used to interact with strangers and/or virtual acquaintances rather than real life friends (Wellman & Gulia, 1999). In a previous study (Whitty, 2002), it was found that people tend to use chat rooms for emotional support and this may indicate that when there is no emotional support available in the real life setting, a person is more likely to turn to the Internet for this purpose. Students who have just left their familiar home surroundings, study in different cities and/or

countries may feel more alienated and start using chat functions of the Internet to excess. This explanation is supported by other research (Simkova & Cincera, 2004), indicating that students who use online chat functions are more likely to be addicted to using the Internet relative to other students.

Online forums, on the other hand, can be used for a variety of purposes, such as being a platform for knowledge collection as well as discussion (Cheng, Liu, & Shieh, 2012). Furthermore, similar to online chat rooms, online forums may serve the function of giving and receiving support (Morrow, 2006) in a variety of domains, such as occupational problems (Deryakulu & Olkun, 2007), and providing professional advice to those struggling with their physical and/or mental health (Smithson et al., 2011; Welz et al., 2011). As with online chat rooms, online forums may be a substitute for real life contacts, and engagement with them could lead to excess, as suggested by the results of this study. However, it needs to be noted that in this study, the usage of online chat rooms and forums was assessed together. Unlike forums, chat rooms are a synchronous mode of communication, and therefore require direct interaction in real time. Alternatively, the asynchronicity of forums may potentially have a different effect on the risk of developing Internet addiction. Therefore, merging the use of chat rooms and forums may have decreased the specificity of measure because it is unclear to what extent the usage of each of these Internet applications was specifically a risk factor for Internet addiction.

The final social Internet application to increase the risk for being addicted to the Internet was online instant messaging (i.e., increased chance by 51%). Previous research has found that the reasons for increased use of instant messengers (e.g., ICQ, MSN) in young populations are media richness and presentational control (Sheer, 2010). Moreover, previous research suggests that in addition to being emotionally open online, heavy use of the messenger ICQ predicts problematic Internet use over and above the use of any other online

(social) Internet application (Leung, 2004). Synchronous communication tools such as ICQ may be used in order to modify mood and to escape real lives and real life problems, and could therefore result in the development of problematic behaviours (Wellman, 1996), that are in turn exacerbated through a simultaneous retreat from real life relationships (Leung, 2004). This may therefore result in a vicious cycle in such a way that real life problems lead to escape via Internet usage, which in turn increases those problems, so that the students find even more reason to continuously engage in online activities.

This study also demonstrated that engaging in online gaming increased the risks of being addicted to the Internet when paired with higher openness to experience. Students who played online games frequently and whose scores on the NEO-FFI subscale for openness were elevated at the same time, had a 64% increased risk of being addicted to the Internet. This is an original finding that has yet to be replicated. Increased novelty seeking that is linked to openness to experience has been associated with Internet addiction (Ko, et al., 2010). Moreover, it appears from research into substance dependence that openness to experience is associated with marijuana use, which differentiates the latter from any other drug users (Terracciano, et al., 2008). The associations between marijuana addicts and Internet gaming addicts with regards to higher openness to experience require further examination in the future.

For the first time in any empirical study, online shopping was found to be a significant risk factor for Internet addiction in a university student population. Frequent engagement in this activity significantly increased the odds for being addicted to the Internet by 81%. Students shop online because of convenience, price, and larger selection of products (Delafrooz, Paim, & Khatibi, 2010), customer service (Ahuja, Gupta, & Raman, 2003), anonymity and pleasure (Kukar-Kinney, Ridgway, & Monroe, 2009). Anonymity and pleasure have been found to have strong correlations with compulsive buying, indicating that the

absence of social interaction and the possibility to buy unobserved may facilitate compulsive shopping behaviours online (Kukar-Kinney, et al., 2009). In light of students who spend large amounts of their time online for the purpose of research, coursework, and socializing, online procrastination may potentially lead to shopping excess. On the one hand, they may devote large amounts of time to researching the best deal, which, on the other hand, will reward them with a pleasurable experience that is just one click away.

Counter-intuitively, this study found that Internet addicts who shopped online frequently had decreased neuroticism scores. High neuroticism has been repeatedly linked with Internet addiction (Dong, et al., 2012; Tsai, et al., 2009), and was found to increase the odds of being addicted to the Internet by 233% in this study, making it the strongest predictor. Due to the increased odds for Internet addiction as a consequence of both frequent shopping and high neuroticism, it would be expected that an interaction of the two would have a similar effect on increasing the risk. However, the interaction between online shopping and neuroticism decreased the odds for being addicted to the Internet by 45%. From a hedonistic viewpoint, this finding could be explained by the speculation that in order to make themselves feel better, neurotics shop online frequently, which in turn reduces their perceptions of depression and anxiety, which are commonly associated with neuroticism. Just as neurotics are found to use drugs such as nicotine for the purpose of self-medication (McClernon, Hiott, Westman, Rose, & Levin, 2006), students' use of online shopping in this study may fulfill a similar purpose. This finding is unprecedented and adds to our knowledge about the associations between both problematic and specific uses of the Internet and personality.

Low agreeableness increased the risk of Internet addiction by 46%. Low agreeableness corresponds to what Zuckerman identified as *aggression-hostility* (Zuckerman, 2002). In a previous study, aggressive behaviours were linked to

Internet addiction in adolescents after controlling for watching violence on television (Ko, Yen, Liu, et al., 2009). The authors explained this relationship by arguing that online anonymity may lead to a decrease of personal responsibility and deindividuation (Zimbardo, 1969). Online disinhibition (Joinson, 1998) as demonstrated in flaming and other aggressive behaviours on the Internet may therefore be transferred into real life (Ko, Yen, Liu, et al., 2009), and may have significant negative consequences both for the addicted individual as well as their interpersonal relations both online and offline.

Unlike the predicted hypothesis, the scores on the extraversion subscale of the NEO-FFI did not have an influence on the risk of being addicted to the Internet. This could be explained by previous findings indicating that both extraversion as well as introversion may play a role in the extent of Internet use (Ross et al., 2009; Zywicki & Danowski, 2008). People with large offline social networks, who are more extroverted, and who have higher self-esteem, use online networks for social enhancement, supporting the principle of 'the rich get richer'. On the other hand, people with only a limited number of real life contacts compensate for their introversion, low self-esteem, and low life-satisfaction by using SNSs for online popularity, thus supporting the social compensation hypothesis of 'the poor get richer' (Barker, 2009; Ellison, et al., 2007; Mehdizadeh, 2010). Therefore, high introversion and high extraversion scores, respectively, might have cancelled out each other's effects on Internet addiction in the present study.

Overall, the included variables explained 21.5% in the variance of addiction. Compared to prior studies, this percentage is relatively low. For instance, Hsu, Wen, and Wu (2009) conducted a study on addiction and found five experience factors, curiosity, role playing, belonging, obligation, and reward predict addiction. In their study, the five factors predicted 65.1% of the variance in addiction. The relatively low R square value in this study may

indicate there are still some other risk factors that require further study in order to explain Internet addiction. In addition, the present study examined the risk of addiction using a clinically verified cut-off point, whereas Hsu et al. (2009) looked at the extent of addiction from a dimensional point of view that may have contributed to dissimilar explained variances.

### *Limitations*

The present study is not without its limitations. Firstly, other Internet applications that have not been assessed here (i.e., the use of YouTube, online video streaming, online support groups, etc.) may also impact upon Internet addiction. These online applications and their relationship with excessive and/or addictive use need to be evaluated in the future. Secondly, the AICA-S does not specifically address a time criterion in determining Internet addiction status. Therefore, researchers are encouraged to replicate the findings by examining the occurrence of the specified addiction symptoms within the period of the last twelve months, as utilized for substance dependence (American Psychiatric Association, 2000). In addition to this, it needs to be noted that a self-report tool in and of itself can never be the sole criterion upon which to base an actual mental health diagnosis. It can merely be an indicator of potentially addictive behaviours. Therefore, it is recommended that ideally, self-reports should be supplemented with significant others' reports and/or a professional assessment via a structured clinical interview (Beard, 2005). Thirdly, a convenience sample was used which limits the generalizability of findings beyond English university populations. Bearing this in mind, cross-cultural comparisons using the same measurement instruments are warranted. Fourthly, as gender did not significantly increase the risk of being addicted to the Internet, it was excluded from further analyses in line with our aim to arrive at a parsimonious model. This does not preclude the possibility that gender interacts with one or more of the other predictors in increasing Internet



addiction risk. Therefore, care should be taken in future studies that focus on gender to investigate these relationships further.

### ***Implications***

Findings from this research have implications for university and government bodies who may put regulatory mechanisms in place that limit the usage of potentially addictive Internet applications particularly for those students whose personality puts them at risk for developing Internet addiction. In terms of prevention, children and adolescents with specific risk factors may be targeted via their schools to educate them about the potential risks the problematic engagement with specific online applications can bring about. Furthermore, clinicians will benefit from this piece of research as findings of the present results may aid them in developing targeted treatment approaches that benefit high-risk individuals by tailoring therapy according to their individual needs. Finally, this research informs future studies that may specifically (i) replicate the original findings (i.e., the specific interaction effects) (ii) in other populations, and potentially (iii) supplement the self-reports with additional diagnostic tools, such as professional interviews, and (iv) assess the extent to which gender mediates the detected findings.

### **Conclusion**

Overall, the present study integrated previous findings concerning the influence of both, specific personality traits, as well as the usage of particular Internet applications, into a coherent framework, drawing on previous literature. In addition to this, for the first time, it showed the interaction of the assessed variables in increasing the risk factors for being addicted to the Internet. In sum, the present research adds to the current pool of knowledge that substantiates the American Psychiatric Association's decision to include Internet Gaming Disorder in the DSM-5.

Following an in-depth assessment of the prevalence and risk of Internet addiction in two independent samples, the next two chapters will present a novel and parsimonious model of Internet addiction and establish a nomological framework for it.

## CHAPTER 6

### **Assessing Internet addiction using the parsimonious Internet addiction components model**

#### **Introduction**

Over the last decade, the pervasiveness of the Internet has increased radically. Usage has grown by 239% in the developed world (International Telecommunication Union, 2012). This technology-driven interconnectivity is paralleled by an increase in research indicating that excessive Internet use can lead to symptoms that are associated with problems and/or addiction (Ko, Yen, Chen, et al., 2009; Leung & Lee, 2012b; Young, 2010). Internet addiction has been described as a 21<sup>st</sup> century epidemic (Christakis, 2010) with prevalence estimates ranging from 0.3% in the USA (Aboujaoude, Koran, Gamel, Large, & Serpe, 2006) to 18.3% in Great Britain (Niemz, et al., 2005). The discrepancy in prevalence estimates is a consequence of not only the population studied (for example Niemz et al. [2005] studied a restricted student sample), but also the measurement instruments utilised to identify people as being addicted to using the Internet vary in terms of classification and cut-off points for psychopathology. Research on Internet addiction is still in its relative infancy and in order to progress further, more specific and sensitive criteria need to be established in order to aid in accurate clinical diagnosis.

To date, the official diagnostic criteria for pathological gambling (Kaltiala-Heino, et al., 2004; Young, 1999) and substance dependence (Armstrong, et al., 2000; Nichols & Nicki, 2004; Yuen & Lavin, 2004) are most commonly applied to diagnose Internet addiction both in survey research and in clinical settings. The proposed revision of the *Diagnostic and Statistical Manual for Mental*

*Disorders* (DSM-V) (American Psychiatric Association, 2012b) makes pathological gambling the first behavioural addiction to be recognised alongside substance-related addictions and it theoretically paves the way for other excessive behaviours to be classified as actual addictions. If one behaviour can be classed as an addiction without the ingestion of a psychoactive substance, there is no reason why other non-chemical behaviours could not be potentially classed as addictions in future revisions. Among those, Internet addiction stands out as the APA decided to include it in the appendix of the DSM-5 (2012a). In accordance with substituting the category of Substance Related Disorders with Addiction and Related Disorders (American Psychiatric Association, 2012b), the components model of addiction (Griffiths, 2005b) postulates substance-related and behavioural addictions (such as Internet addiction) develop via similar biopsychosocial processes and share a number of characteristics, most notably the addiction criteria of salience, mood modification, tolerance, withdrawal, relapse, and conflict. Salience indicates the person is preoccupied with their behaviour on a number of levels, namely cognitively (their thinking revolves around their behaviour), emotionally (they crave for their substance/behaviour), and behaviourally (other behaviours, i.e., social interactions, are neglected). Someone addicted to the Internet may constantly think about the next time they are going to use the Internet, crave for logging on to their favourite sites, and sacrifice social interactions for being online. Mood modification occurs when the person uses their substance/behaviour in order to elevate depressed moods and escape their real life. The use of the Internet makes them feel better and lets them forget about everyday problems (Young, 2004). Tolerance denotes the requirement to increase the amount of engagement in the addictive behaviour to produce an experience similar to initial behaviour engagement. Over time, the individual may need to increase their time or the intensity of being online to feel the same pleasurable effects (Tsai & Lin, 2003). Withdrawal can occur when the

individual decreases or discontinues their behaviour, resulting in negative physiological and psychological symptoms.

For those addicted to the Internet, physiological symptoms can include psychosomatic problems, weakened immunity and physiological dysfunction (Cao, et al., 2011), whereas psychological symptoms most notably include depression and anxiety (Yen, Ko, et al., 2007). Conflict denotes both the interpersonal and intrapsychic problems that arise as a consequence of the behaviour. Individuals addicted to the Internet jeopardise their relationships with others for the sake of Internet use (Liu & Kuo, 2007), and may lose control over their usage (Treuer, Fabian, & Furedi, 2001), which can lead to internal conflict. Finally, relapse denotes the unsuccessful efforts to quit the engagement in the behaviour if the person is trying to cease (Griffiths, 2005b). In Internet addicted individuals there may be an inability to remain abstinent or to moderate their addictive behaviour (Murali & George, 2007). Taken together, the component model of addiction contributes to a robust account of substance-related and behavioural addictions that is explicative in denoting their acquisition, development and maintenance. Support for the components model comes from a number of studies assessing behavioural addictions, such as exercise (Griffiths, Szabo, & Terry, 2005), shopping (Clark & Calleja, 2008), gaming (Lemmens, et al., 2009), work (Andreassen, Griffiths, Hetland, & Pallesen, 2012), and social networking addiction (Andreassen, Torsheim, et al., 2012).

Relatedly, the syndrome model of addiction postulates that all addictions develop via similar distal antecedents that increase vulnerability, including neurobiology and psychosocial context (Shaffer, et al., 2004). Proximal antecedents such as specific negative events and/or the continued use of the psychoactive substance and/or engagement in the behaviour may lead to a change in the individual. Different addictions are manifested that are dissimilar

in their expression (e.g., drug addiction, or Internet addiction), but share some essential domains, such as symptoms, addiction history, psychology, sociology and treatment approaches. Moreover, addictions as such may not be specific to a particular object or behaviour and one substance or behaviour can be easily substituted by another one (Shaffer, et al., 2004). Research supports the likelihood of people switching between substance use or behaviour engagement, such as the use of nicotine following drug treatment (Conner, Stein, Longshore, & Stacy, 1999). Additionally, the use of substances and the engagement in behaviours can co-occur (Smith, Farrell, Bunting, Houston, & Shevlin, 2001). For instance, pathological gambling, substance dependence and alcohol use are commonly experienced together (El-Guebaly et al., 2006).

Further evidence for the syndrome model of addiction has accrued given different forms of addictions share neurobiological similarities. The role of the neurotransmitter dopamine in behavioural as well as in substance-related addictions has been stressed repeatedly (Lopez-Moreno, Gonzalez-Cuevas, Moreno, & Navarro, 2008; Volkow, Fowler, Wang, Swanson, & Telang, 2007). Similarly, it appears substance-related addictions and Internet and gaming addiction share a variety of neurobiological mechanisms (Kuss & Griffiths, 2012c), such as reward deficiency (Blum, Cull, Braverman, & Comings, 1996) as a consequence of lack of dopaminergic activity (Liu et al., 2010), the resulting modifications in brain structure (Lin, et al., 2012; Volkow, Fowler, & Wang, 2003), and the impairment of cognitive functioning as a consequence of the addiction (Dong, Zhou, & Zhao, 2011; Littel et al., 2012). Taken together, the components and syndrome model of addiction contend that behavioural addictions do not rank behind substance-related addictions in terms of pathogenesis and phenomenological expression. Accordingly, in this paper it is argued that Internet addiction is comparable to other addictions that have been shown to fit the addiction components model. This research aims to lend further

support to behavioural addictions and a unitary addiction model which corroborates the APA's efforts to replace the restrictive Substance-Use Disorder category with Addiction and Related Disorders (American Psychiatric Association, 2012b) and to include Internet Use Disorder in the revised DSM (American Psychiatric Association, 2012a). In the present study, it is hypothesised that Internet addiction predicts the endorsement of the Internet addiction components salience, mood modification, tolerance, withdrawal, conflict and relapse, as represented in Figure 1.

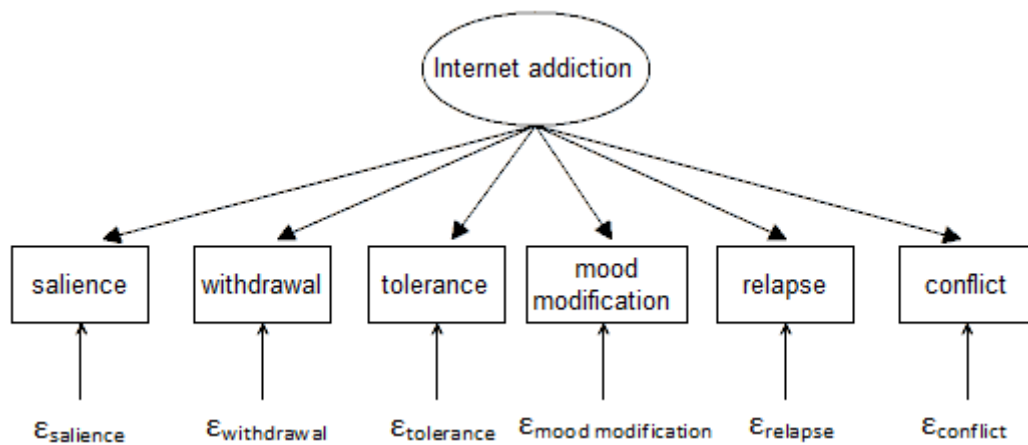


Figure 1  
*Internet Addiction Components Model*

In order to investigate this conjecture, two prominent Internet addiction measures are scrutinised as to their explanatory power of the components model view of Internet addiction across age using two independent samples of adolescents and young adults, respectively. The aim is to provide converging evidence concerning the degree to which Griffiths' addiction components model (2005b) can organize the self-reported behavioural components of Internet addiction using the Compulsive Internet Use Scale (CIUS) (Meerkerk, et al., 2009) and the Assessment for Internet and Computer Game Addiction Scale (AICA-S) (Wölfling, et al., 2010). The rationale for this study is to provide a more stringent test of the proposed model by using different samples and different measures.

## Methods

The present study used a cross-sectional design and integrated two independent data sets collected by the authors, which are described in turn. This study has received ethical approval by the relevant bodies at the respective institutes.

### *Participants*

The first sample (S1) consisted of the 2011 subsample of the annual Monitor Study “Internet and Youth” as described in Chapter 4. A total of 3,105 valid responses from students in 13 secondary schools in the Netherlands stratified with regards to region, urbanisation and school level were received. The adolescents’ mean age was 14.23 years ( $SD = 1.07$  years) and 51.70% were female. Of the participants, 54.2% had a higher education qualification (i.e., they participated in HAVO [“Hoger Algemeen Voortgezet Onderwijs”] or VWO [“Voorbereidend Wetenschappelijk Onderwijs”] schooling, the completion of which would allow them to enter higher education). Detailed information of the respective sample characteristics can be found in Table 1. Following the agreement to participate, pen-and-paper questionnaires were distributed to 3,756 students in participating schools. The total response rate was 84%.

The second sample (S2) was an opportunity sample of 2,257 students from an English university in the East Midlands (England) as described in Chapter 5. The mean age was 22.67 years ( $SD = 6.34$  years), and 64.4% were female. Of these students, 82.8% were undergraduates. Detailed information of the respective sample characteristics can also be found in Table 1. Emails were sent to students at a university in the East Midlands including relevant information about the study as well as the link to the online questionnaire. Participation was incentivised through a lottery for vouchers.



Table 1  
*Sociodemographic Information of Included Samples*

	S1 (N = 3,105)	S2 (N = 2,257)
<i>Age (years)</i>		
M (SD)	14.23 (1.07)	22.67 (6.34)
Range	11 - 19	18 - 64
<i>Sex</i>		
Male	48.3%	35.6%
Female	51.7%	64.4%
<i>Country</i>	The Netherlands	England
<i>Level of study<sup>1</sup></i>		
Higher education qualification	54.2%	100%
Undergraduate	-	82.8%
Postgraduate	-	17.2%

*Note.* In the level of study section, Dutch adolescents were classed as having higher education qualification when their schooling was in HAVO/ VWO.

## **Materials**

### *Internet addiction assessment in Sample 1*

In order to assess Internet addiction in S1, the Compulsive Internet Use Scale (CIUS) (Meerkerk, et al., 2009) was used. The CIUS is a self-report instrument that assesses Internet addiction with 14 questions scored on a 5-point Likert scale ranging from 0 (“never”) to 4 (“very often”) and conceptualises Internet addiction as the addiction to certain online activities (i.e., not the Internet per sé), leading to compulsive Internet use (Meerkerk, et al., 2009). It examines a number of addiction symptoms based on official substance dependence and pathological gambling criteria (American Psychiatric Association, 2000) as well as Griffiths’ addiction components (2005b), including loss of control, salience, withdrawal, mood modification, and conflict. However, it does not assess tolerance. To date, no clinically validated cut-off point for Internet addiction as measured via the CIUS has been proposed. However, it has been shown that

when the CIUS scoring is divided into clusters, the average of the highest scoring cluster is 2.8/2.9 (van Rooij, et al., 2011b), which translates to a score of 28 following the adopted scoring in the present study. Based on van Rooij et al.'s study (2011b), Rumpf and colleagues (2011) adopted a minimum score of 28 out of a possible total of 56 that may be indicative of psychopathology.

As a psychometric tool, the 14-item version of the CIUS assessing the unidimensional construct of Internet addiction has been validated, and is reliable as it demonstrated sound construct and concurrent validity, factorial stability and internal consistency in an adolescent sample (Meerkerk, et al., 2009). Moreover, its usage in the current sample has been validated in a previous study (Kuss, van Rooij, Shorter, Griffiths, & van de Mheen, 2013) as presented in Chapter 4. The wording of the CIUS was slightly adjusted for use in the Dutch adolescent sample. The CIUS is presented in Appendix III.

#### *Internet addiction assessment in Sample 2*

Internet addiction in the English university student sample was measured using Wölfling, Müller and Beutel's Assessment for Internet and Computer Game Addiction Scale (AICA-S) (2010). Initially devised as diagnostic tool in a clinical setting, the AICA-S is a 16-item self-report instrument that assesses both Internet usage (i.e., structural requirements for Internet use, age of onset, frequency of and specific Internet application use, such as gaming) and Internet addiction. Internet addiction is modelled and based on the official diagnostic criteria for substance dependence as outlined in the DSM IV-TR (American Psychiatric Association, 2000) and the ICD-10 (World Health Organization, 1992). In addition to substance dependence criteria, mood modification is also examined (i.e., item 11: "How often do you avoid negative feelings by being online?"). Items are scored on a 5-point Likert scale ranging from 0 ("not at all"

or “never”) to 4 (“very strongly” or “very often”). The diagnosis of Internet addiction is applied when an individual scores higher than 13 from a possible total score of 24 (Wölfling, et al., 2010). In a clinical setting, 11.3% of adolescent psychiatric inpatients were found to fulfil the diagnostic criteria (Müller, et al., 2012). In terms of its psychometric qualities, the AICA-S measures Internet addiction reliably, accurately and exclusively. Its internal consistency is optimal with Cronbach’s  $\alpha = .88$  (Wölfling, et al., 2010), and its utility in assessing Internet addiction in the present sample has been demonstrated in a previous study (Kuss, Griffiths, & Binder, 2013), as presented in Chapter 5. The AICA-S is presented in Appendix V.

### ***Behavioural addiction assessment***

In order to evaluate the extent to which each of the measurement instruments assesses Internet addiction as behavioural addiction, each instrument’s items were compared against Griffiths’ (2005) addiction components. Best fit was determined via the items’ match with the components’ description as well as a cross-check with the author of the original model. For each component, the single item most representative of the behavioural addiction components per questionnaire was used in order to avoid possible multicollinearity or singularity problems, which could decrease model identification. A confirmatory approach regarding the literal content of the respective addiction components was chosen over an exclusively exploratory statistical “specification search” (MacCallum, 1986) as it has been noted that it is “an art to find a fragile balance between dutiful theoretical considerations and statistical interpretations” (Boomsma, 2000, p. 474). The aim was to represent the addiction components items as closely as possible from a contentual point of view using each of the two included scales. A detailed compilation of behavioural addiction items and their equivalents in the respective Internet

addiction measurement instruments is provided in Table 2, including the respective standardised betas and R square values.

Table 2  
*Internet Addiction Components*

Component	AICA-S	$\beta$ (SE)	R <sup>2</sup>	CIUS	$\beta$ (SE)	R <sup>2</sup>
Salience	How strongly are you mentally preoccupied with the Internet during a day? (item 5)	.59 (.02)	.35	Do you think about the Internet, even when not online? (item 6)	.65 (.02)	.42
Withdrawal	Do you feel moody if you cannot be online? (item 7)	.78 (.01)	.61	Do you feel restless, frustrated, or irritated when you cannot use the Internet? (item 14)	.71 (.02)	.51
Tolerance	Did you recognise having to be online more often or for a longer time to feel good or relaxed again? (item 8)	.87 (.01)	.75	-		
Mood modification	How frequently do you avoid negative temper or feelings by surfing the Internet? (item 11)	.65 (.02)	.42	Do you use the Internet to escape from your sorrows or get relief from negative feelings? (item 13)	.60 (.02)	.36
Relapse	How often have you tried to quit or restrict surfing the Internet? (item 12)	.49 (.02)	.24	Have you unsuccessfully tried to spend less time on the Internet? (item 9)	.61 (.02)	.37
Conflict	Did you face problems or negative consequences because of your Internet usage? (item 15)	.55 (.02)	.30	Do you neglect your daily obligations (school, or family life) because you prefer to go on the Internet? (item 11)	.60 (.02)	.36

### *Statistical analyses*

Statistical analyses were performed using *Mplus* (Muthén & Muthén, 2011). Initially, both samples were compared regarding the participants' Internet addiction scores, Internet addiction prevalence, and endorsement of behavioural addiction criteria. Relationships between the Internet addiction components were assessed using polychoric correlations as the former were treated as ordered categorical rather than continuous (Muthén & Asparouhov, 2002). Next, two independent confirmatory factor analyses (CFA) were conducted for each of the assessment instruments. CFA was used in order to validate the construct of the Internet addiction components model. CFA was

the method of choice as it accounts for measurement error, unlike typically used ordinary least square techniques such as multiple regression and correlation (Brown, 2006). The exogenous latent variable was Internet addiction, whereas the observed variables were the addiction components from each scale. The observed variables were treated as ordinal rather than continuous (Jöreskog, 2005) using robust weighted least squares (WLSMV) (Brown, 2006). In comparison to ordinary weighted least squares analyses (WLS), WLSMV is more robust with regards to non-normality of data and less restrictive with regards to sample size, and it corrects means and variances (Flora & Curran, 2004). Missing data were excluded only if cases were missing on all variables (i.e., in S1, 26 cases were excluded, and in S2, 4 cases were excluded). Other than that, missing data were treated as missing at random (MAR) as there were no missing data patterns apparent from the analyses. These missing data were handled as pairwise present (i.e., they were replaced by estimates using information available from pairs of variables and the entire data set to account for relationships in the data as suggested by Little and Rubin (2002)).

## Results

The results indicate that on average, Dutch adolescents scored 9.72 of a possible 56 on the CIUS, whereas English students scored 5.04 out of 24. Based on the respective cut-off criteria, 3.67% of Dutch adolescent sample and 3.18% of the English university students were classified as being addicted to using the Internet. Detailed information on Internet addiction prevalence and Internet addiction components can be found in Table 3.

Table 3  
*Internet Addiction Prevalence and Internet Addiction Components Across Samples*

	S1	S2
<i>Internet addiction</i>		
<i>M (SD) on CIUS/AICA-S [max. score]</i>	9.72 (8.07) [56]	5.04 (3.26) [24]
Prevalence	3.67%	3.18%
<i>Internet addiction components<sup>1</sup></i>		
Salience	2.1%	11.8%
Withdrawal	5.3%	10.8%
Tolerance	-	7.8%
Mood modification	4.9%	17.1%
Relapse	3.5%	8.5%
Conflict	4.6%	16.7% <sup>2</sup>

*Note 1.* Components were endorsed often and very often by the respective samples.

*Note 2.* For the English students, conflict was endorsed when they experienced problems in a minimum of three areas of their life out of a possible of six.

The endorsement of the respective Internet addiction components was assessed across samples. Participants who indicated they experienced the respective symptoms either often or very often (and thus falling in the category for frequent experience of symptoms) were taken into account to provide frequencies. Overall, the English university students endorsed all components more frequently, with mood modification and conflict standing out at 17.1% and 16.7%, respectively, compared to 4.9% and 4.6% in the Dutch adolescent sample. The associations between the Internet addiction components pairs in the respective samples were moderate to large. In the Dutch adolescent sample, the correlations varied between the lowest ( $r = .33$ ) for mood modification and conflict, and the highest ( $r = .46$ ) for withdrawal and salience, each representing a medium effect (Cohen, 1992), substantiating their conceptual relatedness. A correlation matrix is presented in Table 4 rather than a variance-covariance matrix as the former includes less rounding error and may still be used to create the latter directly (Brown, 2006).

Table 4  
*Correlation Matrix for CIUS Internet Addiction Components*

	Saliency	Withdrawal	Mood modification	Relapse
Withdrawal	.46			
Mood modification	.39	.44		
Relapse	.40	.41	.38	
Conflict	.38	.44	.33	.37

In the English university student sample, the correlations between the Internet addiction components varied between being weak ( $r = .25$ ) for relapse and saliency, moderate, and strong ( $r = .69$ ) for withdrawal and tolerance, demonstrating their association. The correlations between the AICA-S Internet addiction components are presented in Table 5.

Table 5  
*Correlation Matrix for AICA-S Internet Addiction Components*

	Saliency	Withdrawal	Tolerance	Mood modification	Relapse
Withdrawal	.49				
Tolerance	.53	.69			
Mood modification	.35	.48	.55		
Relapse	.25	.34	.40	.37	
Conflict	.30	.39	.42	.42	.37

Overall, for both Internet addiction measures, the Internet addiction components model was a good fit to the data, where CFI and TLI  $\geq .95$ , RMSEA  $< .07$ , and WRMR  $\geq 1$  indicate excellent fit (Hooper, Coughlan, & Mullen, 2008; Hu & Bentler, 1999; Steiger, 2007; Yu, 2002). In S1, model fit was excellent ( $X^2(5) = 6.33, ns$ ; CFI = .999, TLI = .999, RMSEA = .009, WRMR = .347). In S2, model

fit was acceptable ( $X^2(9) = 121.37, p < .01$ ; CFI = .984, TLI = .973, RMSEA = .074, WRMR = 1.281). The RMSEA value was marginally higher than a previously suggested optimal score (Hooper, et al., 2008; Hu & Bentler, 1999). A number of researchers have indicated that numerical cut-off points for model fit indices are arbitrary and should be viewed more flexibly in light of the respective models and data (Hayduk & Glaser, 2000; Steiger, 2000). The value for the weighted root-mean-square residual (WRMR) deviates marginally from the estimated excellent fit,  $\geq 1$  (Yu, 2002). As the fit statistic WRMR is experimental and research on it is still in its infancy, its developers contend that if all other fit indices are good, WRMR does not have to be used (Muthén, 2012).

### Discussion

The Internet addiction components model as based on the addiction components model of Griffiths (2005b) presented in this paper showed good fit to the data of two independent samples using two validated assessment instruments. In the first sample, salience, withdrawal, mood modification, relapse and conflict loaded highly on the Internet addiction components factor using the Compulsive Internet Use Scale (Meerkerk, et al., 2009) in a large sample of Dutch adolescents. However, the CIUS does not include an item assessing tolerance to using the Internet. In their original article, Meerkerk and colleagues (2009) stated that in a previous qualitative study, they had found that this component did not appear to be an integral characteristic of Internet addiction. From the present data, it is unclear whether the addition of tolerance as addiction component would have changed the model in any way. In this regard, conclusions about disregarding tolerance as key addiction component appear premature. Results from a psychophysiological study measuring gamblers' heart rates (Griffiths, 1993) strongly suggested that tolerance was present among regular gamblers compared to non-regular gamblers. Griffiths



demonstrated that arousal levels among regular gamblers (as measured by heart rates) decreased immediately upon cessation of gambling compared to non-regular gamblers whose arousal levels remained elevated. This evidence suggests that tolerance is indeed an integral component of pathological gambling and may thus be similarly relevant as Internet addiction symptom.

A recent review of online game addiction surveys concluded that tolerance (when operationalized as spending more time gaming to affect one's feelings (as does the AICA-S) in contrast to spending more time without a reason), seemed indeed to be a component of online gaming addiction (Hellman, Schoenmakers, Nordstrom, & van Holst, 2013). On the other hand, spending more time online might be something different than physiological habituation reactions, which could be indicators of loss of control. Nevertheless, in the present study, the evidence in favour of including tolerance as key Internet addiction component is limited to one of two assessments. Given the parallels between different types of addiction, future research should aim to further investigate the role of tolerance in Internet addiction.

Similarly, in the second sample, salience, withdrawal, tolerance, mood modification, relapse and conflict were acceptable in explaining the Internet addiction components model using the Assessment for Internet and Computer Gaming Addiction Scale (Wölfling, et al., 2010) in a large sample of English university students. All of the models' items contributed significantly to explaining the Internet addiction components factor. Once the model is validated in clinical samples and tested for sensitivity and specificity, it may be similarly useful in highlighting individuals at risk for developing Internet addiction or Internet addiction itself. Moreover, the results of the correlation analyses indicate that both measurement instruments assess the Internet addiction components that constitute a valid construct with acceptable reliability.

The results of this study show that the addiction components model is useful for assessing Internet addiction using two distinct scales applied to two separate samples, making a strong claim in favour of the parsimonious model for psychometric (pre-) diagnostic evaluation of Internet addiction. The usefulness of the addiction components model for Internet addiction has implications for Internet addiction assessment in different populations, notably adults and adolescents, as well as residents in different European countries. Ultimately, the applicability of the addiction components model to yet another behavioural addiction suggests that the syndrome model of addictions as proposed by Shaffer et al. (2004) is viable.

In this study, the English university students were more likely to endorse the Internet addiction components frequently relative to the Dutch adolescents. This could indicate that (i) symptoms were present more frequently, (ii) university students subjectively experienced their symptoms to be present more frequently than adolescents, or that (iii) adolescents do not recognise their behaviours as being problematic. With regards to (i) and (ii), the subjective experience of symptoms appears to be an important indicator of psychopathology because individuals are the best judge of the extent to which their addiction impacts upon their life (Larkin & Griffiths, 2002). Also, as both studies used convenience samples, differences may be caused by random factors instead of real differences in the respective populations. Concerning (iii), adolescents' cognitive control capabilities related to impulse control, foresight, and resistance to peer pressure may not have fully developed (Andrews-Hanna et al., 2011), indicating that the adolescents may lack introspective ability to comprehend potentially problematic Internet usage.

### *Limitations*

A number of limitations require mentioning. Self-report instruments were used in order to assess Internet addiction, which may decrease the validity of

achieved classifications (i.e., in some cases, self-reports may be prone to deception and self-serving biases). A self-report can never suffice for diagnosing Internet psychopathology (Beard, 2005). Nevertheless, the choice of self-report measures has a number of advantages, which pay tribute to their widespread usage and scientific acceptability. These include practicality (ease of administration and cost-effectiveness), interpretability, and information richness. Typically it is assumed that the individual is the best person to be a judge of him- or herself (Paulhus & Vazire, 2009).

In addition to this, the procedures in the two studies differed. In S1, pen-and-paper questionnaires were distributed, whereas in S2, participants were asked to fill in online questionnaires. It has been argued that online, participants tend to be more honest and therefore their answers appear to have higher validity relative to offline (Griffiths, 2010a). If this were the case, the higher endorsements of each one of the Internet addiction components in the university students who filled in the survey online may indicate that the endorsement in the adolescent group may have been underestimated due to contextual factors, such as social desirability and relative lack of anonymity. In order to verify this conjecture, the study requires replication assessing the different groups with online versus offline surveys which will allow for comparisons to be made.

Moreover, the samples utilised in this study are different with regards to both age group as well as national residence. This may have decreased the comparability of results. Nevertheless, the analyses showed that both measures utilised in order to assess Internet addiction were comparable as the data from both samples provided a good fit to the Internet addiction components model. In addition to this, prevalence rates were comparable with 3.2% and 3.7% between samples. Ultimately, viewing Internet addiction from the perspective of the Internet addiction components model appears valid as two

questionnaires using two independent samples provide empirical evidence for it.

### *Implications*

The present research has implications for research and clinical practice in the field of addictive disorders. It has been established that Internet addiction is comparable to other behavioural addictions fulfilling common addiction criteria, including salience, mood modification, tolerance, withdrawal, conflict and relapse. It has also shown that two independent scales for the assessment of Internet addiction can be significantly reduced and still retain a stable one-factor solution, which evidences the applicability of the addiction components model (Griffiths, 2005b) to popular Internet addiction measures. Over the last decade, the addiction components model has formed the basis for instruments measuring exercise addiction (Griffiths, et al., 2005), shopping addiction (Clark & Calleja, 2008), gaming addiction (Lemmens, et al., 2009), work addiction (Andreassen, Griffiths, et al., 2012), and social networking addiction (Andreassen, Torsheim, et al., 2012). The results of the present analysis confirm that the model has utility in assessing the Internet addiction components factor.

In terms of clinical practice, treating addiction as a syndrome implies that therapy approaches focusing on behavioural disorders such as Internet addiction may profit from the wide array of knowledge that exists in the domain of evidence based treatment for substance related addictions (Glasner-Edwards & Rawson, 2010). However, at present, treatment facilities and organisational health care structures appear to offer insufficient professional support for adolescents and adults suffering from addictions (McLellan & Meyers, 2004). The reported presence of Internet addiction in the samples presented here throws light on a ubiquitous problem and indicates that prevention efforts should commence from an early age and it calls for a system supportive of those in need. This is particularly important for activities which

theoretically do not have an age limit (i.e., the Internet or computers are being used by children in schools from an early age (Gray, Thomas, & Lewis, 2010)), possibly even from when they commence formal schooling.

Regarding recommendations for future research, it appears useful to study the Internet addiction components model using the CIUS including an item assessing tolerance. Tolerance is an integral criterion for both, substance dependence as well as pathological gambling in the current version of the DSM (American Psychiatric Association, 2000) and has been implicated in a number of prominent addiction models, such as the opponent process theory (Solomon, 1980), hedonic homeostatic dysregulation, and reward allostasis (Koob & Le Moal, 1997, 2001), as well as in experimental studies (i.e., Griffiths, 1993). It remains to be seen in how far the exclusion of tolerance in the CIUS is conducive to a potential review of criteria.

### **Conclusion**

In this study, Internet addiction was found to be a problem for a minority of adolescents and young adult university students. The AICA-S and the CIUS measured Internet addiction following the employed Internet addiction components framework well. Both instruments are grounded in substance dependence and pathological gambling criteria as set forth by the American Psychiatric Association (2000) and thus follow the same framework. The APA's reclassification of *Substance Use Disorders* into *Addiction and Related Disorders* (2012b) calls for a unitary addiction framework which can explain initiation and maintenance of both substance related and behavioural addictions and which views both from a disease framework (Kuss, 2012). Griffiths' (2005) addiction components appear to explain Internet addiction as operationalized by the questionnaires comprehensively, precisely and parsimoniously, and therefore

emphasise that Internet addiction can be assessed using a parsimonious framework. In sum, the two sample/two instrument approach provides converging evidence concerning the degree to which the components model can organize the self-reported behavioural components of Internet addiction.

The next chapter will make use of the Internet addiction components model as tested in this Chapter and will extend it by creating a nomological network by assessing its relationships with personality traits.

## CHAPTER 7

### **The Internet addiction components model and personality: Establishing construct validity via a nomological network**

#### **Introduction**

The increased ubiquity and portability of new digital media comes at a price. The last decade has witnessed a growing concern over excessive and sometimes problematic Internet use which is highlighted by a steadily growing research base (Byun, et al., 2009). Treatment approaches such as specialised cognitive-behavioural therapy (CBT) (King, Delfabbro, Griffiths, et al., 2012) and more controversial methods such as boot camps (Koo, Wati, Lee, & Oh, 2011) are being developed in order to provide professional support for those in need of help from problematic Internet use. Similar to substance-related addictions, Internet addiction is characterised by clinical symptoms leading to significant impairment and distress, which have led the American Psychiatric Association (APA) (2013) to include it in the current version of the Diagnostic and Statistical Manual for Mental Disorders (DSM-5) as *Internet Gaming Disorder* in the research appendix.

A number of factors have been associated with an increased risk of Internet addiction. These include the presence of comorbid psychiatric symptoms, such as obsessive-compulsive and depressive symptoms (Jang, Hwang, & Choi, 2008), the use of specific Internet applications, such as downloading, social networking, MSN use, Habbo Hotel, chatting, blogging, and online games (van Rooij, et al., 2010), being an adolescent (Leung, 2007), and/or being a university student (Widyanto & Griffiths, 2006). In addition to this, certain personality traits have been established as risk factors for Internet

addiction. For instance, a study of Dutch adolescents found that emotional stability, agreeableness, and conscientiousness as measured via the Quick Big Five Scale (QBF; Vermulst & Gerris, 2009) decreased the risk of Internet addiction operationalized with the Compulsive Internet Use Scale (CIUS; Meerkerk, et al., 2009), whereas resourcefulness increased it (Kuss, van Rooij, et al., 2013), as reported in Chapter 4. It has also been found that neuroticism as measured via the NEO-Five Factor Inventory (NEO-FFI) (Costa & McCrae, 1992b) increased the risk of Internet addiction as measured with the Assessment for Internet and Computer Game Addiction Scale (AICA-S; Wölfling, et al., 2010), whereas agreeableness decreased it in an English university student sample (Kuss, Griffiths, et al., 2013), as reported in Chapter 5. Moreover, in a sample of 204 individuals diagnosed with Internet addiction disorder and 100 control subjects from universities and high schools in Beijing it was found that the Internet addicts had lower extraversion and higher psychoticism scores (Xiuqin, et al., 2010) as measured via Eysenck's Personality Questionnaire Revised (EPQ-R) (Eysenck & Eysenck, 1975). Furthermore, in a sample of 7,888 adolescents in the Netherlands it was found that the likelihood of developing Internet addiction as assessed via the CIUS (Meerkerk, et al., 2009) increased with low agreeableness and emotional stability, and high introversion (van der Aa, et al., 2009). To add to this, in a sample of 868 university students in China, Internet addicts as classified via Young's Internet Addiction Test (Young, 1998b) scored more highly on the EPQ's neuroticism and psychoticism subscales than non-addicts (Dong, et al., 2012). Finally, in a sample of 1,360 university freshmen in China tested via the Chinese Internet Addiction Scale-Revision (CIAS-R; Chen, et al., 2003) and the EPQ (Eysenck & Eysenck, 1975), indicating that Internet addiction was associated with neuroticism (Tsai, et al., 2009).



From the framework of the components model of addiction (Griffiths, 2005b), Internet addiction appears as behavioural addiction that develops as a consequence of biopsychosocial processes along with situational and structural factors. Similar to any other substance-related addiction, Internet addiction is characterised by the following symptoms: salience, withdrawal, tolerance, mood modification, relapse and conflict. The previous chapter indicated the addiction components model conceptualises Internet addiction in a parsimonious and comprehensive way as indicated by good fit with data obtained from two independent samples using two separate Internet addiction measures. This suggests the Internet addiction components model is an empirically grounded theoretical construct.

As Internet addiction is a relatively recent phenomenon, research on this mental health problem is still in its infancy (Young, 2010). Therefore, it is of crucial theoretical and practical importance to develop a conceptual basis and a valid and reliable psychometric assessment tool for it. From a theoretical perspective, Cronbach and Meehl (1955) argue that it is necessary to understand the nature of a construct by comprehending the statistical or deterministic laws that underlie its appearance, namely its *nomological network*. The laws underlying this network can either link (i) observations to each other, (ii) constructs to observations, or (iii) constructs to each other (Cronbach & Meehl, 1955). In line with the principles of the nomological network that underlie a construct's validity, in this study the Internet addiction components model in addition to the respective personality traits are operationalised as theoretical constructs that have been observed in two distinct populations via psychometric self-reports. As the Internet addiction components model has recently been established (see Chapter 6), its theoretical understanding requires the development of a statistical model which is able to explain its associations with related constructs. The potential importance of this research is to establish

a nomological network of theoretical knowledge about the concepts of the Internet addiction components model and personality traits, their observed manifestations, as well as their associations.

Based on the findings presented in Chapters , in the present study it was hypothesised that (i) in a Dutch adolescent sample low emotional stability, low agreeableness, low conscientiousness, and resourcefulness predict the Internet addiction components factor, whereas in an English university student sample, it was predicted that (ii) neuroticism and low agreeableness predict the Internet addiction components factor. The overall aim of this study was to establish a nomological network for the Internet addiction components model by testing the predictive accuracy of personality traits on the Internet addiction components factor.

## Methods

### *Participants*

Two separate samples were used. Sample 1 (S1) contained a total of 3,105 adolescents aged 11 to 19 years ( $M = 14.2$ ,  $SD = 1.1$  years) sampled from high schools in the Netherlands. Sample 2 (S2) contained a total of 2,257 university students aged between 18 and 64 years ( $M = 22.7$ ,  $SD = 6.34$  years) from a university in the East Midlands of England. Detailed sample information are provided in Chapters 4 and 5.

### *Measures*

#### *S1 Personality traits*

Personality traits in S1 were measured using the 30-item Quick Big Five Scale (QBF) (Vermulst & Gerris, 2009), which is based on Goldberg's personality

markers (Goldberg, 1992). It assesses the Big Five personality traits extraversion, agreeableness, conscientiousness, emotional stability and resourcefulness. Extraversion is the extent to which the following characteristics are present or absent: talkative, introverted, quiet, reserved, withdrawn, and bashful. Agreeableness is the extent to which the participant indicates the following characteristics: kind, cooperative, sympathetic, pleasant, agreeable, and helpful. Conscientiousness consists of being organised, systematic, thorough, neat, careful, and not sloppy. Emotional stability is indicated by the degree of being anxious, irritable, touchy, nervous, fearful, and high-strung, all negatively scored. Finally, resourcefulness consists of being creative, complex, imaginative, artistic, deep and innovative. The QBF uses a 7-point Likert scale ranging from 1 ("is not completely correct") to 7 ("is exactly correct"), and total scores for the respective scales were derived by summing up the scores for the applicable items. The factor structure, validity and reliability of the scale have been evidenced in large adolescent samples in the Netherlands (e.g., Gerris et al., 1998; Harakeh, Scholte, DeVries, & Engels, 2006; Otten, Engels, & Van den Eijnden, 2008). The internal consistency of the personality trait scales in the present sample was good, with a *Cronbach's alpha* of .86 for extraversion, .84 for conscientiousness, .81 for agreeableness, .82 for emotional stability, and .75 for resourcefulness. The QBF is presented in Appendix IV.

#### *S1 Internet addiction components*

In order to assess the Internet addiction components in S1, the 14-item self-report Compulsive Internet Use Scale (CIUS) (Meerkerk, et al., 2009) was used. It enquires into the extent of compulsive Internet use on a 5-point Likert scale ranging from 0 ("never") to 4 ("very often"). From the original scale, five items (Items 6, 14, 13, 9 and 11 representing withdrawal, mood modification relapse, and conflict respectively) were extracted on the basis of Griffiths' addiction

components model (2005b), as reported in Chapter 6. They represent the best match between the respective CIUS items and five of the six core components of addiction as indicated by content and cross-check with the author. There is no item measuring tolerance on the CIUS scale. In Chapter 6, it has been shown that the Internet addiction components model showed a good fit to the data of S1. The internal consistency in the current sample was furthermore established to be acceptable with a Cronbach's *alpha* of .67. The CIUS is presented in Appendix III.

### *S2 Personality traits*

Personality traits in S2 were measured using the 60-item NEO-Five Factor Inventory (NEO-FFI) (Costa & McCrae, 1992b). It assesses extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience. Extraversion comprises warmth, gregariousness, assertiveness, activity, excitement-seeking, and positive emotions. Conscientiousness denotes the degree of competence, order, dutifulness, achievement striving, self-discipline, and deliberation. Neuroticism is characterised by anxiety, angry hostility, depression, self-consciousness, impulsiveness, and vulnerability. Finally, openness to experience is characterised by fantasy, aesthetics, feelings, actions, ideas, and values. The NEO-FFI uses a 5-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"), and total scores for the respective subscales were derived by summing the scores of the relevant items. A consistent factor structure, good validity and reliability of the scale have been verified in a range of university student samples (e.g., Anthony, Clarke, & Anderson, 2000; Chamorro-Premuzic, Furnham, Dissou, & Heaven, 2005; Heinström, 2005). The internal consistency of the personality trait scales was good, with a Cronbach's *alpha* of .79 for extraversion, .76 for agreeableness, .84 for conscientiousness, .86 for neuroticism, and .69 for openness to experience. The NEO-FFI is presented in Appendix VI.

### *S2 Internet addiction components*

In order to measure the Internet addiction components in S2, the 16-item self-report Assessment for Internet and Computer Game Addiction Scale (AICA-S; Wölfling, et al., 2010) was used. It is a diagnostic tool used in clinical settings and uses a 5-point Likert scale ranging from 0 (“not at all” or “never”) to 4 (“very strongly” or “very often”), whereas the presence of problems as a consequence of excessive or addictive Internet use is scored from 0.5 (one problem is present) to 3 (six problems are present). From the original scales, six items were most representative of the six addiction components, namely salience (AICA-S item 5), withdrawal (item 7), tolerance (item 8), mood modification (item 11), relapse (item 12), and conflict (item 15). In Chapter 6, it has been shown that the Internet addiction components model shows a good fit to the data in S2. The internal consistency of the Internet addiction components model in S2 was good with Cronbach’s *alpha* of .77. The AICA-S is presented in Appendix V.

### *Statistical analysis*

Structural equation modelling (SEM) was performed using *Mplus 6.11* (Muthén & Muthén, 2011). In both samples, analyses aimed to determine which personality traits predicted the Internet addiction components factor in a single multivariate regression model. In both samples, the Internet addiction components factor was treated as latent endogenous variable using the addiction components from each scale (CIUS in S1, and AICA-S in S2) as specified by Griffiths (2005b); the respective personality trait factors were used as exogenous latent variables (via the QBF in S1, and NEO-FFI in S2). Maximum likelihood estimation was used as the data were distributed normally (Kline, 2005). Missing data were excluded only if cases were missing on all variables (i.e., in S1, 26 cases were excluded, and in S2, 4 cases were excluded), and otherwise treated as missing at random (MAR). These missing data were

handled as pairwise present by being replaced by estimates using information available from pairs of variables and the entire data set to account for relationships in the data (Little & Rubin, 2002). Throughout, a .05 significance level has been adopted. Graphical representations of both models are presented in Figure 1 and Figure 2.

### Results

Mean scores on the Internet addiction components ranged between 0.4 and 0.6 in S1, and 0.6 and 1.4 in S2. Means and standard deviations for the Internet addiction components and personality trait total scores for S1 and S2 are presented in Tables 1 and 2. Mean scores on the personality trait totals ranged from 25.8 to 33.0 in S1, and 35.5 to 42.8 in S2. Overall, participants in both samples scored highest on agreeableness ( $M = 33.0$  in S1 and  $M = 42.8$  in S2) relative to any other personality trait, whereas the samples differed with regards to their scoring on all of the other personality traits. Notably, conscientiousness received the lowest mean score of all personality traits in S1 ( $M = 25.8$ ), whereas in S2, it was the second most highly scored personality trait ( $M = 42.4$ ).

In S1, all correlations between the exogenous latent variables were significant except for the correlation between emotional stability and resourcefulness ( $R = .03$ , *ns*). The other correlations were weak (i.e., for conscientiousness and extraversion  $R = -.06$ ,  $p < .01$ ) to strong (i.e., for emotional stability and extraversion,  $R = .78$ ,  $p < .001$ ). In S2, all correlations between the exogenous latent variables were significant except for the correlation between neuroticism and openness to experience ( $R = .03$ , *ns*) and agreeableness with openness to experience ( $R = .05$ , *ns*). The other correlations ranged from being weak (i.e., extraversion with openness to experience,  $R = .07$ ,  $p < .01$ ) to being moderate (i.e., extraversion with neuroticism,  $R = -.51$ ,  $p <$

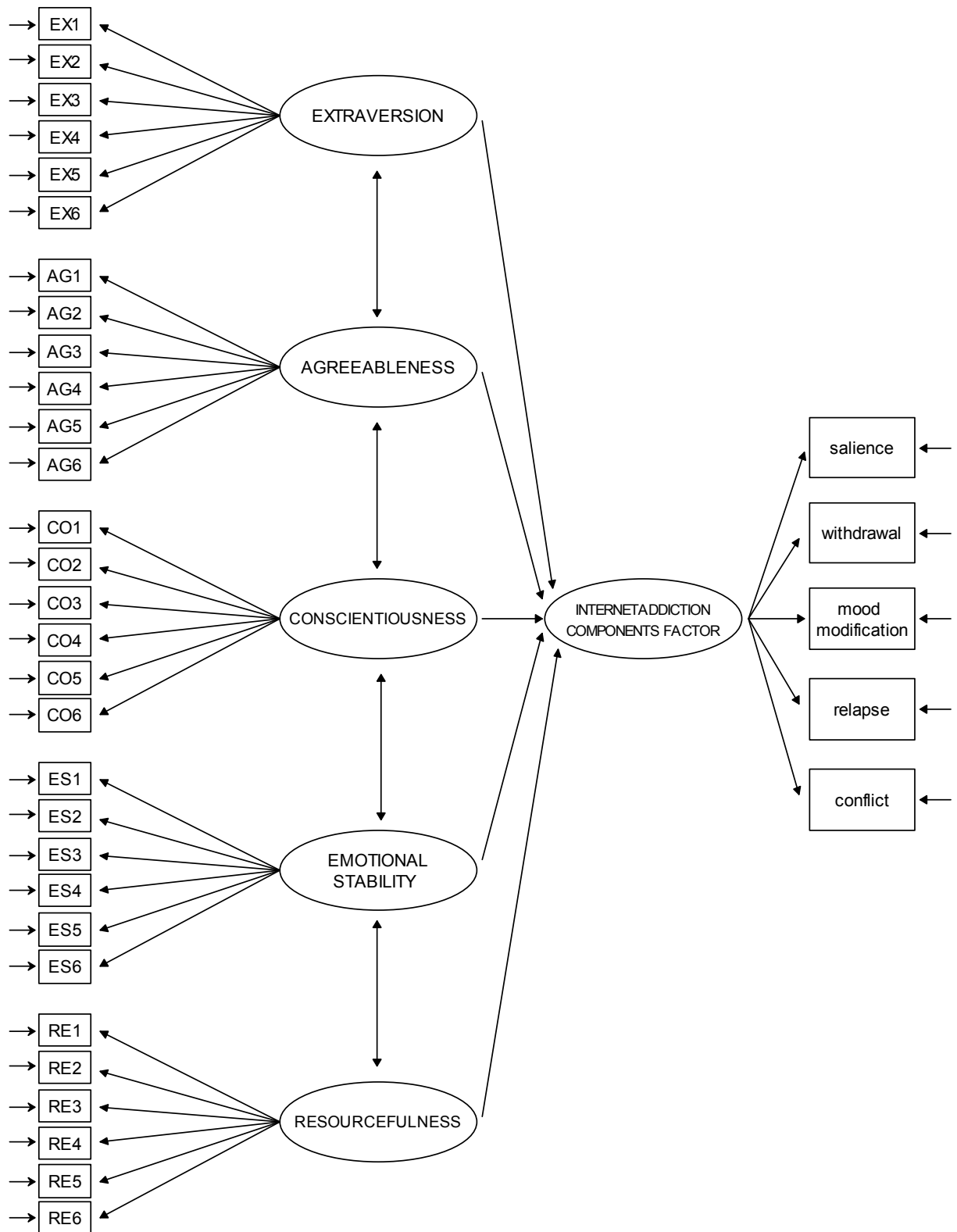


Figure 1  
*QBF Personality Traits Regressed on the Internet Addiction Components Factor in S1.*

Note. Representations of relationships between the respective personality factors and items and Internet addiction components have been omitted for the sake of presentation clarity.

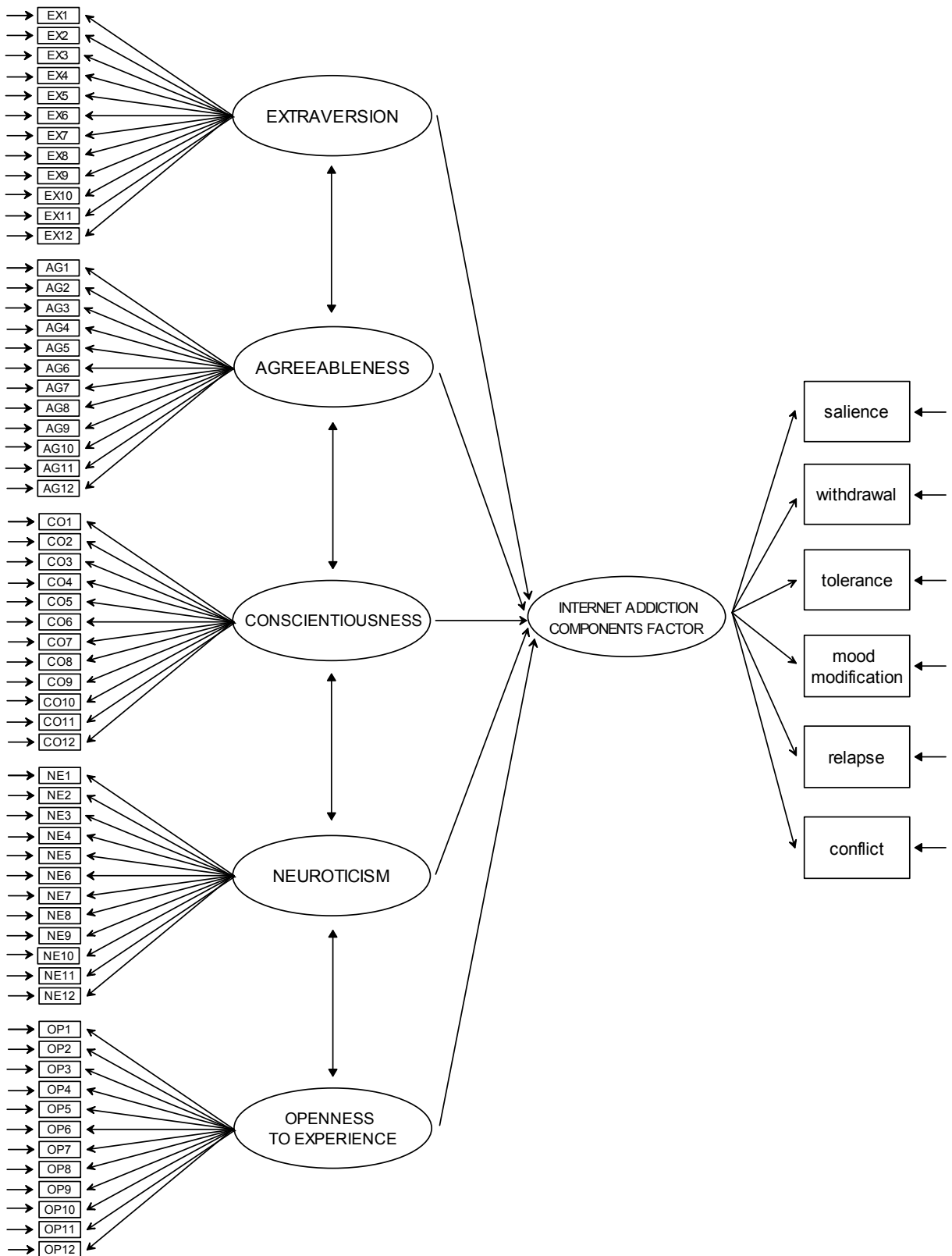


Figure X  
 NEO-FFI Personality Traits Regressed on the Internet Addiction Components Factor in S2.

Note. Representations of relationships between the respective personality factors and items and Internet addiction components have been omitted for the sake of presentation clarity.



Table 1  
Means, Standard Deviations and Ranges for Internet Addiction Components and Personality Trait Total Scores for S1

	<i>M</i>	<i>SD</i>	Range
Internet addiction components total	2.43	2.78	0 – 20
Saliency	0.37	0.72	0 – 4
Withdrawal	0.57	0.90	0 – 4
Mood modification	0.53	0.91	0 – 4
Relapse	0.46	0.81	0 – 4
Conflict	0.52	0.88	0 – 4
Extraversion	31.53	6.91	8 – 42
Agreeableness	33.02	4.87	6 – 42
Conscientiousness	25.81	7.02	6 – 42
Emotional stability	29.30	6.67	6 – 42
Resourcefulness	28.35	6.09	6 – 42

Table 2  
Means, Standard Deviations and Ranges for Internet Addiction Components and Personality Trait Total Scores for S2

	<i>M</i>	<i>SD</i>	Range
Internet addiction components total	6.30	4.01	0 – 20
Saliency	1.32	0.98	0 – 4
Withdrawal	1.13	1.04	0 – 4
Tolerance	0.99	0.99	0 – 4
Mood modification	1.41	1.11	0 – 4
Relapse	0.90	1.05	0 – 4
Conflict	0.59	0.71	0 – 3
Extraversion	40.33	6.31	15 – 57
Agreeableness	42.78	5.93	22 – 60
Conscientiousness	42.41	6.80	16 – 60
Neuroticism	35.50	8.40	12 – 58
Openness to experience	40.02	6.04	18 – 57

.001). The correlations between the exogenous latent variables for S1 and S2 are presented in Tables 3 and 4.

Table 3  
Correlations between Exogenous Latent Variables in S1

	Agreeableness	Conscientiousness	Emotional stability	Resourcefulness
Extraversion	.32**	-.06*	.78**	.15**
Agreeableness		.45**	.17**	.62**
Conscientiousness			-.07*	.34**
Emotional stability				.03

\*\*  $p < .001$ , \*  $p < .01$ .

Table 4  
*Correlations between Exogenous Latent Variables in S2*

	Agreeableness	Conscientiousness	Neuroticism	Openness to experience
Extraversion	.44**	.32**	-.51**	.07*
Agreeableness		.22**	-.26**	.05
Conscientiousness			-.35**	.09*
Neuroticism				.03

\*\*  $p < .001$ , \* $p < .01$ .

Overall, model fit indices for both Model 1 and Model 2 were equivocal. However, RMSEA values and SRMR indicated good fit. In both samples, RMSEA and corresponding confidence intervals were lower than .06 (Hu & Bentler, 1999) and the SRMR values were  $\leq .08$  (Schreiber, Stage, King, Nora, & Barlow, 2006). The advantages of the RMSEA relative to other fit indices include (i) sensitivity to misspecification of the developed model, (ii) current guidelines for interpretation lead to informed conclusions, and (iii) standard statistical programmes provide confidence intervals for the RMSEA value (MacCallum & Austin, 2000).

In S1, the personality trait items loaded onto the respective personality trait factors as expected, with standardised loadings ranging from .42 to .84. The standardised loadings of the Internet addiction components were similarly high, ranging from .50 to .64. The structural analysis revealed that agreeableness ( $\beta = -.13$ ), conscientiousness ( $\beta = -.05$ ), emotional stability ( $\beta = -.17$ ), and resourcefulness ( $\beta = .06$ ) significantly predicted the Internet addiction components factor (all  $ps < .001$ ). Overall, these personality trait factors explained 14.0% of the variance in the Internet addiction components factor ( $R^2 = .14$ ), indicating a small to medium effect (Cohen, 1992). A detailed account of unstandardised and standardised loadings for the full structural equation model in S1 is provided in T5.

Table 5

*Unstandardized Loadings (Standard Errors) and Standardized Loadings for Structural Equation Model of the Internet Addiction Components Factor on Personality in S1*

Latent construct and indicator for measurement model	Unstandardised loading (SE)	Standardised loading (SE)	<i>p</i>
<b>Internet addiction components factor</b>			
<i>Salience</i> : Do you think about the Internet, even when not online?	1.00 (.00)	.54 (.02)	.000
<i>Withdrawal</i> : Do you feel restless, frustrated, or irritated when you cannot use the Internet?	1.49 (.07)	.64 (.02)	.000
<i>Mood modification</i> : Do you use the Internet to escape from your sorrows or get relief from negative feelings?	1.27 (.07)	.54 (.02)	.000
<i>Relapse</i> : Have you unsuccessfully tried to spend less time on the Internet?	1.06 (.06)	.50 (.02)	.000
<i>Conflict</i> : Do you neglect your daily obligations (school or family life) because you prefer to be on the Internet?	1.15 (.06)	.50 (.02)	.000
<b>Extraversion</b>			
reserved	1.00 (.00)	.71 (.01)	.000
quiet	1.06 (.03)	.69 (.01)	.000
introverted	1.03 (.03)	.76 (.01)	.000
talkative	0.68 (.03)	.53 (.01)	.000
bashful	1.10 (.03)	.74 (.01)	.000
withdrawn	1.09 (.03)	.84 (.01)	.000
<b>Agreeableness</b>			
agreeable	1.00 (.00)	.58 (.01)	.000
helpful	1.32 (.05)	.70 (.01)	.000
kind	1.08 (.04)	.70 (.01)	.000
cooperative	1.37 (.05)	.75 (.01)	.000
pleasant	1.27 (.05)	.67 (.01)	.000
sympathetic	1.16 (.05)	.52 (.02)	.000
<b>Conscientiousness</b>			
sloppy	1.00 (.00)	.59 (.01)	.000
careful	1.08 (.04)	.72 (.01)	.000
organised	1.27 (.04)	.78 (.01)	.000
thorough	1.16 (.04)	.75 (.01)	.000
neat	1.25 (.04)	.80 (.01)	.000
systematic	0.76 (.04)	.48 (.02)	.000
<b>Emotional stability</b>			
irritable	1.00 (.00)	.42 (.02)	.000
nervous	1.76 (.08)	.74 (.01)	.000
touchy	1.56 (.08)	.59 (.01)	.000
anxious	1.56 (.08)	.63 (.01)	.000
fearful	1.53 (.07)	.73 (.01)	.000
high-strung	1.82 (.08)	.82 (.01)	.000
<b>Resourcefulness</b>			
imaginative	1.00 (.00)	.60 (.01)	.000
deep	0.73 (.04)	.42 (.02)	.000
complex	0.73 (.04)	.45 (.02)	.000
innovative	0.87 (.04)	.60 (.02)	.000
artistic	1.22 (.05)	.66 (.01)	.000
creative	1.25 (.05)	.72 (.01)	.000
Parameter estimates for the structural model			
	B	$\beta$	<i>p</i>
<b>Internet addiction components factor ON</b>			
Extraversion	.01 (.02)	.02 (.05)	.685
Agreeableness	-.13 (.03)	-.21 (.04)	.000
Conscientiousness	-.05 (.01)	-.13 (.03)	.000
Emotional stability	-.17 (.03)	-.29 (.04)	.000
Resourcefulness	.06 (.02)	.14 (.03)	.000

Model fit indices:  $\chi^2$  (545) = 7417.35,  $p < .001$ ; CFI = .83, TLI = .82; RMSEA (90% CI) = .06 (.06-.07); SRMR = .07.

In S2, all the personality trait items for the personality trait factors extraversion, agreeableness, conscientiousness, and neuroticism loaded highly onto their related factors. However, for openness to experience, there was evidence of low factor loadings including item OP8 which did not load significantly onto the openness to experience factor ( $\beta = -.03$ , *ns*), indicating that this factor did not explain a sufficient amount of variance in this item ( $R^2 < .01$ ). Items OP1, OP4, OP6, and OP7 were also low, with standardised factor loadings of .13, .26, .28, and .25, respectively. Other than that, the standardised loadings for the respective personality trait factors ranged from .06 to .78. The standardised loadings for the Internet addiction components were good, ranging from .44 to .79. The structural analysis revealed that extraversion ( $\beta = .15$ ), agreeableness ( $\beta = -.31$ ), conscientiousness ( $\beta = -.13$ ), and neuroticism ( $\beta = .47$ ) significantly predicted the Internet addiction components factor (all *ps* < .001). Overall, these personality trait factors explained 19.1% of the variance in the Internet addiction components factor ( $R^2 = .19$ ), indicating a small to medium sized effect (Cohen, 1992). A detailed account of unstandardised and standardised loadings for the full measurement and structural equation model in S2 is presented in T6.

Table 6

*Unstandardized Loadings (Standard Errors) and Standardized Loadings for Structural Equation Model of the Internet Addiction Components Factor on Personality in S2*

Latent construct and indicator for the measurement model	Unstandardised loading (SE)	Standardised loading (SE)	<i>p</i>
<b>Internet addiction components factor</b>			
<i>Saliency</i> : How strongly are you mentally preoccupied with the Internet during a day?	1.00 (.00)	.55 (.02)	.000
<i>Withdrawal</i> : Do you feel moody if you cannot be online?	1.43 (.06)	.73 (.01)	.000
<i>Tolerance</i> : Did you recognise having to be online more often or for a longer time to feel good or relaxed again?	1.47 (.06)	.79 (.01)	.000
<i>Mood modification</i> : How frequently do you avoid negative temper or feelings by surfing the Internet?	1.31 (.06)	.63 (.02)	.000
<i>Relapse</i> : How often have you tried to quit or restrict surfing the Internet?	0.86 (.68)	.44 (.02)	.000
<i>Conflict</i> : Did you face problems or negative consequences because of your Internet usage?	0.68 (.04)	.51 (.02)	.000
<b>Extraversion factor</b>			
I like to have a lot of people around me.	1.00 (.00)	.52 (.02)	.000
I laugh easily.	0.79 (.05)	.47 (.02)	.000
I don't consider myself especially "light-hearted".	0.65 (.05)	.33 (.02)	.000
I really enjoy talking to people.	0.98 (.05)	.59 (.02)	.000

I like to be where the action is.	0.78 (.05)	.44 (.02)	.000
I usually prefer to do things alone.	0.83 (.05)	.43 (.02)	.000
I often feel as if I'm bursting with energy.	0.93 (.06)	.49 (.02)	.000
I am a cheerful, high-spirited person.	1.29 (.06)	.76 (.01)	.000
I am not a cheerful optimist.	1.38 (.07)	.68 (.02)	.000
My life is fast-paced.	0.58 (.05)	.31 (.02)	.000
I am a very active person.	0.87 (.06)	.45 (.02)	.000
I would rather go my own way than be the leader of others.	0.72 (.05)	.36 (.02)	.000
<b>Agreeableness</b>			
I try to be courteous to everyone I meet.	1.00 (.00)	.43 (.02)	.000
I often get into arguments with my family and co-workers.	1.46 (.10)	.48 (.02)	.000
Some people think I'm selfish and egotistical.	1.95 (.12)	.63 (.02)	.000
I would rather cooperate with others than compete with them.	0.85 (.08)	.30 (.02)	.000
I tend to be cynical and sceptical of others' intentions.	1.54 (.11)	.49 (.02)	.000
I believe that most people will take advantage of you if you let them.	1.27 (.10)	.38 (.02)	.000
Most people I know like me.	0.87 (.07)	.39 (.02)	.000
Some people think of me as cold and calculating.	2.03 (.13)	.65 (.02)	.000
I'm hard-headed and tough-minded in my attitudes.	1.12 (.09)	.37 (.02)	.000
I generally try to be thoughtful and considerate.	0.85 (.06)	.44 (.02)	.000
If I don't like people, I let them know it.	1.26 (.10)	.39 (.02)	.000
If necessary, I am willing to manipulate people to get what I want.	1.65 (.12)	.48 (.02)	.000
<b>Conscientiousness</b>			
I keep my belongings neat and clean.	1.00 (.00)	.45 (.02)	.000
I'm pretty good about pacing myself so as to get things done on time.	1.51 (.08)	.65 (.01)	.000
I am not a very methodical person.	0.71 (.06)	.34 (.02)	.000
I try to perform all the tasks assigned to me conscientiously.	0.79 (.05)	.52 (.02)	.000
I have a clear set of goals and work toward them in an orderly fashion.	1.44 (.08)	.68 (.01)	.000
I waste a lot of time before settling down to work.	1.18 (.07)	.51 (.02)	.000
I work hard to accomplish my goals.	1.23 (.07)	.71 (.01)	.000
When I make a commitment, I can always be counted on to follow through.	0.90 (.06)	.52 (.02)	.000
Sometimes I'm not as dependable or reliable as I should be.	1.07 (.07)	.46 (.02)	.000
I am a productive person who always gets the job done.	1.22 (.06)	.73 (.01)	.000
I never seem to be able to get organised.	1.48 (.08)	.63 (.02)	.000
I strive for excellence in everything I do.	1.16 (.07)	.60 (.02)	.000
<b>Neuroticism</b>			
I am not a worrier.	1.00 (.00)	.36 (.02)	.000
I often feel inferior to others.	1.51 (.10)	.58 (.02)	.000
When I'm under a great deal of stress, sometimes I feel like I'm going to pieces.	1.66 (.11)	.59 (.02)	.000
I rarely feel lonely or blue.	1.62 (.11)	.61 (.02)	.000
I often feel tense and jittery.	1.61 (.11)	.63 (.02)	.000
Sometimes I feel completely worthless.	2.35 (.15)	.77 (.01)	.000
I rarely feel fearful or anxious.	1.61 (.11)	.61 (.02)	.000
I often get angry at the way people treat me.	1.27 (.09)	.50 (.02)	.000
Too often, when things go wrong, I get discouraged and feel like giving up.	1.72 (.12)	.65 (.01)	.000
I am seldom sad or depressed.	1.06 (.09)	.39 (.02)	.000
I often feel helpless and want someone else to solve my problems.	1.59 (.11)	.63 (.02)	.000
At times I have been so ashamed I just wanted to hide.	1.73 (.12)	.60 (.02)	.000
<b>Openness to experience</b>			
I don't like to waste my time daydreaming.	1.00 (.00)	.13 (.02)	.000
Once I find the right way to do something, I stick to it.	0.35 (.15)	.06 (.02)	.008
I am intrigued by the patterns I find in art and nature.	5.20 (1.01)	.60 (.02)	.000
I believe letting students hear controversial speakers can only confuse and mislead them.	1.79 (.38)	.26 (.02)	.000
Poetry has little or no effect on me.	6.03 (1.17)	.67 (.02)	.000
I often try new and foreign foods.	2.50 (.53)	.28 (.02)	.000
I seldom notice the moods or feelings that different environments produce.	1.87 (.40)	.25 (.02)	.000
I believe we should look to our religious authorities for decisions on moral issues.	-0.29 (.22)	-.03 (.03)	.179
Sometimes when I am reading poetry or looking at a work of art, I feel a chill or wave of excitement.	7.13 (1.38)	.78 (.02)	.000
I have little interest in speculating on the nature of the universe or the human condition.	3.87 (.76)	.47 (.02)	.000
I have a lot of intellectual curiosity.	2.94 (.58)	.49 (.02)	.000
I often enjoy playing with theories or abstract ideas.	4.19 (.82)	.55 (.02)	.000

Parameter estimates for the structural model	B	$\beta$	<i>p</i>
Internet addiction components factor ON			
Extraversion	.15 (.04)	.15 (.03)	.000
Agreeableness	-.31 (.05)	-.19 (.03)	.000
Conscientiousness	-.13 (.03)	-.11 (.03)	.000
Neuroticism	.47 (.05)	.37 (.03)	.000
Openness to Experience	.19 (.11)	.05 (.03)	.059

Model fit indices:  $\chi^2$  (2064) = 13964,  $p < .001$ ; CFI = .70, TLI = .69; RMSEA (90% CI) = .05 (.05-.05); SRMR = .07.

## Discussion

The aim of this study was to establish a nomological network for the Internet addiction components model to evidence its construct validity by testing the predictive accuracy of personality traits on the Internet addiction components factor. The results support the first hypothesis that low agreeableness, low conscientiousness, low emotional stability, and resourcefulness significantly predict the Internet addiction components factor in S1. The association between low agreeableness, low emotional stability and Internet addiction can be explained by the presence of characteristics associated with these personality traits, namely anxiety, tension, lack of stability, antagonism, lack of kindness, and dishonesty (Goldberg, 1992). These may lead to a difficulty in establishing peer networks in real life for the adolescents, which may make them turn to the Internet instead (Caplan, 2003). Conscientiousness, on the other hand, has been implicated as a predictor of health behaviours (Hagger-Johnson & Whiteman, 2007), suggesting that high scores on the conscientiousness subscale have served as a protective factor with regards to Internet addiction in this study, whereas low scores had the opposite effect for the adolescents. Moreover, resourcefulness has been associated with openness to experience (Matthews, et al., 2009), and its subcomponent novelty seeking has been associated with Internet addiction in previous research (Ko, et al., 2010), which indicates that the present results corroborate previous work in the field.

Moreover, the results support the second hypothesis that neuroticism and low agreeableness predict the Internet addiction components factor in S2. In

addition to the hypothesised predictions in S2, low conscientiousness and extraversion predicted the Internet addiction components factor. In comparison to the other personality trait factors, the coefficients for neuroticism and agreeableness were low, indicating that they are weaker predictors of the Internet addiction components factor. Moreover, in Kuss et al.'s original study (2013), Internet addiction was assessed as a binary categorical variable using a cut-off score for a potentially pathological level of Internet addiction using the complete AICA-S. In the present study, a more parsimonious theoretical approach was adopted using the Internet addiction components model as based on Griffiths' (2005b) framework. From a comparative point of view, the finding that low conscientiousness predicts the Internet addiction components factor in S2 mirrors a similar finding in S1, indicating that low conscientiousness is associated with the Internet addiction components factor more generally.

To the authors' knowledge, extraversion, on the other hand, has not been associated with increased risk for Internet addiction in previous research. On the contrary, low extraversion (i.e., introversion) has been found to be correlated with greater problematic Internet use in an undergraduate Australian university student sample (Mottram & Fleming, 2009). Nevertheless, it has previously been reported that "socially rich" individuals who score highly on extraversion use social applications such as *Facebook* frequently (Zywica & Danowski, 2008). This suggests that the English university students in S2 may have lived out their high sociability online which may have led them to score more highly on the Internet addiction components factor relative to their more introverted peers. This conjecture requires testing in future research studies.

Overall, the respective personality trait factors explained 14 to 19% of the variance in the Internet addiction components factor. This indicates a small to medium sized effect (Cohen, 1992). Overall, it appears that a number of other

factors which have not been included in the present analyses may have contributed to explaining the variance in the Internet addiction components factor. Possible candidates are the respective Internet applications users engage with as it has been shown in Chapters 4 and 5 that the excessive usage of applications such as online games increases the risk for Internet addiction. Future research is strongly encouraged to assess the predictive power of Internet application usage on explaining the Internet addiction components factor as based on the CIUS and the AICA-S, respectively.

With regards to the validation of the respective measurement models in the current study, scores on the respective QBF personality trait scales in S1 are comparable to scores found in previous samples containing Dutch adolescents aged between 13 and 17 years (Harakeh, et al., 2006). In addition to this, overall, the scores on the respective NEO-FFI personality scales in S2 closely resemble norm scores for British populations (Egan, Deary, & Austin, 2000). With a four-point difference, the current sample only scored slightly higher on neuroticism, suggesting that English students are marginally more neurotic as measured via the NEO-FFI than the general British population. Furthermore, the low factor loadings of a number of items onto the openness to experience factor suggest that the respective items do not measure the theoretical construct of openness to experience adequately. Previous research on the NEO-FFI in three independent British samples has shown that openness to experience and extraversion are less reliable subscales than those for neuroticism, agreeableness and conscientiousness (Egan, et al., 2000). Openness to experience specifically appears to be defined somewhat imprecisely when viewed from the point of lexical systems, where it initially originated. In lexical systems, synonyms for openness such as intellect, culture, or imagination are frequently made use of (Digman & Takemoto-Chock, 1981). This indicates a discrepancy in meaning as openness is associated with rather different



constructs, which may lead to validity problems. The present research adds to the conundrum that surrounds the factor of openness to experience and suggests that a revision of the factor and specifically the items by which it is measured is necessary.

Notwithstanding the favourable model results, it needs to be borne in mind that there exists a discrepancy between the theoretical model and its real-life counterpart, i.e., the ways in which the theoretical constructs appear in the real world. The question is one about the degree of “model-reality consistency” (Bollen, 1989). The QBF and NEO-FFI are separate scales that measure similar phenomena in separate ways. For instance, the number of NEO-FFI items per factor was larger than for the QBF. This would suggest a possibly better solution, more accurate parameter estimates and greater variability in participants’ scores on the NEO-FFI (Marsh, Hau, Balla, & Grayson, 1998) relative to the QBF. However, rather than providing a direct comparison between two samples with regards to observed personality traits, the present study confirms the applicability of empirically grounded models to the data obtained from two independent samples. This analysis must be understood and evaluated as an indicator of the observable relationship between personality traits and the Internet addiction components model. An account has been made of the nomological network of the Internet addiction components model. The inclusion of personality trait factors as predictors of the Internet addiction components factor in the established model serves as a first step towards the development of a more comprehensive and elaborate theoretical framework for Internet addiction.

### *Limitations*

A number of limitations need to be addressed. First of all, a self-report measure will never be sufficient to assess clinically relevant levels of psychopathology. The Internet addiction components model therefore must be understood as an

indicator of risk for pathological Internet use, not as a behavioural addiction per sé. Second, the lack of a measure of tolerance in S1 may have consequences for the actual construct of the Internet addiction components model because tolerance has been implicated as important distinguishing feature between pathological and non-pathological gamblers (Griffiths, 1993). Future studies should assess the validity and reliability of the Internet addiction components model via the CIUS including an item assessing tolerance to facilitate comparability and investigate the importance of tolerance as a criterion for a behavioural addiction.

### *Implications*

Specifically assessing different Internet application usages and their relationships with personality traits may prove advantageous as previous research (presented in Chapters 4 and 5) has indicated an interaction between certain personality traits and Internet application usages in increasing the risk for Internet addiction.

In terms of clinical applications, the Internet addiction components model as such is a parsimonious construct which can be used for initial screening of potential clients in mental health institutes in order to discern problematic Internet usage. Moreover, assessing factors associated with Internet addiction, i.e., certain personality traits, may prove beneficial in comprehending the degree to which individuals suffer from Internet addiction symptoms. Certain personality traits have been found to be predictive of Internet addiction and they can potentially exacerbate the phenomenological symptom experience. Young persons with certain personality traits and Internet usages may furthermore be targeted in schools in order for prevention efforts to be established. Identifying children and adolescents at risk for developing Internet addiction will enable and facilitate prevention endeavours as these groups can be specifically targeted before the actual psychopathology manifests itself.

Finally, a cross-validation and replication of the study's results are necessary in order to verify the reliability of the findings.

### **Conclusion**

In sum, the main contribution of this research is the establishment of a nomological network for the Internet addiction components model which is primarily of conceptual and research relevance. It has been shown that in two independent samples using two measures of Internet addiction and personality traits, low agreeableness and high neuroticism/low emotional stability predicted the Internet addiction components factor. In addition to this, low conscientiousness and low resourcefulness predicted it in the adolescent sample only. Taken together, a theoretical framework has been established that allows researchers to utilise and expand upon the recently developed Internet addiction components model. Overall, this may inform research into Internet addiction in general as the application of the model to real life data obtained from two independent samples has been demonstrated. Accordingly, the model has real-life applicability. The association between Internet addiction and certain personality traits indicates that some populations appear to be at a higher risk for developing Internet addiction than others. In order to confirm and expand this finding, future research is necessary.

Following a thorough investigation of the prevalence and risk and the establishment and test of the theoretical construct of Internet addiction, the subsequent and final empirical chapter will shed light upon how Internet addiction presents itself in specialised treatment settings across Europe, the USA, and Canada.

## CHAPTER 8

### Internet addiction:

#### How psychotherapists make sense of the presenting problem

##### Introduction

Internet addiction is a behavioural problem that has gained increasing scientific recognition in the last decade, with some researchers claiming it is a “21<sup>st</sup> Century epidemic” (Christakis, 2010). Prevalence rates vary from 0.8% in Italian students aged 14 to 21 (Poli & Agrimi, 2012) as assessed via the Internet Addiction Test (IAT; Young, 1998a) to 18.3% of English university students (Niemz, et al., 2005) using the Pathological Internet Use Scale (Morahan-Martin & Schumacher, 2000). These discrepancies in reported prevalence rates exist due to different sample characteristics and assessment instruments. The classification of Internet addiction has been problematic ever since the term’s conception in the late 1990s (Goldberg, 1996). Classifications have included terms such as compulsive Internet use (Meerkerk, et al., 2009), Internet dependence (Dowling & Brown, 2010), pathological Internet use (Morahan-Martin & Schumacher, 2000), and virtual addiction (Greenfield, 1999). With the variety of terminologies, a diagnostic conundrum emerged, impeding scientists’ and practitioners’ efforts to find the appropriate diagnostic category which is of paramount importance for clinical practice.

To reduce nosological ambiguity, the American Psychiatric Association (APA) has conceived *Internet Gaming Disorder* for the revised fifth edition of the Diagnostic and Statistical Manual for Mental Disorders (DSM-5) (Herold, et al., 2012). The research diagnosis of Internet Gaming Disorder draws on Internet addiction studies which have mostly focussed on online gaming addiction

rather than any other form of pathological Internet behaviour (as discussed in Chapters 2 and 3), and is a condition that requires further scientific investigation. It is situated within the category of Substance Use and Addictive Disorders and this classification paves the way to the increased recognition of Internet addiction alongside the only recognized behavioural addiction so far, i.e., pathological gambling. Given the novelty of the term Internet Gaming Disorder and the conventional usage of *Internet addiction* in major reviews (e.g., Chou, et al., 2005; Widyanto & Griffiths, 2006), similar to the previous chapters, in this chapter, the condition will be referred to as Internet addiction. As a behavioural addiction, Internet addiction includes the following main components as specified by Griffiths (2005b) and discussed in Chapters 6 and 7: salience, mood modification, tolerance, withdrawal, conflict, and relapse. When these symptoms are present and significant impairment or distress is experienced, the individual presents with the problem of Internet addiction.

A number of treatment approaches have been applied so far to alleviate Internet addiction symptomatology, but the evidence base for treatment of this condition is limited. Three reviews shed some light upon the effectiveness of evidence-based treatment (King, Delfabbro, Griffiths, et al., 2011; Liu, et al., 2012; Winkler, Dörsing, Rief, Shen, & Glombiewski, 2013). King et al. (2011) assessed the Internet addiction treatment literature using the CONSORT (Consolidated Standards of Reporting Trials) guidelines, which define gauges of quality for the reporting of clinical interventions involving psychopharmacology and psychotherapy with the aim of transparency and accountability for study design choices and the reporting of research methods. Important quality indicators include references to randomisation process, sample inclusion criteria, treatment elucidation, and a power analysis of sample size (Schulz, Altman, & Moher, 2010). The eight clinical trials identified by King et al. (2011) varied substantially regarding methods used, diagnosis and

classification of Internet addiction, therapy, aftercare, random allocation, blinding, sampling and recruitment. The therapy components differed and included cognitive behavioural therapy (CBT), motivational interviewing (MI), reality training, as well as novel approaches containing psychological and counselling ingredients. In the included studies, therapy for Internet addiction was delivered by trained professionals or by software that has been developed for this purpose. The length of treatment varied from one session to 19 months (King, Delfabbro, Griffiths, et al., 2011).

Liu et al. (2012) included 24 Internet addiction treatment outcome studies conducted in China that comprised patients between 9 and 23 years of age in their systematic review. Similar to King et al. (2011), they used the CONSORT statement to evaluate the quality of evidence for treatment, including indicators such as objectivity, sample size, power, outcome, random allocation, an active comparison group, baseline measure, manualised treatment, treatment adherence rating, collateral reports, objective assessments, intention to treat (ITT) analysis, and blinding. The particular strengths of the studies were sequence generation and ITT assessment, whereas weaknesses were present in the other criteria. More than half of the studies included treatment that combined various elements, such as physical engagement, CBT, electroacupuncture, family therapy, group therapy, MI, and psychopharmacology. CBT in combination with pharmacological treatment appeared most efficacious with an effect size (Cohen's *d*) of 3.93. Overall, the treatment of Internet addiction as based on its outcome was considered to be efficacious with a mean effect size of 1.89. Nevertheless, the quality of the studies was modest (Liu, et al., 2012).

Winkler and colleagues (2013) more recently used Internet addiction status (measured via dedicated questionnaires), time spent online, depression and anxiety as outcome variables. Studies were included if they assessed

pharmacological or psychological Internet addiction treatment and were not case studies. Internal, external and construct validity of the included studies were measured via a quality scale (Glombiewski et al., 2010). A total of 16 studies conducted in China, the USA, and Korea were included. Treatments used to alleviate Internet addiction symptomatology varied, including CBT, Multilevel Counselling Programmes (MCT), reality therapy (RT), acceptance and commitment therapy (ACT), and psychopharmacology. Overall, the results indicate the effect sizes for changes in Internet addiction status were large and changes from pre- to post-treatment were significant, suggesting that treatment was efficacious in reducing Internet addiction symptoms. The analyses revealed there were no significant differences between psychological and pharmacological treatments in improving Internet addiction status, whereas psychological therapies were more effective in reducing depression symptoms associated with Internet addiction. There was no difference in effectiveness between CBT and other psychological interventions (Winkler, et al., 2013).

The recent reviews of Internet addiction treatment effectiveness offer some insights into the state of the art of evidence based treatment for Internet addiction. Different types of interventions are applied, and studies use a variety of assessment methods, diagnostic and evaluation criteria, and outcomes, which impedes the possibility of cross-comparisons. Overall, the reviews suggest there is not a single most effective treatment approach available to date. Instead, psychopharmacological and psychological therapies are found to be similarly efficacious, a combination of CBT and pharmacotherapy had the largest effect sizes, and there was no difference between CBT and other psychological interventions in improving Internet addiction symptomatology.

To date, Internet addiction treatment research has focused on the efficacy of treatment and the alleviation of symptoms as measured via patient self-reports. Research has not paid adequate attention to assessing the core

ingredient of therapy, the therapist. Researchers have long called for the examination of the therapists' experience of treatment (Goldberg, 1986; Jarman, Smith, & Walsh, 1997). Qualitative studies on Internet addiction have focused on how those affected understand, explain and experience Internet addiction (Douglas et al., 2008), leaving out the position of the clinician. Understanding the experience of the therapist is vital for a number of reasons. First, psychometric assessment does not suffice for the classification of a patient as being addicted to using the Internet. Researchers have emphasised the necessity of professional evaluation in order to gauge the severity of the presenting problem and the need for expert help (e.g., Beard, 2005). Second, professionally trained psychotherapists profit from a large pool of clinical knowledge, including the experience of different treatment settings and therapy approaches, and have experience with a variety of mental disorders. The practice of psychotherapy embeds their experience of Internet addiction within the clinical context, which allows them to demarcate Internet addiction from other disorders with regards to potential risks, severity, symptomatology, and psychosocial consequences for the affected individual.

More than a decade ago, only one study has looked at therapists confronted with Internet addiction diagnosis and treatment. Young and colleagues (1999) surveyed 35 therapists from the USA, UK and Canada using an online questionnaire inquiring into therapist demographics, their patients' Internet usage behaviours, and the treatment strategies applied. The results indicated patients typically presented with compulsive Internet use, interpersonal problems, or addiction, and anonymity was the "leading factor" for compulsive Internet use. Moreover, the data indicated there were five subtypes of Internet addiction, i.e., cybersexual addiction (dealing with pornography), cyberrelationship addiction (virtual relationships), net compulsions (gambling, shopping, trading), information overload (surfing),



and computer addiction (gaming). Treatment approaches used included CBT, sexual offender therapy, marital and family therapy, social skills training, and psychopharmacology. Overall, therapists agreed Internet addiction was a significant societal problem, mental health practitioners need to be attentive to the negative consequences of excessive Internet use, and Internet addiction is similar to other addictions regarding resulting problems (Young, et al., 1999). Although this study offers a first insight into the therapist's point of view with regards to Internet addiction, it suffers from significant shortcomings. First, data were collected online which raises the question about the professional identity of the participants. Online anonymity does not allow for the verification of actual psychotherapist qualification and current practicing status. Second, the technique utilised for the qualitative data analysis was not described in any form. Third, no detailed information was provided with regards to how therapists experience the presenting problem of Internet addiction. Fourth, the concurrent utilisation of quantitative and qualitative techniques does not allow for an in depth utility of either method, and thus merely scratches the surface of the problem if the study is not planned and executed with sufficient methodological rigour.

Taking these factors into consideration, the present study aims to fill the gap in knowledge of the psychotherapists' understanding of Internet addiction and to overcome the previously elucidated research problems. The research aim in this Chapter is to offer an in depth insight into how experts in Internet addiction treatment across countries make sense of Internet addiction. Specifically, it is explored how practiced psychotherapists experience the presenting problem of Internet addiction.

## Methods

### *Participants*

Sampling was purposive with the following inclusion criteria: (i) expert status in Internet addiction treatment, as operationalized by having significant therapeutic experience of treating clients who present with Internet addiction, and possessing a (ii) psychotherapeutic qualification and/or (iii) a doctorate in the medical field. Of the 46 therapists contacted and invited for interview, 38 (83%) responded, 26 (57%) agreed to participate, and 23 (48%) were subsequently available to be interviewed. Three interviews were excluded as the participants did not fulfil the inclusion criteria. Participants were informed about the present study, its objectives, its context (i.e., a doctoral research project), as well as the use of recording equipment and verbatim reports for the final data presentation via email. Upon agreement to participate, they signed a declaration of informed consent.

A total of 20 (43%) psychotherapists from six different countries (i.e., Germany, UK, USA, Canada, Austria and Switzerland) were included in the sample. The inclusion of a relatively large sample with regards to IPA standards (Smith, Flowers, & Larkin, 2009) was justified by the aim of having international and diverse psychotherapists' accounts to draw on. The large majority of psychotherapists were male (80%), with an age range from 30 to 60 years. Their professional qualifications included psychotherapy training, possessing a Doctor of Medicine (MD) or Doctor of Philosophy (PhD). Therapeutic practise between participants ranged from four to 26 years with a mean of 15 years, with Internet addiction treatment experience ranging from 2 to 14 years, with a mean of eight years. Further participant characteristics are presented in Table 1. Prior to study initiation, ethical clearance was granted by the research host university's ethical committee.

### *Interviews*

Individual participants were interviewed in German or English, respectively, in a semi-structured manner using an interview schedule. Questions were chosen carefully based on four overall topics: therapist, therapy, patients, and Internet applications. The interview schedule is attached in Appendix VII. The interviews were conducted via telephone ( $n = 15$ ), voice-over-IP (i.e., Skype;  $n = 4$ ), or in person ( $n = 1$ ) between September 2011 and September 2012, and lasted from 50 to 90 minutes. The interviews were recorded, transliterated verbatim and annotated using QSR NVivo©. Data collection, coding, and analysis were performed by the first author.

### *Analyses*

Interpretative Phenomenological Analysis is a qualitative technique which discerns the quality and texture of lived experience and the ways in which people give meaning to it. Contrary to quantitative hypothetico-deductive research, which is commonly used in scientific practice, IPA is inherently inductive and thus probing (Willig, 2001). By focusing on the case, IPA offers an innovative territory for researchers, who enquire into subjective experience of addiction ideographically. If a researcher wants to focus on the individual as a unit of analysis, this approach is preferable to a quantitative nomothetic one (Shinebourne & Smith, 2009), as IPA does not “impos[e] preconceived ‘variables’” (Willig, 2001, p. 9) using deductive reasoning. Instead, IPA encourages participants to explore and establish their concerns, rather than

Table 1  
*Therapist characteristics*

<b>Sociodemographics</b>	<b>N</b>	<b>Percent of total</b>
Country		
Germany	10	50
UK	3	15
USA	4	20
Canada	1	5
Austria	1	5
Switzerland	1	5
Gender		
Male	16	80
Female	4	20
Age		
30-40	3	15
40-50	7	35
50-60	10	50
<b>Professional qualifications</b>		
Psychotherapy training	18	90
MD	10	50
PhD	4	20
Psychotherapy experience	Years (range)	<i>M (SD)</i>
Therapy practice	4-26	14.94 (8.80)
Internet addiction treatment	2-14	8.06 (4.13)
<b>Settings of Internet addiction treatment provision</b>		
Inpatient	9	45
Outpatient	13	65
Private practice	7	35
<b>Age groups in therapy</b>		
Children/adolescents	5	25
Adults	15	75

that of the researcher, and it is therefore immanently inductive. In addition to this, IPA has a number of advantages over other qualitative approaches (such as grounded theory). IPA offers a higher degree of structure in terms of a rather meticulous analytical procedure. IPA requires a number of readings of the transcripts in order to identify overarching themes, which are then linked, clustered and finally represented by illustrative citations in the write up (Storey, 2007). The consequence of the adherence to IPA's structural and procedural prerequisites increases the transparency of the research and facilitates its replication and therefore the reliability of the present research. Moreover, unlike other qualitative research methods, IPA adds the dimension of interpretation by the researcher, and thus creates a *double hermeneutic* with two orders of interpretation, i.e., via the participant (first order) and via the researcher (second order; Smith, 2004). Beyond that, it integrates two stances of interpretation, namely a hermeneutics of empathy (Ricoeur, 1970) and a hermeneutics of suspicion (Ricoeur, 1970) or questioning (Smith, et al., 2009). With the former, the researcher tries to understand the participants' interpretation of his experience from an insider perspective (Conrad, 1987), whereas with the latter, an analytical and interpretivist outsider perspective to the data is adopted (Smith, et al., 2009).

Furthermore, IPA is grounded in phenomenology as based on Husserl's philosophy (2012 [1931]) and is located in between traditional empiricist and social constructionist/relativist positions as regards the source of knowledge, i.e., knowledge is either objective or subjective. Consequently, phenomenology is concerned with understanding of experience as perceived by the individual who endows it with meaning. In this regard, knowledge is objective because it concerns the external world from a realist point of view, and it is subjective as it is individually constructed via language, context and meaning. Grounded theory, particularly one of its more rigorous form, i.e., constructivist grounded

theory (Charmaz, 2006), aims to bring together a large pool of data from multiple sources in order to develop a theory from a conceptual point of view. In comparison, rather than aiming at theory construction, IPA endeavours to discern lived experience on a micro-level by drawing on a small group of individuals, by specifically stressing the convergence and divergence in their views and perceptions (Smith, et al., 2009). IPA makes use of the universal tendency for self-reflection by appropriating it in the analysis and understanding of how individuals perceive, understand, and give meaning to their experiences (Chapman & Smith, 2002; Smith, Flowers, & Osborn, 1997).

In the current study, the usage of IPA has several advantages over other methods, as it encouraged dialogue between the researcher and the therapists and resulted in a broader scope of themes for exploration. Additionally, a semi-structured assessment offers a flexible approach open to changes and divergence. This was enabled by the inherent double hermeneutics (Smith, 2004). Not only did the participants interpret their experience, but it was also reinterpreted by the researcher. This took the form of placing the participants' accounts into the perspective of the analysed research themes and comparing and evaluating these in relation to the other accounts. Accordingly, a double narrative emerged, which integrated both the participants' as well as the researcher's position (Shinebourne & Smith, 2009). Consequently, in the present research great care was taken in presenting the results in an unbiased and informed way.

In the readings which followed the first annotation, emerging themes and topics as well as their connections were extracted. Superordinate topics emerged which spanned the accounts of multiple participants. In the last stage of research, the nascent topics were noted down into a narrative format and illustrated by the participants' accounts, following the principles of IPA (Chapman & Smith, 2002). These steps in the research process needed to be

adhered to meticulously and to be represented transparently so that another analyst who aims at using IPA on the same verbal accounts would deliver comparable results (Smith, Jarman, & Osborn, 1999). In addition to the standard operating procedure, the relevant text fragments were first translated from German into English language by a bilingual speaker in order to ensure both comprehension and conceptual equivalence across languages (Mangen, 1999). Next, the initial translations were translated back and cross-checked by an independent bilingual speaker who was not involved in the initial translation process in order to ensure inter-translator reliability and translation validity (Brislin, 1980). For the purpose of comparison, the respective interview pieces are provided in their original form in Appendix VIII.

### **Results**

Two superordinate themes were identified during the analysis: “risk” and “addiction”. The first superordinate theme represents the individual, situational and structural factors that may put a person at risk for developing Internet addiction. The second superordinate theme noted Internet addiction as actual psychopathology, containing addiction symptoms, criteria and diagnosis, and it draws on the similarities of Internet addiction with other addictions. The hierarchical organisation of emergent themes is presented in Table 2. Where appropriate, excerpts are translated into English, with the original quote provided in Appendix VIII.

Table 2  
*Hierarchical Organisation of Emergent Themes*

<b>Superordinate topics</b>	<b>Subordinate themes</b>	
<b>Risk</b>	<i>Individual</i>	Age Gender Profile
	<i>Situational</i>	Neglect Students Trigger
	<i>Structural</i>	Internet applications
<b>Addiction</b>	<i>Symptoms and criteria</i>	Saliency Tolerance Mood modification Loss of control Withdrawal Denial and concealment Problems and conflict Relapse
	<i>Diagnosis</i>	Comorbidities Internet addiction diagnosis Primary disorder Same but different

### ***Risk***

The discerned risk factors can be categorized in accordance with Griffiths and Wood's conceptual framework for factors that drive the acquisition, development and maintenance of problematic gambling (2000), as this framework captures the participants' understandings of risk adequately. These characteristics are individual, situational, and structural factors which increase the individual's chance to develop an addiction to using the Internet.



### *Individual*

From the participants' accounts, individual factors that may put an individual at risk for developing Internet addiction appeared to be age, gender, and their individual profile. Each of these will be turned to subsequently.

#### Age

Early exposure appears as a significant contributor to behavioural problems related to technology over-use in children and young adolescents. One of the participants noted that parents "give their iPads to their six-months, three months old baby", and their iPhone is "surrounded in rubber and the kid can chew on it" as an example for the early technology contact. She furthermore stated that "the usage rate is growing incrementally with our very, very vulnerable, very young children. (...) they are attaching to the device rather than attaching to their parents." (P14). Here the igadgets appear as symbols for the ubiquity and mobility of the Internet which captures the attention of the youngest infants. From a very young age, children grow up with the technology. A participant likens technology exposure to Skinner's early experiments:

"You expose a rat early to the lever. It loves the lever. So now we're giving iPads to 3-year olds. We're teaching them that if they're bored, instead of being creative and go sing and go outside and play, just punch fingers on this little iPad, and you deliver this digital bliss that basically allows you to feel good and make you not bored and make you entertained. So we're teaching these young rat-like people to push little digital levers." (P8).

Via operant conditioning (Skinner, 1969), Internet usage is reinforced by the parents and the behaviour is learned. The Internet is being used as mood modifier, successfully so. Another participant explains the reasons for why parents may use the Internet as a babysitter and states the following:

"(...) there's something about the way in which society has sort of encouraged young people to gravitate to their bedroom and to use the

computer. (...) certainly with my own children I was less happy for them to go out (...). Now where does that come from? It's some sort of media, social sort of message. So I'm being more happy [sic] for them to be indoors and at home. That couples with the fact that I'm sure like other parents, I work and my wife works. We both work quite hard. (...) I don't want them to be too demanding of me when I come home because I'm trying to relax and rest or I want to get on with some other work that I have to do. So ideally I would want the children in the home. I also want them to be reasonably quiet and entertained without me having to do too much. So then I get all into buying them a TV in the bedroom and then this computer and laptop. So now they've got all the gadgets. They are in the house, they are upstairs, they are in the bedroom, they're quiet, they are getting on with whatever they're doing. I'm happy. So I think we got a little bit lulled into that." (P16).

Parents are being "lulled into" a false sense of security by media that function as babysitters. By eliminating the dangers of the outdoors, parents do not realise that they may create other dangers in the home. Besides, children are both exposed to the technology via their parents in their home environment, and required to use computers and the Internet at school because

"kids in public schools are getting a push from technology providers, computer makers. They provide laptops" but there is no "parent control or monitoring system in place. Kids are pretty savvy" and by "middle school level usually bypass those controls. So what happens is the school requires that they have this computer and use it for their class work and for their homework and yet the parents don't really have an adequate parent control service where the kid sits down, does his homework." (P20).

Unlike with substance-related addictions, children who develop problems with their Internet usage do not have problems with access. Both family and school encouragement of Internet use may contribute to the development of potentially pathological behaviours. Control mechanisms put in place to constrain children's online activity may be of limited impact as children learn quickly how to deal with the technology and often surpass their parents' or teachers' technological capabilities.

Children may also form an attachment to their device to make up for the lack of attention from their parents, to the detriment of their health because “the earlier the exposure, the more damage is done to the brain” (P14). Another participant stresses the dopaminergic changes that occur as a consequence of frequent early Internet use and from the perspective of the young clients states that if the Internet has been

“the only place I felt comfortable in for years, maybe my dopaminergic system has changed, (...) the clinical picture would be more pronounced. That’s why they are more burdened. With the adolescents that I’m treating maybe the clinical picture is not that strongly manifested, however the strain is partially as high or even higher” compared to adults<sup>1</sup>.

However, “the possibilities for a positive development [of the addiction] are often better in adolescence than they are for adults.”<sup>2</sup> (P18). There appear to be differences in the presenting problem of Internet addiction between adolescents and adults. With adolescents, “the pathological use of the Internet is embedded in the problem of identity formation (...), identity conflicts, and the control function for emotion regulation that is not yet sufficiently consolidated”<sup>3</sup> (P18). Adolescents develop their identities via the Internet and learn to regulate their emotions via their Internet usage which leaves them with no behavioural alternative. Consequently, the Internet becomes an integral element of their lives and gains salience, and potentially results in the development of Internet addiction.

Clients of different age groups furthermore differ from one another in their insight into their problem:

“The differences between age groups relate to the degree of reflection, because the older clients think more along the lines of ‘how can I integrate the Internet into my life, so that it does not impede my life, my social competence, my professional, my school career’, and adolescents do not think about that. They have insufficient problem awareness. (...) And adults are more reflective. It can happen that they play [computer games] throughout a weekend, have a lan party or

something like that, but overall they are more likely to manage their job or training or studies.”<sup>4</sup> (P5).

The presented lack of insight can make it particularly difficult for adolescents to change as the lack of insight comes with a lack of therapy motivation. Adults appear more reflective in treatment which makes the chances of success better. Adolescents are also limited because they “are not as restricted in their actions and they are free. Also, their insight into their condition is often limited and their view of the consequences is unfortunately not entirely developed the way we’d like it to be.”<sup>5</sup> (P6). Relative to adults, adolescents have positive liberty (freedom to act) as they have more time to engage with the Internet, and they have the negative liberty (freedom from interference; Berlin, 1969) of not being hindered in their usage as it takes a certain amount of time for the social context to realise that usage may go beyond what is socially acceptable.

The importance of professional help for adolescents was highlighted by participants because “by offering something a bit earlier, they wouldn’t lose educationally or socially some of the achievements that are part of ordinary adolescence” (P10). This is a plea for early identification of problems, and for excessive behaviours to be taken seriously so Internet addiction can be treated more effectively and efficiently. For adolescents, early recognition offers the additional advantage of intercepting developmental delay which may have detrimental consequences for their future.

With adults, the situation appears different relative to adolescents as an adult’s addiction develops as a “consequence of life events, such as divorce, lay-off, unemployment” which leads to “retreat into the virtual world”:

“(…) rather than going to a pub, alcohol abuse or alcohol dependence, it’s the computer variant, and it takes very, very long until the person in question develops a problem awareness in order to draw conclusions from it. (...) the flexibility to change isn’t there anymore because the job market is poor, or the chance for a new relationship is relatively small, so why should I do it? I’m reasonably satisfied with

my ten characters in some online role-playing game, or I've got a position in forum XY. I'm important there. I've got a good position there, which I will surely not be able to attain in real life."<sup>6</sup> (P9).

Adults seek refuge from the sometimes harsh real life and may find that online, life is so much easier as they are able to achieve their goals more quickly and their game keeps them occupied and deceptively happy. Nevertheless, in comparison to adolescents, adults "have more to lose. They may have built up more around them, may have more to lose by leaving." (P16). Adulthood typically comes with careers, families, social lives, as well as the associated responsibilities. Adults spend years and decades building up their lives whereas adolescents look back at a relatively short life. Moreover, "being slightly older comes with a different maturity and an outlook on life. (...) young people still have a sense of they're sort of invincible and (...) can manage and it's not such a big deal." (P16).

From the participants' accounts, older clients are more likely to be capable of reflection and understanding the consequences of what they are doing as impacting their lives negatively. Adolescents, on the other hand, may lack the capacity of self-reflection and psychological maturity. The lack of maturity however not only applies to adolescent clients, as one participant notes, "many of those kids, they may be 22, but really they're about 12." (P1). She furthermore stresses the lack of independence and basic life skills of patients suffering with Internet addiction by stating that young clients "have a hard time communicating their needs" and one exemplary client

"never made a meal, didn't know how to work, but everything that he does, every step along the way you have to hold his hand. I mean it's very immature, very dependent. (...) they have spent most of their formative teen years instead of working on the tasks of identity and intimacy, all that kind of stuff, they've just been gaming." (P1).

The extreme time investment in the game from an early age for some young clients appears to have detrimental effects on their development, particularly

the tasks crucial to gaining maturity and autonomy. Adolescents who spend most of their time using the Internet “pretty much drop out of the ‘ordinary developmental tasks’ for 15 to 20 years olds, such as going out, meeting people from the other sex etc.” (P2). In this way, developmental delays as a consequence of early excessive Internet use reach far beyond childhood and adolescence and create young adults who remain immature and dependent cognitively, behaviourally, and socially. The problem of impeded autonomy development becomes particularly pressing when the adolescents reach adulthood as “adolescents realise that in 6, 8, 10 months they are supposed to be responsible for themselves and parents realise that their professional training doesn’t work, there’s no job in sight, studies don’t work.”<sup>7</sup> (P4). The request for professional help comes with the realisation of the actual real life consequences of excessive Internet engagement. Concerning therapy, reaching adulthood creates a problem as 18-year olds do not want to be regimented, which appears to be less of a problem with younger adolescents. As of 18 years, young adults are of legal age and they are assumed to act responsibly and autonomously. However, in the case of clients suffering from Internet addiction, the required developmental tasks are often not fulfilled even well into their twenties.

### Gender

Another prominent individual factor that can put individuals at risk for developing Internet addiction was gender. The therapists’ professional experience suggests the large majority of clients presenting with Internet addiction are males. In comparison to girls, boys’ social competence is not well formed during adolescence which may make them particularly vulnerable to excessive engagement with online games. One participant puts it this way:

“I think that a crucial reason for why boys are more affected is that they are socially not as stable, not as competent, and most of the time

they are not interested in things like talking to each other (...). Amongst each other, boys want to do something together, but they don't know what to do, apart from maybe organising a lan party. And those things that boys and girls used to do previously, riding a bicycle and meeting up with other boys, why, it's too boring or too exhausting. There's a lot of convenience and lack of social competence."<sup>8</sup> (P12).

Boys may look to online games to fill a void in their real life as they might have a problem with their self-esteem because "an online role-playing game like World of Warcraft offers a lot of exaggerated emotional content. It has the effect of replenishing them internally. It structures daily life, it creates social contacts with this functional connection of what happens in this game."<sup>9</sup> (P2). Overall, boys tend to find online life easier as they claim that "online, I'm much nicer than usual", "more social, amicable, competent"<sup>10</sup> than in real life (P12). A participant elaborates on the potential reasons for why the Internet may be more problematic for boys than for girls by drawing on Sax' five factors that drive male underachievement (2007):

"He talks about what's happening to the generation of boys in our country and identifies changes in our school system, video games, some other things. There's [sic] a lot of problems in our country, I believe, but the way that we're raising boys and what we're requiring of them, a lot of things are shifting gender wise. You know most college students are now women. Women are becoming much more successful." (P1).

In this account, the feminisation of the school system is alluded to which, according to Sax (2007), makes it particularly difficult for boys to be successful and as a consequence they drift into video games. In addition to this, Sax refers to the increase of prescription drugs given to boys to cope with their attentional deficits, "endocrine disruptors" in the home and school environments which decrease boys' testosterone levels, as well as a general devaluation of masculinity (Sax, 2007). Therefore, a number of environmental factors underlying modern life may turn online games into a sanctuary for some boys. Some males fulfil their biological potential via their Internet gaming because for

them, skills are important, appearing as strong and competent, being able to win the battle in online role-playing games. Typically, in online games, males will be part of larger groupings, guilds or tribes, “which are dependent on particular achievement and a specific presence” requiring a lot of time (P6). As one participant notes, “when I belong to a group which only admits a new member starting from a daily playing time of eight hours, I have acquired something uncanny and you have to bear in mind that in the background progamers and prodevelopers appear as role models.”<sup>11</sup> (P6). From the participants’ accounts it appears that boys live out their need for belongingness and for proving oneself via the Internet rather than through real life accomplishments, and look up to the successful and renowned progamer, who has now replaced the father as ultimate role model. Boys strive for something different than they used to a couple of decades ago. Coupled with the “uncanny” requirements of many online games, sociocultural changes and inadequate paragons of masculinity increase the risk for Internet addiction in boys.

The participants’ opinions on Internet addiction risk in females differed. A minority of clients presenting with Internet addiction in both outpatient and inpatient settings are females. This fact has led some therapists to believe that females are at lower risk for Internet addiction, which was explained by their closer proximity to human existence because for women it is important “what you can’t do on the Internet”:

“You can’t “fall in love” there, you can’t have sex, you can’t give birth. You can neither become really sick there nor can you be in somebody’s care. You can’t die there. You can’t be accompanied in death and you can’t be buried. These are all the things that have to do with the existential dimension of humanity, where the human proves his humanity and from my view this is where women have a larger affinity and a larger strength. And for me this is a bridge to the understanding of why females may be rather protected from becoming addicted to media.”<sup>12</sup> (P4).



In this regard, females may find more pleasure and importance in the here and now as they realise what the Internet can give them can never measure up to the very tangible things of real life. However, rather than excessive Internet use not being a problem for females per sé, females may appear more functional than their behaviours indicate. One participant states, "I think girls navigate social worlds and their interactions with family better and so they're not coming to the attention of therapists and families so much." (P1). Another participant elucidates this functionality further by stating:

"(...) from my clinical experience, boys become more noticeable significantly earlier, just like with other psychiatric illnesses, and they don't hold up social rules properly anymore and attract attention or are noticed due to a very conspicuous retreat in this sense, whereas girls are able to keep up their social commitments and responsibilities much longer, and are able to function in school, and they slide into the problematic behaviours more slowly and more subtly."<sup>13</sup> (P6).

Others think that "girls are addicted to other things. They're addicted to Facebook and texting. And I don't think it really interferes as much maybe with their functioning perhaps as gaming does." (P1). In general, Internet usage appears to be different for females relative to males, because females tend to look for the "exchange with friends" and they "spend a lot of time on the Internet in social communities, chats, discussions, writing to each other"<sup>14</sup> (P5).

"Social networking sites are well designed to appeal to women. Women like to be socially connected and chatty and talking and all of that with one another and the social networking sites really facilitate that and so women are really drawn to that" (P7).

Females' excessive engagement in Internet applications that allow for communication, exchange, and that foster a sense of belonging is often combined with the exclusion of the real world for these purposes. In these cases, socialisation occurs exclusively via the Internet. Correspondingly, one participant notes a surprising result of a study including a sample representative for the population of Germany:

“(...) the number of 14 to 18 year old girls with pathological Internet use exceeds the number of boys. (...) it turns out that girls don’t play role-playing games primarily, but use social forums excessively, in order to experience social interaction with other girls and above all to feel understood in their very individual problem constellations, very different from boys, who want to experience narcissistic gratification via games. This means the girls want direct interaction. They want to feel understood. They want to be able to express themselves. That’s a totally different quality and usage intention than for boys. It’s almost the opposite of this totally narcissistic, almost schizoid reaction that happens with boys. The girls always remain in contact and sometimes they meet up with the people they meet online. And the interesting thing about this is, and it’s totally new for us, since just a few months we’re getting girls with clinical pictures that are so pronounced that we have to admit them into inpatient treatment. (...) we have to develop strategies to specifically target girls much better because there appears a huge gap. Epidemiologically, they are a very important group, but we’re not getting them into consultation and treatment. (...) at least for Germany that’s a nationwide problem and that’s where health politics need to come in.”<sup>15</sup> (P18).

The relatively high prevalence of pathological Internet use in girls was an unexpected finding as the current reality in consultation and treatment requests looks different. Excessive Internet use in women is not well acknowledged in research to date. Girls’ usage motivations and behaviours appear to differ from those of boys. The numbers of teenage girls with potentially pathological Internet use in the German population are unexpectedly high and the outcomes of excessive engagement are analogous between sexes. Internet addiction in females clearly warrants further exploration. Thinking about how treatment reality compares with epidemiological evidence, a participant notes the following:

“Apparently girls are left to take care of themselves, and their parents’ problem awareness is not such that they say to themselves: ‘I am going to look for help now’, the way they do it for boys. On the other hand, (...) the girls remain in social contact, even if it’s excessive [Internet] use. Computer game playing by the boys is more evident for the parents than it is with girls, although the consequences are similar, regarding achievement orientation, school absenteeism. Although it is

probably like with all the addictions in girls – when you think about pill addiction in women, that’s also a very quiet addiction. A lot happens in secrecy and it is being concealed for longer. Particularly girls try to conceal it longer. The need for a representation of normality is much more pronounced in girls, so that the desire to change their behaviour becomes concrete much later compared to boys. That’s the perfect addiction.”<sup>16</sup> (P18).

The presented analogy to prescription drug addiction in females indicates that females have a more pronounced awareness of the social environment around them as well as an ability to cover up pathological behaviours through appearances of normality. Females do not want to draw attention to themselves and try to cope with their problems internally, rather than externally. They are “not eliminating their social life, which is one of the big reasons that boys come in.” (P1). Another facet of the relatively low figures of females in treatment for Internet addiction can be explained by females requesting professional help for other reasons. Only in the course of therapy it transpires that Internet addiction is the real problem:

“Over the years I have met women, female patients, who did not present with a primary problem of excessive Internet use. Only in the course of therapy it appeared that they are always in chat rooms trying to establish new contacts. To put it differently, I’ve always experienced women (...) who are using all sorts of social networks in order to meet people there, (...) and this appeared like excessive Internet use, however, the clients didn’t name it this way.”<sup>17</sup> (P2).

This excerpt illustrates two potential explanations for why the actual problem of Internet addiction transpires only in the course of treatment. First, females may lack insight that their behaviours deviate from the norm. This explanation would put females in a similar position to young males who do not reflect on their behaviours sufficiently. Second, females may be aware of their problem, however they may try to conceal it for reasons such as sociocultural stigmata attached to the condition. In sum, gender appears to be a potential risk factor for Internet addiction in such a way that males present with the problem significantly more often. At the same time, excessive Internet usage appears

potentially problematic for adolescent girls who tend to appear functional, but may nevertheless suffer from a quiet addiction.

### Profile

Another critical theme pertaining to individual factors that elevate the risk for suffering from Internet addiction was personality and associated factors. Most participants referred to a standard client profile when presenting with the problem of Internet addiction. The standard clients are characterised as being “very, very lonely, socially very undernourished people, both with regards to family as well as the social context, family circle, the feeling of belongingness”<sup>18</sup> (P11). The following excerpts highlight the very nature of a prototypical client presenting with the problem of Internet addiction in clinical settings.

“The boys with pathological Internet use are predominantly insecure, shy, partially even schizoid boys when they come to us, they have big problems in trying to establish contacts and stood out because of a tremendous self-insecurity and being easily hurt from a very early age, have taken on a peripheral position in their school environment, never really wanted to establish contacts with their peers, and in the foreground there’s anxiety up to an anxiety disorder, problems with a sense of self-worth right up to schizoid personality disorder.”<sup>19</sup> (P18).

“(…) the online computer gamers are predominantly young males who have failed on their way into a self-determined autonomous adult life, who have broken off their education or professional training, their studies, they have not reached an adult life with friends, relationship, sexuality, professional success, and either avoid the responsibilities of the concrete real adult environment, and are anxious in terms of being sociophobic or feel narcissistically aggrieved, or depressed, sometimes both. They find an alleged solution for their problems with self-esteem and self-worth on the Internet and in computer games. They play the hero, play with others, but in relatively non-committal relationships. But once they do that continuously, they get tangled up in it, and the outside world is experienced as more dangerous and aggrieving and the possibility to find their way around, to appear confident, to be

successful, decreases. And then they enter the typical cycle of dependence.”<sup>20</sup> (P4).

“The ones I’ve seen were pretty depressed young men, appeared depressed, they somehow dropped out of life, had few friends, and received access to social contacts via their use of online role-playing games or some chat rooms or something like that. They had peer groups who took place online, and by these means they had a sphere of activity, which they didn’t have in real life anymore.”<sup>21</sup> (P2).

A client suffering from Internet addiction here is characterised by being a young, socially awkward, narcissistically attuned, and developmentally immature male who lacks self-esteem and confidence. The lack of real life goals and ambitions as well as social relationships renders some young men depressed and they flee from these unpleasant feelings into an online game. Another characteristic of the standard client is the relative lack of life perspectives. A participant describes this in the following way:

“It’s definitely my impression that people who are actively involved in family and working life have other things to do than playing WoW [World of Warcraft] for forty hours a week. And those people who can take the time to play forty or sixty hours of WoW per week don’t have anything left.”<sup>22</sup> (P2).

Another participant describes the standard typical person suffering from Internet addiction as the following:

“(…) they tend to be very dependent, very conflict avoidant, poor social skills, very passive really in the world, uncomfortable in the real world, uncomfortable in the natural world, uncomfortable in the real social world, and so this is what they need to change, but of course because it’s really constructed in their personalities, it’s a very long, slow process.” (P7).

Moreover, a therapist gives an example of another typical client whose self-worth is “pretty low” and experiences the following problems:

“(…) difficulty in meeting new people and forming new relationships. So he’s tended to stay home more and more, and spent more and more time playing online, playing games online. (...) I didn’t notice if it’s a chicken or egg thing. Are people’s social skills obviously affected by playing games because they’re not social or anything and meeting

people face to face, or were their social skills not good in the first place because of their characteristic, they were shy or had another issue and therefore playing games has given them a way at least to have some sort of relationship with the outside world." (P16).

This participant draws attention to the lack of knowledge as the origin of the behavioural problem. Particular personality traits appear to be risk factors for Internet addiction, whereas Internet addiction may manifest and exacerbate existent shyness and seclusion. A cyclical pattern of use and problem exacerbation emerges which the individual finds increasingly difficult to break out of. Overall, individuals suffering from Internet addiction appear comparable with regards to their personality characteristics and the way they present themselves in treatment across the board:

"With "media addicts", it doesn't matter whether they are adolescents or adults, we haven't got the extroverted, impulsive people, but the introverted, quiet, shy, anxious, slightly depressive, insecure ones who lack a sense of self-worth or who have a low perceived self-efficacy."<sup>23</sup> (P17).

One participant makes an interesting point about the typical individual with Internet addiction drawing attention to their high intelligence:

"What I find also is that they're very bright. Because if you are very bright, or a video gamer who is very bright, who is able to play video games because they can complete their normal work faster than anyone else. So they have more free time to get into these games, or they're just bored because they're ahead of their class, or on top of that, so they use these video games for stimulation. So the danger that we're finding is that we're turning people who are more or generally reclusive anyway into more of a recluse and then we're turning these very bright intellectual people in our society into people that are not innovators, who are not contributing to society. And that's the nature that we face." (P8).

This quote is enlightening because rather than drawing attention to clients' deficits, here the focus is on their strengths. Due to their above average intelligence, some clients may require additional stimulation as they do not find enough of it in real life, and thus may seek it in game. This participant

furthermore makes the connection between the typical online gamer to a *Hikikomori*, a person who is reclusive and isolates himself from the external world:

“They surf the Internet all day, watch anime cartoons, you know, play video games, do whatever, and they live in a room like little hoarders. They don’t leave their rooms, and their parents have to bring food on hot trays to them so they eat. And they do everything in their rooms. When their parents try to get them out to get a job, they basically punish their parent, they abuse their parents. (...) they are considered to be parasites of society. They don’t want to have relationships. They don’t want to get married. They don’t want to have children. Nothing. They don’t want to have a job. (...) This is kind of like the *Matrix* movie, where you plug in and you live in this phantasy world and you’re tricking your brain to feel good. But in essence, everything is falling apart in reality.” (P8).

Hikikomori are characterised by an absolute lack of ambition and drive. The demands and responsibilities of adult life appear tenuous which leads to isolating behaviours (Tamaki, 2013). Young men presenting with the problem of Internet addiction exhibit a striking similarity to the hikikomori and live a never-ending adolescent life which is often facilitated by the over-caring co-dependent mother. Rather than facing the gloomy reality which appears frightening and arduous, Internet addicts chose to live in the *Matrix* where they find comfort and (virtual) fulfilment.

Another facet of the standard client profile includes the therapists’ appreciation of the client as suffering from an addiction. This entails the experience of addiction features for the following reasons:

“At the end of the day, all clients suffering from addictions have a big problem with their sense of self-worth because addictions still have the reputation that they are diseases, but ‘it’s my own fault because I’m not able to get on top of my behaviour’. And this assumption is a massive setback of self-esteem.”<sup>24</sup> (P9).

Viewing oneself as failure, as not strong enough to overcome the problem alone, can take away the last ray of hope for individuals suffering from Internet addiction. A participant explains this vicious cycle in the following way:

“As you get more sucked into the game, it becomes more and more of your life. (...) you are a very capable student (...) but now because you’re not getting enough sleep, you’re not really as well at school. There’s this gap between how you see yourself and the way you’re experiencing the world. And that can become very depressing if you’re very frustrated. You’re feeling helpless. I mean on the one hand you like to do better at school, but on the other hand you’re stuck in the game. You’re playing ridiculously long hours and you can’t stop. That’s very depressing. And what makes you feel good the other day is this game, but then in the morning when you wake up (...), you’re feeling horrible about yourself, about your life. There’s a great deal of shame that comes along with that, (...) shame or anger. This is why you disconnect with relationships. That’s happening, whether it’s families, or children, or with couples. It’s difficult because now there’s a lot of anger, there’s a lot of frustration, there’s a lot of disconnection, (...) being sucked into addiction, just like (...) any other addiction.” (P20).

For clients, the Internet and specifically online games become a place of refuge where they can escape their real lives that have become increasingly depressing and frustrating. Over time, leading a virtual life leads to feelings of shame and anger, and the loss of relationships. In order to deal with this, the computer appears as safe haven. Addiction develops. In another instance, a participant states that Internet addicts are just like “functioning alcoholics”:

“They work every day and they’re not losing their job and they have difficulties with relationships and they have difficulty with some areas of their life, but they’re getting by and that’s how they are. I think a whole class of people fits into that category of using, being dependent on the computer or gaming. They’re lethargic. They’re just functioning addicts.” (P20).

Although the standard profile of a client suffering from Internet addiction draws on male gender, females are not exempt from the problem, as the previous section demonstrates. In addition to this, an example par excellence of a female suffering from Internet addiction is provided by one therapist.



“A textbook example is a single mother, two small children, the grandmother lives far away, so she doesn’t have the possibility to go out once or twice a week. But she’s got a PC. Of course it’s possible to exchange views about things in a forum or chat when the kids are in bed rather than watching TV. And there will be people who understand me, who listen to me, whom I can talk to about daily things, other things that are important to me, whatever. That’s attractive. (...) And that’s how it all starts. Of course there will be flash events where the situation changes. Suddenly the chat becomes more important than my children. (...) That Saturday and Sunday we didn’t go out again although the weather was nice. Why didn’t I go out? Ah right, because I was chatting. And lunch doesn’t work anymore either. My kids have to say they’re hungry ten times before I react to it. And then everything is quick, quick because I must continue discussing, gossiping, or communicating with the avatar that I’m in love with, where I think he’s the one.”<sup>25</sup> (P9).

In this excerpt, the social motive is inherent. Females actively seek the rewards of social engagement. They lack the possibility or the motivation for social interaction in real life and the Internet becomes their “virtual café” (Turkle, 2003). Similar to their male counterparts, female Internet addicts look for something online that they cannot achieve in their real life. Internet engagement fills a void that otherwise would result in depression, loneliness, and frustration.

### *Situational*

From the interviews, it appeared that situational factors which may increase a person’s risk for developing Internet addiction included neglect, being students, and having a trigger that would set Internet addiction development into motion. Each of these will be referred to in turn.

### *Neglect*

Neglect appeared as an important risk factor for Internet addiction. From an early age, some children are not being paid adequate attention to, so that they

are left with attaching to the Internet rather than to their parents. "In a high stress environment, the children are getting lost and ignored." (P7). Furthermore, an "interpersonal connection can't happen if they are attached to a device, so when they are detached from each other" (P7). The device, the Internet, becomes their safe haven. Online, they find what they cannot find in life. "[I]t gives them predictability, it gives them safety, it gives them attention. It gives them all the things they want. They can create a relationship with it." (P7). Particularly in the formative years it is crucial for children to have caretakers, people who feel responsible for giving the child all the love and attention they require. When the child does not receive sufficient attention, they may go elsewhere to find it. The interviews furthermore revealed that neglect is not only experienced by children, but it also affects adolescents and young adults.

In addition to neglect via lack of appropriate attention, neglect occurs by proxy, namely the lack of a proper family structure. In the interviews, therapists mentioned that often, the family set-up of young clients who seek professional help is problematic. Some single parents are overburdened with having to take care of the family and at the same time providing for them financially when there is limited external support available. A participant draws attention to the problem of (involuntary) neglect by parents as risk factor:

"A large proportion of those who used WoW excessively were sons of single mothers. Either mothers were single parents or the fathers were gone elsewhere. (...) So normally they'd have a mother who would be nagging constantly with a truly piercing voice, who would give them hell. I don't want to depreciate mothers. (...) of course you can be annoyed when every time you go into your son's bedroom, day and night, he is sitting in front of [the computer]. Of course this irritates and bugs you. However, in the long run this was a residual situation that I've learned about, that they were particularly nagging and bore little relation to their sons. That was one side of the coin. On the other side there wasn't a dad who would have engaged in something with them, who would have shown them the world, who was present,

approachable, an adviser, anything. So all these structures weren't really there and it appears as if the adventure world of World of Warcraft compensated for the lack of a father figure."<sup>26</sup> (P2).

Playing online games gives young men the possibility to escape from real life problems and gain the recognition they seek that is absent in real life. The lack of an important father figure in their lives may be particularly traumatic, and this absence compensated for in some other way. Single mothers can only do so much. Another extract demonstrates how single mothers can lose authority and a vicious cycle of excessive online use and family conflict is established involuntarily, but quickly:

"The mother who, after divorce, has taken on a role of being at eye level with the adolescent, who caved in when he went berserk the first time and wanted his computer back on, and has planted himself in front of her threateningly, and she's said, well, I didn't have anything to hold against him then, he has learned 'I need to kick up a fuss, I need to kick the door out of the hinge, then I can get what I want'."<sup>27</sup> (P17).

With the stresses of daily life and the single responsibilities for taking care of their families, the easy way to deal with a problem appears to be relenting. The son wishes to seek refuge in the game, but uses immature negotiation and threats to obtain his goal, and ultimately finds contentment in the game. The aspect of the "broken home" is also highlighted in the following account:

"So we've almost always got the "broken home" story particularly when it comes to computer users, with a long conflict development in the background, where everybody is coming out from their trenches and the family climate has deteriorated. Everything evolves around the issue of dispute and it dominates everything."<sup>28</sup> (P17).

Early neglect appears to be linked to an increased risk of developing Internet addiction by the therapists. Neglect may relate to the actual physical lack of a father figure, but it could also be due to excessive engagement in technology by young parents, as the following account demonstrates:

"(...) parents themselves are not modelling healthy Internet use themselves and are abandoning their children to gaming and other Internet devices. So children are bonding poorly within the family,

they're not getting enough attention from parents who are themselves glued to their smartphones. (...) When I started developing my interest in this area [Internet addiction], very few parents were spending much time at all on the Internet themselves. (...) it's a young generation now coming up having kids, and they are themselves a generation that grew up with this technology and gaming themselves and so they're thinking it's normal, thinking it's perfectly healthy. They're happy to not be bothered with their kids, to know their kids are safe. (...) Use of digital media is the culture of the household and the kids are growing up that way more and more. And I think it has very detrimental effects on children, the lack of appropriate parental attention and all of this. (...) But parents themselves are so caught up, are addicts. Many of the parents are addicts themselves. And I have some sympathy for parents because they don't know, there's nothing like a public health campaign like there's in China to educate parents. So parents are just very comfortably flipping into these behaviours and allowing their children to experience what the children are experiencing in terms of lack of parental attention. The children are becoming Internet addicts or game addicts themselves. All of this is happening in a very unconscious way. That is normative in the culture and it has many profound implications that are worrisome." (P7).

From this account, technology has become a regular constituent of parents' lives, an ever so present ingredient in the mediaphilic culture they live in. Rather than actively engaging with their children, parents may let them play on their phones and computers because this way they know their children are safe in their sight. They think the Internet is "a great babysitter" (P20). Another aspect of neglect is the overall lack of knowledge about potential detrimental consequences of excessive Internet use. A behaviour that parents deem to be "normal" and "healthy" and that they like to engage in themselves cannot possibly harm their children. There appears to be a fundamental error in this thinking as "parents have a responsibility to their kids" because "if you can't set limits and your kids are able to play more than 25 hours a week, it can easily turn into a full addiction and it's getting out of control." (P20). Parents have to face the possible dangers excessive Internet use can pose to their children's

psychosocial health. The risk of developing Internet addiction is present in cultures that fully embrace technology with its ubiquity and mobility.

One participant takes the meta-perspective of addictions in general to explain the development and maintenance of problematic behaviours as fostered by usage motivations, such as achievement, in order to compensate for deficits:

“In my view, there exist two large stressors that every human is faced with because none of us grows up in paradise. So in childhood, it’s deficits, i.e., situations, where we don’t receive enough of something that we need for our personal development, attention, support, recognition, or situations, where people, often older people, exceed our tolerable limits up until bad and worst violations, such as sexual abuse, physical, psychological abuse. In general, addictions are a human’s attempt to compensate for these deficits and injuries, to somehow deal with it, to counterbalance it. So often that’s the way to gain recognition, acknowledgement, because the normal way via the peer group, the social school environment, the family context doesn’t work. And when we think about gamers who put a lot of time into it, on the Internet (...) they are a famous figure and a valued figure with a high level and they receive recognition and acknowledgement this way by means of a specific skill that they have developed there.”<sup>29</sup> (P5).

Neglect with regards to the wider social environment can have detrimental consequences on the children’s and adolescents’ development. It is denoted by the physical or emotional absence of the caregiver, and in some cases can take the severe form of early abuse which may be compensated by the excessive engagement in online behaviours. The result is Internet addiction.

### Students

The second situational factor increasing the risk for Internet addiction that appeared from the therapists’ accounts was student life. More often than not, starting university is the first time in the life of a young person when they are outside of their family home environment. This endows them with new

freedoms and a variety of life style options, now of their choosing. As one participant puts it, “you leave home. You may go to university. You may engage sexually with others. You may choose to lead your life in whatever way. You have much more possibilities for independence.” (P10). The lack of parental guidance can lead to the excessive engagement in online behaviours, and as one participant states young people “generally really accentuate their addiction in college. So this is the time when the structure of the family is gone, expectations of a family, all that has gone” (P1) and this makes students “a particularly vulnerable group” (P16). Similar to adolescence, the entry to university functions as a rite of passage (Turner, 1967). From an anthropological point of view, adolescence marks the transition from childhood to adulthood, the liminal stage. Upon passing through this stage, the child develops into an autonomous and responsible adult.

Accordingly, student life marks the transition from living under parental control to being a fully self-sufficient and self-providing adult. In that case, the transitional period of adolescence is extended to include the student years. In both cases, the (further) development of autonomy, independence and responsibility are crucial to be able to pass from one stage to the next. During the transitional phase of student life, certain key skills need to be developed:

“(...) young adulthood is marked by rapid autonomy, strong autonomy needs, mastery. It’s a huge phenomenal goal, and the problem with some of these games is that particular games tap into some of that mastery and they become successful at it, they become (...) sucked into it. That is a tremendous risk [for students], while I think for older adults and younger children it’s not quite so much. But the mastery element is huge. These games are designed to tap into this element. (...) They are all about being successful, moving out, killing, whether it’s acquiring things, whether it’s points or (...) status. (...) And (...) the reward centre of the brain can’t distinguish between real life reward versus a virtual reward. It can have the same impact on the midbrain, the reward centre. So [gaining] pleasure from their real life of course is hard, but from the game is easy, just go on the game.” (P20).

This excerpt highlights another important factor that describes the risk of student life for developing Internet addiction. In addition to striving for autonomy, which appears as key to reaching the next stage, the student strives for mastery. Entering university is another challenge, the challenge to succeed, to become an expert, a master, in something. This entails a high degree of commitment and perseverance, and thus is rather difficult to obtain. Rather than taking on this challenge in real life, students may choose to succeed in virtual life via their avatar or some virtual identity they have adopted as this seems the easier way to obtain the valued goal of mastery. In sum, the risk for students to develop Internet addiction arises from the rite of passage which endows them with freedoms, but at the same time requires them to develop crucial skills for the transition to adulthood. For some, the liminal stage of adolescence appears particularly problematic. When they look for professional help for their children, parents state the following:

“(...) their concern has been particularly highlighted when their child has come up to university. And you’ve removed the parental control and suddenly this young person who’s got this extra freedom hasn’t got Mum and Dad telling them to stop playing or to get off that machine now. And the next thing is they become so engrossed in playing that attention suffers and in two or three occasions there have been people that have been (...) excluded [from university] because they haven’t maintained their academic commitment.” (P16).

At university, the newly found freedom can be a risk factor. Although they have reached the age of legal majority, university students may require external control and guidance to be able to construct their lives in an appropriate and healthy manner.

### Triggers

In addition to neglect and student status, triggers appeared important in increasing the individual risk to developing Internet addiction. A trigger is a

specific event which may initiate a pattern of excessive engagement with the Internet in individuals who are vulnerable to developing addiction in the first place. One such event is mobbing, as the following excerpt illustrates:

“One of my patients has been goofed on during a school trip and he wasn’t able to fight back against his class mates. I think that’s what you can call mobbing, and he was helplessly exposed to that situation. So it happened that he didn’t face up to his life anymore, and the fact that there was an online possibility led to him being lured into taking this path and to escape into the virtual world and to reject and push aside the other world. And this wasn’t the case only with him, but in my opinion this was clearly the case with everyone [clients presenting with Internet addiction problems] whom I’ve met.”<sup>30</sup> (P2).

Mobbing appears to be a trigger which sets in motion a cascade of behaviours and consequences that affect the individual negatively. There is psychological pain that makes them want to retreat from the real world to avoid danger. The alleged lure of the Internet lies in the possibility to create an alternative world, a virtual world, which is easier to navigate and where potential risks are minimised. With shutting off the possible dangers, one shuts off possible relationships, contentment and real life satisfaction. Once the virtual world becomes one’s main *lebensraum*, life revolves around it. The addiction manifests.

Many clients suffering from Internet addiction “drop out of life, either they were crossed in love, they have been socially excluded, where there’s no cure for that, or they’ve been rejected professionally in their training, or they just weren’t successful.”<sup>31</sup> (P2). A particular event appears to be the crux in most cases. Another participant points to the circumstances in which addictive behaviour occurs when initiating treatment where he is looking at “when the development of addiction began and why, what kinds of situations the addictive behaviour occurs in, how the risk moments come about, in which aspects does the addictive behaviour become a coping strategy.”<sup>32</sup>



A particular event can be a trigger for the engagement in online activities, which is sometimes used as coping strategy and over time becomes dysfunctional.

“With adolescents, it doesn’t matter whether it’s boys or girls, whether it’s in the outpatient or the inpatient setting, very often (...) mobbing in real life occurs as the cause for a very severe social retreat. Often there appears such a triggering event.”<sup>33</sup> (P17).

This excerpt illustrates excessive Internet usage is initiated by an unpleasant, pain evoking episode, and the reaction to this episode, i.e., Internet usage, soothes the individual so that the behaviour is learned quickly and carried on continuously. Internet usage has become a coping mechanism for life stressors and allows the individual to regulate his emotions accordingly. Finally, the learned coping mechanism of Internet usage can lead to the development and maintenance of a full-blown Internet addiction.

### *Structural*

The structural characteristics of the Internet appear as additional factors that may put vulnerable people at risk for developing Internet addiction. They entail different online applications, some of which can become particularly problematic if used in excess. Nearly all participants indicated online gaming was the most common presenting problem among their clients with Internet addiction. This related to gamers spending significantly more time gaming than other users spend engaged in alternative online behaviours, and the consequences appear to be more severe for gaming addicts. For instance, a typical gamer “has a greater risk of relapsing and to come crashing down (...) compared to a pure chatter.”<sup>34</sup> (P11). An explanation for the increased Internet addiction risk of gamers is that they grow into gaming behaviours from an early age and in some cases do not learn to be adults as their time is spent on games

rather than crucial developmental tasks. It has been suggested “their way into addiction is longer” and “the damage done is more severe”<sup>35</sup> in comparison to other online addictions (P4). Participants particularly emphasised Massively Multiplayer Online Role-Playing Games (MMORPGs) as they appear to increase addiction potential, as the following excerpts illustrate.

“(…) I think all the Massively Multiplayer Online Role-Playing Games are (…) actually more addicting than other types of games.” (P1).

“There seems to be a natural progression until they find MMOs as early pre-teens or teenagers and once they find that, that’s where they can get their social needs met, so they think, it’s fun, it’s exciting. Those games are very cleverly designed in terms of intermittent reinforcement. The reward schedules that are built into those games are very carefully designed to get them hooked and then the social aspect is absolutely of critical importance to them. And so I think it’s that combination of a game which gives them the right schedule of reinforcement, keeps them hooked in the game plus since they don’t have outside social lives, that social aspect is of crucial importance to their addiction.” (P7).

Intermittent reinforcement schedules have been established as notable structural characteristics of fruit machines that can contribute to the development and maintenance of pathological gambling (Parke & Griffiths, 2006). One of the participants explicitly links online games to fruit machines as both contain a peculiar reinforcement schedule (P19). For video games, similar relationships have been established taking into consideration that rewards provided at variable ratio schedules reinforce behaviours most strongly and consistently, and “for a lot of people [gaming] is a more powerful reward” than other applications (P20). Over time, gaming is associated with rewards and the behaviour is learned and manifested quickly (King, Delfabbro, & Griffiths, 2010b). MMORPGs utilise these psychological mechanisms, as noted by a number of participants, contributing to a particularly elevated risk of developing Internet addiction for users of these types of games. Another participant explains the difficulty to abstain from playing an online game:

“It is not the game, but communication. It’s the communicative aspect, the group, group cohesion. (...) It’s exclusively the social factor because the game itself is not a challenge for the client anymore. (...) most of my clients who were in online games did not play much actively anymore. They were online, but they were primarily chatting” or using some other chat channels<sup>36</sup> (P9).

Another factor raised is MMORPGs are inherently social games. The Massively Multiplayer element in MMORPGs entails the inclusion of large numbers of players who populate enormous game universes at the same time, up to many thousands of players on a single server alone. In addition to providing the possibility of social interaction, MMORPGs require it when team work is required, often at the higher levels. The social element of these games allows people to meet their needs in game that they may not be able to meet in real life. Overall, MMORPGs are the only online games that offer a wide variety of incentives for gaming and may thus be particularly appealing and potentially pathogenic if used in excess. The social element may furthermore add peer pressure as players are coerced into playing by their online friends and guild members:

“So one of my World of Warcraft players who had actually stayed off the game for about nine months when he finished his GCSE’s found the other players were putting considerable pressure on him to join the game again and take up the role of a guild master in the past. So he was a very valued player. But I don’t think it was just his desire to play. It was as if he was under some sort of coercive pressure to reengage with it that I think brings this new dimension to gaming. I don’t think it’s just about the strategic elements. (...) you’re part of a community.” (P10).

Younger gamers appear particularly vulnerable to withstanding the pressures and may give way to the group’s demands. Recognition and acknowledgement come at a price. This price appears to be sleepless nights during which players aim to kill the boss with their guild members. Overall, “expectation of demand” is present not only for MMORPG players, but for young Internet users in general, as the next excerpt illustrates.

“They actually believe people want more from them than they actually do. But they certainly fear the sort of relentlessness of on-going messaging (...). But concurrently with that is an absolute terror of exclusion. And the model that I tend to use as a description for it is rather like the tale of the Pied Piper. (...) we’ve got the story where the Pied Piper gets through the wall of rats in Hamelin. (...) And then the townsfolk refuse to pay him, so he comes back and lures all the children to a mountain, but there’s one boy who is crippled (...). The experience of being left out is so devastating in that tale because what is going on inside the mountain is so exciting and so wonderful (...) and I think social media has promoted this. One hears all the time about young people. I know people are supposed to only be 13 on Facebook, but how they just have to keep updating their status, and have to keep responding to messages, (...) it is compulsive.” (P10).

The tale of the Pied Piper of Hamelin (Brüder Grimm, 1956) elucidates the devastating fear of social exclusion which makes the boy in the tale want to be part of something which he does not know is dangerous. Exclusion, in this case, was his life saver, but he craves for being part of the community. He has got a strong desire for companionship laden with emotional and psychological needs that can only be fulfilled through group membership. Exclusion results in alienation and isolation. Similarly, today’s young Internet users are afraid of social exclusion and in order to avoid it, they tend to be always online, always contactable, and always up to speed about their friends’ whereabouts and updates, in order not to miss out on anything. Being online continuously, on their PCs, laptops, iPads and smartphones, however puts a high amount of pressure on them as they can never truly relax and disconnect. Another participant contends:

“In some way I think technology has made life more stressful, more urgent, more immediate. Like ‘why didn’t that person respond to my text in five minutes?’ It makes life more stressful, and people more stressed. And then they turn to technology as a form of escape.” (P14).

Paradoxically, constant Internet use is stressful and in order to overcome stress, clients make use of the Internet. The Internet has become a short-term cure for

their problems. Disconnection from the Internet means disconnection from their social lives, as is illustrated by the following account:

“They’re not really socializing face to face very much; instead, they’re socializing either through the games or through those social networking sites. We had one guy who was a gamer and a skyper, you know. He spent his time in his room. He rarely left his room and he did a lot of skypering with his online friends, thought it was fine, just thought he was dandy, or he thought he was gaming, he was doing one or the other. We’ve had a woman with us who didn’t game at all. Her addiction was strictly an addiction to social networking sites, but it was all around a romance addiction, sex and romance. It was all around that. So, you know, it varies. But most of them are doing texting and social networking and gaming.” (P7).

Online socialising appears as a strong motivator for Internet use among many clients. A participant illustrates the problem that occurs when parents take away their children’s computers by describing online friends in the following way:

“They are the only social functions or contacts that are left. (...) And that’s really difficult in the context of parents who proscribe using the computer or who remove it so they can’t play with it anymore, but this means that all at once any social contact is broken off from the adolescent.”<sup>37</sup> (P12).

If the virtual community has become the only social contact that is left for the clients, taking this away leaves them lonely and forlorn. Consequently, they may be upset, depressed and frustrated, and may seek the Internet even more.

A number of participants drew attention to social networking sites specifically as they have been primarily designed to encourage social interaction between users. A participant explains why some clients use social networking sites to excess:

“(...) social networking when you post like: ‘oh I went to the grocery store’, and someone likes it, or you post a picture and someone likes it, you get a little bit of an emotional reward. So there’s a little bit of dopamine being released because someone liked it on *Facebook*. The problem is, to get the same level of emotional reward from social

networks that you do in a face to face interaction, you have to do more hours of it in social networks because there's so much less of it. (...) But that means you won't get little bursts of rewards on *Facebook*, so therefore you have to spend 15 hours a day to get the same as if you spend two hours face to face with your best friend. And that is the problem. So people are disconnecting from real life to go on to social networking for their social interaction, but they have to spend ten, twelve hours of their time. What you and I have in common is one thing and that's we only have 24 hours a day. No matter how you slice it up, we only have 24 hours a day. So if you spend 12 hours a day (...) on social networking, but I decide to devote maybe an hour and a half into a real life relationship and I get the same amount of emotional reward, that's just freed up ten and a half hours where you can do something else." (P8).

As "social animals", humans strive for interaction with peers and belongingness to a group (Brooks, 2012). The previous excerpt illustrates that online, this can be achieved, however only tangentially as more interaction needs to occur in the virtual space to produce a rewarding effect that is similar to real life interaction. Young Internet users appear particularly vulnerable to becoming wrapped up in the lures of social online applications.

Other participants draw attention to the links between specific Internet application usages and identity stating Internet use is "a function of their personality":

"(...) people addicted to role-playing games are insecure, have been rather oppressed during their development, and in role-playing games they experience a certain appreciation and that's why they overindulge in role-playing games because externally they don't receive any real inputs to strengthen their self-worth."<sup>38</sup> (P11).

An insecure personality may contribute to problems establishing and maintaining social contacts in the real world. Online, anonymity and disembodiment protect an individual from judgements based on age, physical appearance, and socioeconomic status. This creates various freedoms which may draw some people to the Internet while at the same time "the real world takes a back seat"<sup>39</sup> (P11). This overengagement with social Internet

applications can result in excessive use and possibly even addiction. Mastering the game, on the other hand, is experienced as particularly rewarding. Virtual rewards are much easier to attain than real life rewards because more often than not, the latter require a larger investment of commitment and time.

In this way, the Internet also appears as a strong “tool to express oneself”. People can “enact a persona” to use the Internet as an “auxiliary device” (P3) to compensate for personality and character traits that may not be to the person’s liking, may impede their self-expression, or cloud the way they view themselves. For example, “on *Facebook*, one may tend to present an idealised version of the self”, whereas “in a chat room maybe one would reveal aspects of oneself which one would not want to present elsewhere.”<sup>40</sup> (P3). This is also true for people who like to gamble online in order to satisfy their competitiveness:

Their “need to achieve and the need to chase spectacularly, which of course fits the theory of gambling, because you can achieve huge amounts of money (...) and lose huge amounts of money. (...) it’s also about the whole area of risk and the buzz and the adrenaline that you get out of risk taking and the whole kind of adrenaline arousal stuff. So for some people it’s largely about that and exclusively about that. I would also want to say that for others, it’s about the fact of not just winning, but actually not losing. In other words, it’s how far can I go and push the boundaries without actually losing. I mean, that’s the kind of the adrenaline side of things. That is (...) arousal and risk taking stuff, which is really pushing it to the limit.” (P15).

Just like chatters and gamers, gamblers want to satisfy a certain aspect of their personality online because for whatever reasons they cannot do it in real life. Risk-taking, getting a buzz and an adrenaline rush are strong motivators that can hook clients on gambling.

The participants’ opinions diverged concerning the relevance of a distinction between Internet applications for the purpose of diagnosis. On the

one hand, some participants were in favour of separating out various addictive behaviours on the Internet:

“(…) it’s a problem that the discussion has mostly been about Internet addiction (…). But in fact that’s pretty imprecise because the Internet itself is a huge space that contains a variety of applications. And if you look at this phenomenon it’s very important to look at those various online applications that lead to addictive behaviours, such as online gambling, online role-playing games or computer games, social networking sites.”<sup>41</sup> (P3).

The separation of online behaviours may appear particularly beneficial because these specific behaviours can provide an insight into the individual’s needs and therefore allow them to connect to their emotions. Typically, clients will look for something online and in most cases, they do not know what they are looking for because they often shut off their innermost feelings and needs and tend to not wanting to feel themselves. In treatment, therapists want to understand “what needs are being met, which main motives are involved? What does a person look for, and what did he find on the Internet? What creates satisfaction, what gives him a kick or something like intoxication?”<sup>42</sup> (P17). Specifying particular excessive Internet usages can facilitate a deeper understanding of the self on behalf of the client and this is important for treatment. The type of Internet application used conveys what kinds of needs are fulfilled by it:

“I’m always checking, where we’ve got this bridge, and see what this addictive behaviour represents, what is this person searching for in this behaviour, in this addictive substance, what is the desire or help that the affected person is looking for, (…) which needs do they fulfil for him and why do they help him in this situation. (…) and to reveal the actual need because otherwise the affected person is not aware of this deeper need. And when this is done, a lot is achieved already because the person affected gains access to his emotions and his own needs. (…) with addiction I often see people who want to cover up and hide their own feelings and their inside (…) and they don’t want to feel themselves too strongly.”<sup>43</sup> (P3).

On the other hand, some participants do not see the benefit of attention to the separate Internet applications because “the Internet is moving at such a fast



pace that one would have to develop new diagnostic categories every little while.”<sup>44</sup> (P2). The forever evolving nature of the Internet makes it difficult to pinpoint new potentially addictive activities. Participants state all clients “present with the same isolated addiction behaviour irrespective of their particular Internet usage. (...) The problematic behaviour is always addictive behaviour”<sup>45</sup> (P19). Clients engage in “very similar behavioural patterns, and it doesn’t really matter what they do online, but it matters that they use it for extended time periods and thus do not have alternative experiences.”<sup>46</sup> (P19). Viewed from this perspective, separating out various online behaviours in the context of treatment may not be particularly useful in some cases. For instance, some clients do not focus their endeavours on specific Internet applications, but they are “more drawn to technology for technology’s sake” (P1). They will use a variety of Internet applications. This mixed behaviour is referred to as the following:

“[P]olymediomania, analogous to polytoxicomania” denotes the type of person “who doesn’t care what he does with electronic media. What’s important is the usage of the devices, not whether they are chatting, surfing, gaming or whatever, it’s randomly interchangeable, just like with a polytoxicomaniac who doesn’t care what he consumes.”<sup>47</sup> (P6).

The principle of *l’Internet pour l’Internet* (as an analogue to *l’art pour l’art*; Gautier, 1835) is emphasised in the previous accounts. Some clients use the Internet *only* or primarily because of its structural characteristics, whereby pure use becomes a purpose in itself. Over time, the presenting problem of Internet addiction has changed with regards to specific Internet applications because rather than playing a single game, clients use many games and other Internet applications. “If one isn’t available, I use something else.” (P17). Polymediomaniac Internet use can be downgraded to *Facebook* use as well:

“[T]hat’s the applications, the possibilities that I’ve got on *Facebook*. That’s both communication with regards to chats and leaving comments as well as clicking through friends’ lists, and playing games

on the side, such as *Farmville*, and things like this. This can get out of hand and result in a relatively structured daily routine, which happens online exclusively.”<sup>48</sup> (P9).

In sum, the structural characteristics of the Internet appear to provide usage incentives for many individuals. The interviews indicate that on the one hand, the usage of specific Internet applications by clients who seek professional help for the presenting problem of Internet addiction provides an insight into their needs and innermost feelings that are met via their behaviours. On the other hand, clients who use diverse Internet applications have a similar problem, namely the addictive behaviour. Some appear to use the Internet for a self-contained purpose. Overall, the structural characteristics of the Internet appear as risk factors for Internet addiction for some clients.

### *Addiction*

The second superordinate theme that emerged from the interviews was addiction. This entailed participants pointing out separate symptoms and criteria, discussing the concept of clinical diagnosis, and reflecting on their professional experiences with similarities between Internet addiction and other substance-related addictions. Each of these will be presented subsequently.

#### *Symptoms and criteria*

The presenting problem of Internet addiction contained symptoms traditionally associated with substance-related addiction as indicated in the diagnostic manuals (American Psychiatric Association, 2000; World Health Organization, 1992), namely salience, tolerance, mood modification, loss of control, withdrawal, denial and concealment, and relapse. The symptoms and criteria will be presented successively.

## Salience

For clients presenting with the problem of Internet addiction, Internet usage has become the core of their existence. They think, dream, and breathe the Internet. They think about the last time they have used it and the pleasurable feelings this created, and crave for the next time they can lay their hands on the keyboard. The following excerpts illustrate the participants' experiences of salience:

*"Then there's this small circle of people who continuously think about it, who cannot step out of it internally, who are constantly preoccupied with it, who importantly view every single minute that has not been spent gaming as lost minute because these games are continuous. You have to realise that. When I opt out, the game continues. That's just like at a roulette table, when I don't continue gambling, the next one is going to play. This infinity and this pull play a crucial role for this small group. In my opinion these are the real addicts who would do everything for being able to continue with their behaviours."*<sup>49</sup> (P6).

*"I would use the normal addiction criteria that you would use for substance-related and other behavioural addictions [to diagnose Internet addiction], when the behaviour has become a process with its own dynamics, where the individual is under the impression that he is not under control of what he is doing anymore, when he finds it really difficult not to use it for a certain period of time, for example, when his hardware is broken. For this person, it becomes really unbearable, he has to get a new hardware somehow straight away, he goes to his mates or something like that (...). Then of course there's the salience of the manifestation, so that the diversity of life falls by the wayside, so that the only thing he does, to sit in front of the computer and play and chat, becomes so predominant that the rest is suffering."*<sup>50</sup> (P5).

The perception of loss if Internet usage is discontinued is meaningful as it suggests the client has developed a fear of not being part of the online community, and is excluded from his online world by not being up to date. The constant preoccupation with the Internet leads to a neglect of activities experienced as pleasurable in the past. The social environment suffers from the

excessive Internet engagement and consequent lack of time spent with family and friends. Clients who suffer from addictions

“lose all normal social contacts within only a few months and they are preoccupied with the problematic behaviour or the consumption of the drug, and when you interrupt it (...), you’ll see relatively quickly, within about two weeks, whether it’s really addiction in the narrow sense of the word or just an intensive usage”<sup>51</sup> (P3).

Salience is characterised by a tunnel vision where all that matters is the engagement in the behaviour and everything else is out of sight. Only when usage is discontinued are therapists able to determine to what extent the behaviour is pathological or merely problematic. This is crucial for separating those who are diagnosable and thus can be admitted to or provided with treatment. Others will in most cases be referred to separate counselling centres. The following is an illustration of how a therapist and parent’s own preoccupation with the Internet has led him to pass it on to his adolescent son, for whom the Internet became particularly salient in turn:

“I made my whole family addicted. So I got them all computers. So I can play more, right. So I got my wife addicted to *Sims*, my son addicted to *X-Box*, my other daughter addicted to like [sic] *Webkinz* (...) I was in bliss. Everyone’s addicted to their own little technology thing. So I put them down in front of it. I had five hours to play. That was my strategy of how to create more time (...). And so the unfortunate consequence of that is that my son who was at that time 13 years old became incredibly addicted to *Call of Duty*. So I had to wean him off. So I went from one hour a day to one hour in the weekends. But it didn’t work because he would game all week for the three hours in the weekend. So he would look at *Youtube* videos, he would do research on *Call of Duty*, how to work the maths. He was obsessed with it. And then I knew he was obsessed when he would wake up at four o’clock in the morning before his soccer tournaments. This guy sleeps until ten. You can’t get him up. You can’t wake him up. He’s just like dead to the world sleeping. But when it comes to this gaming, he was up at four o’clock playing. And I said: Son, what are you doing, you have a soccer tournament at the weekend. And he goes: Dad, I’m trying to get my three hours in because I can’t play this weekend. I mean that is a tell-tale sign of an addict, right. He has to get the three hours in because he can’t play because he’s playing a soccer tournament. So now he’s

tired. He used all his dopamine stores. So he can't play soccer very well. So the kid was getting chubby, he was not performing well at soccer. And his school grades were dropping below 3.0." (P8).

The adolescent boy's primary pastime activity had become playing an online game. Not only would he spend his available time gaming, but he would engage in proxy-activities such as researching the game, and developing tactics by watching others play on *Youtube*. He would sacrifice activities crucial for well-being, mental health, and actual development during adolescence, namely sleep. The pervasive salience of online games and associated online applications in the boy's life left him with a number of negative consequences. On the other hand, his father, an addiction therapist, was concerned, but he admits he was to blame for his son's behavioural problems. Prior to becoming an addiction therapist, this parent was gaming excessively himself. In order to be able to play, he would ensure his family were occupied with their own favourite Internet application. This case illustrates a number of factors, such as the parent spending less time with their child, and functioning as an inappropriate role model. It draws attention to the parents' responsibility of creating a healthy home environment for their children. Similarly, it shows how quickly and intensively problematic online gaming behaviour can develop and how strong salience is, particularly at the expense of alternative pastime activities, scholastic achievement, and even mental and physical health. Finally, another participant draws on the similarity of individuals suffering from Internet addiction and people suffering from substance-related addictions with regards to salience: "I see the similarities (...) at the end, with the consequences. The range of behaviours, feeling, thinking, and the identity become increasingly and ever more restricted to consumption."<sup>52</sup> (P18).

## Tolerance

A number of participants has elaborated on how over time, their clients have developed tolerance to using the Internet and their favourite Internet applications. This has been facilitated by the steadily increasing amount of time that has been devoted to Internet use. Tolerance was one of the main criteria distinguishing Internet addiction from excessive Internet use. Internet addiction is diagnosed in the subsequent manner:

“(...) definitely when there’s a development of tolerance, so when the online times increase fast, from one or two hours a day up until 24 hours. So in an extreme case of a 13- or 14-year old boy that I’ve seen here, in some cases he’s been playing 24 hours a day and slept only every other day for five to six hours. Yes, that’s the development of tolerance.”<sup>53</sup> (P12).

As can be seen from the presentation of an extraordinary case above, the development of tolerance can culminate in pathological behaviours that are not to be confused with problematic usage. A participant provides another illustration of tolerance development as stemming from a growing preoccupation with playing an online game:

“(...) let’s say I’m overweight and I don’t feel good about myself, so I go to *Second Life* and I create that ideal avatar. (...) So basically let’s say I have a poor self-image, so now I’m depressed, I go to the game, but the problem is the game gives me a level of dopamine, but you get basically now tolerant over time, so your brain gets tolerant, so now two hours of playing is not enough, you go four. You go to eight, you go to ten. (...) But then the problem is when you stop playing, your dopamine levels drop, you have to go back to the same thing that made your dopamine levels go up.” (P8).

In this account, the escapism motivation for using online games is mentioned. Some clients try to avoid their real lives by going online. In this instance, the client has a poor self-image and creates an idealised alter ego online. Furthermore, the Internet usage’s effect on brain chemistry is noted; Internet use increases the levels of dopamine in the brain and therefore creates a feeling of pleasure and contentment. Over time, more of the behaviour is needed in

order to create the same pleasurable effect, and to keep the level of dopamine stable, leading to the development of tolerance (Kuss & Griffiths, 2012c).

### Mood modification

The therapists provided accounts of their clients' initial and continuous motivations for using the Internet to excess. In most cases, Internet usage occurred because clients wanted to (subconsciously) change their mood states. Some were looking for an "adrenaline rush" (P8). Others wanted to overcome their depression and feelings of self-depreciation. Escape appeared as one of the key motives for Internet use: "We only got to the point where we just needed to escape a lot. (...) get home and turn on the TV and escape from all the pressures of life. (...) And then they turn to technology as a form of escape." (P14). The Internet gives clients something to focus on other than their real life's perceived misery. It captures their attention and makes them feel good about themselves. It can be a form of self-medication:

"I mean the classic one again we've known for years is the kind of self-medication/escape side of gambling. (...) you basically use this way of escaping to whatever you're escaping from, unconscious things. Lots of gamblers do that, we know. Obviously also I'm thinking of the fact of the new kind of technology side of gambling, gambling on the Internet with things like poker you've got the skill element which is for me about proving your worth (...)" (P15).

In this quote, online gambling appears as a tool to avoid real life. It is a tool of reassurance and source of worth for the clients. They use online technology in order to prove to themselves that they can do it. This is likened to other addictions because "lots of examples of people who gamble is escape, like people drink to escape, take drugs to escape, so lots of people for example who would have a very unhappy background that they want to escape from." (P15). There are many different reasons for escape behaviours, conscious and

subconscious, present and early past. What all addictions appear to have in common is that the addicts try to get away from something in their real lives and they use the Internet as a tool to do so.

“Virtually most of the women who come here have got a background in abuse, so physical, emotional, sexual abuse, neglect. And what they are doing is that their way of getting away from that abuse is to gamble. You block it out. And so basically when you’re sitting in front of the computer screen, or you’re in front of a fruit machine – whatever you’re doing, you (...) block out the fact of what is really painful. So that’s the kind of self-medicating idea.” (P15).

Among Internet addicts seeking treatment, women appear as minority. Those who present with this problem, however, seem to have experienced serious traumata in their lives, and have often been abused. In order to cope with these detrimental life events, they use the Internet. The engagement in online activities appears beneficial in forgetting the problem, avoiding its source, and concurrently creating another problem. In addition to this, online gambling is used as a way to cope with rejection. A participant refers to a former client “who was very much rejected when he was a young kid by his mother who constantly put him down. And he gambled in order to win money because the only way he would actually get the affection that he needed, (...) was to be rich.” (P15). The Internet is used to make people feel better, and to deal with negative aspects of life. Another participant draws attention to the repercussions the learned coping mechanism of Internet use can have as it replaces healthier coping styles:

“(...) they’re spending so much time in the game and (...) it becomes their world, they become less able to manage their feelings (...) and be comfortable (...) and as a result those feelings become intolerable and (...) anger and frustration will result in a behaviour which we might consider violent. So it’s striking out against family members or throwing something across the wall (...) stuff like that where it’s out of this anger and the frustration which is more an affect thing and not about the game at all.” (P20).

The mood modifying aspects of Internet use are learned over time, and if the possibility of Internet use is not given, clients can find it hard to cope with



difficulties and conflicts in real life. Some may resort to aggressive and violent behaviours because they do not know how to regulate their emotions other than Internet use. In sum, a symptom of Internet addiction was found to be mood modification. Clients use the Internet in order to change their emotional states and when learned, this dysfunctional coping mechanism can replace more functional ways to deal with real life.

#### Loss of control

Many participants indicated that their clients who suffer from Internet addiction lose control over their behaviours. "Lack of control is the first point, that because of their addiction they can't control their behaviours anymore and out of this psychosocial consequences develop, in job, school, relationship, as well as persistent depressive mood." (P19). Subjective loss of control appears as one of the important criteria that motivates clients to seek professional help as it is experienced as subjectively impairing and problematic. Clients "engage with the Internet excessively, they lose control and sit in front of the computer until late at night."<sup>54</sup> (P2). They tend to lose track of time, which is evident from a therapist's account when he discusses his own experience of being addicted to online games:

"That's when I realized this is a true addiction like any drug or alcohol because over that one year period of playing I lost 1400 hours, because the game allows you to check how much time you spent, (...) and it said 1400 hours. So luckily I was waiting for the new expansion pack and I was level 70 and I was like: I'm done. I'm done. (...) this is a good time to exit." (P8).

For this participant, attending to the time he had spent gaming the last year led to a sudden realisation he was addicted and he needed to stop. Losing 1400 hours to a game equates to 35 full working weeks throughout a year which he

spent on a game. Becoming aware of the subjective loss of control over the gaming hours was a turning point.

Furthermore, adolescents who seek therapy for their addictive Internet behaviours often suffer from control over their online engagements. A participant illustrates how loss of control is an important addiction criterion in this group:

“Definitely when the adolescents themselves say, and this happens often, that they don’t have control over their behaviours, over the times they spend at the computer, so that they can’t simply stop using it, and when parents have ideas that they can play from-to, where they receive specific timespans or something like that, adolescents completely underestimate these times and don’t recognise how time is passing, and they nevertheless always play longer and that’s why conflicts ensue. That’s something that’s absolutely typical and I include it in the addiction criteria.”<sup>55</sup> (P12).

### Withdrawal

Withdrawal symptoms appear as a consequence of discontinuation of the addictive behaviours, i.e. Internet use. From his own experience of being addicted to using online games, a participant explains how withdrawal symptoms develop:

“So my brain has been wired to that game, to release that dopamine. So my brain dumped this huge level of dopamine. I was super excited talking at very hyper speed. So too much dopamine, you become almost schizophrenic. Too little dopamine, you become almost catatonic like a Parkinson’s patient. So here I am, I go to work, I do surgery, and after surgery I was like shaking and I was cold and I didn’t know why, so I took my temperature and my temperature was normal. I didn’t have a fever. So I go home and the shakes get worse. And so I’m cold and everyone’s like, what’s wrong with you, and I’m like, I think I’m going through withdrawals. (...) And so I jump in the hot tub and (...) I’m just like shaking. I shook all night and my wife was like, ‘wow, you’re going through active withdrawals’, because you know I needed the drug to keep the dopamine levels higher and

now I was feeling this withdrawal, but I know that it's not a fever. I wasn't sick, because usually after the next day when you break the fever, you feel great, you feel all energetic. The next day I'm telling you, I was like dead. I was like dragging on the ground. And I was like: what is this? So I started searching the Internet for withdrawal symptoms and most of the research is out of Asia and people had bowel problems, had GI issues, I had all those, and shakes, and mild fevers, and then I felt totally wasted and my dopamine was rather depleted. So I barely could get myself out of bed and you know how energetic I am on *Skype*, I was like dead. I was like dragging around, trying to get myself going." (P8).

The previous account is one where the participant, who used to play online games to excess, experienced detrimental withdrawal symptoms when he refrained from playing. The physiological and psychological symptoms he experienced, which are in line with other therapists' reports, were shakes, nausea, high temperature, apathy, lack of interest, bowel and gastrointestinal problems. These were explained by a lack of dopamine in the brain – in order to re-establish its chemical equilibrium, the brain requests the stimulus of game-play because it has learned that gaming was experienced as pleasurable as it had led to a release of dopamine. Once gaming discontinues, withdrawal symptoms occur. The participant goes on to explain why withdrawal occurs and what clients do when they are faced with it:

"(...) because the brain is being changed, there is a mild to moderate physical dependency. But the problem is the psychological factor. The depression associated with withdrawal is so great that people dive back into the games. Most people cannot deal with that depression, cannot deal with getting out of bed and feeling like a lump, a sack of potatoes. So basically you dive back to the game because it makes them feel good. (...) The problem is that we are going to have a lot of people who are suffering from this and they really can't get help because they can't do it themselves. It's strong enough to hook them in." (P8).

Similar to substance-related addictions, Internet addicts suffer detrimental psychological consequences that some cannot overcome themselves. Typical psychological withdrawal symptoms include "a pervasive internal restlessness and tension, irritability, and agitated melancholia"<sup>56</sup> (P12). As they cannot cope

with the withdrawal symptoms, individuals may reinstate their problematic behavioural patterns which in turn will eliminate the experience of further negative symptoms. A vicious cycle is the result. A participant compares excessive online gaming to taking amphetamines, drawing parallels with associated neurochemical functioning:

“Although they also suffer from the amount of screen time, particularly multitasking and stimulation is also part of this exciting heightened reality. When you switch off, you do suffer. (...) my hypothesis is (...) that their level of stimulation is so heightened, it would be akin to taking amphetamines chronically. (...) if you take stimulants like amphetamines, over time they deplete your neurons and neurotransmitters and you end up either with a rather depressed state, although interestingly, also a rather paranoid psychosis. So again, some of the withdrawal effects one might see on stopping gaming might actually include something with teetering on the edge.” (P10).

Furthermore, in all inpatient and many outpatient settings the participants referred to, abstinence is an important component of therapy. As one participant explains, “the first three weeks are weeks really of withdrawal. And then they’re irritable and anxious and very uncomfortable in their own skins.” (P7). Children and adolescents are likely to externalise their withdrawal, having “temper tantrums” and crying. They want to get back to the Internet because they know it will make them feel better. One participant distinguishes withdrawal symptoms that are either depressive or aggressive:

“(...) parents are even physically attacked when they prohibit their adolescents from playing or they take the computer away or cancel the Internet contract or something like this. So that’s what the adolescents associate with not being allowed to play, because their father or mother or both have done that. And those physical (...) conflicts, they can be pretty heavy. Or you can also view it from the depressive side. I can’t play anymore, I don’t see any sense in life, and then they develop suicidal phantasies or even intentions. I’d definitely classify these as withdrawal symptoms.”<sup>57</sup> (P12).

The withdrawal symptom of aggression is expressed as verbal and physical conflicts with parents and significant others. The symptom of depression takes

on severe forms and can in some cases lead to threats of or actual attempts at suicide. In these cases, admission into hospital is imperative. In addition to this, another participant explains the aggression is not caused by the game per sé, but is a consequence of the client losing the core of his existence, his online persona:

Aggressive symptoms “get aggravated by withdrawal or conflict. But I don’t really see an aggressive nature in gaming exactly. (...) their whole world is the game. I had a client once that basically shut out the entire world except the computer screen. He didn’t have any friends anymore, and siblings, he had an older brother and their relationship deteriorated considerably as a result [of his gaming]. And everything was in that computer. So when someone tries to take that away from you, taking away your world, you’re going to fight. (...) combined with issues like withdrawal, that can be very severe. I’ve seen a lot of aggressive behaviour as a result of the dependency. It is not a primary thing, I think it’s like someone’s trying to take your world away from you and you’re trying to fight it.” (P20).

Correspondingly, in children, aggressive behaviours occur as a consequence of withdrawal from their Internet usage:

“So the only thing I’m seeing is little guys that do a lot of computing (...) and once they go off the device, they just explode. (...) I just see it that there’s a lot of energy there that’s not getting out. They’re not playing outside, playing with each other, they are sedentary. And then when you take the device away, then all that energy just goes crazy. It’s then being interpreted by the systems as aggression. The child is aggressive.” (P14).

What appears here is that common psychological withdrawal symptoms can be discriminated to be either depressive or aggressive. Some clients experience a retreat into themselves, feel apathic and experience a lack of interest in life. In others, withdrawal leads to aggression as the perceived centre of the clients’ existence is removed.

## Denial and concealment

More often than not, attempts at concealing the addictive Internet behaviour are undertaken by clients presenting with Internet addiction. Clients try to hide from their parents and significant others that they have a problem and cannot admit that they are not able to overcome their addiction themselves. A participant elaborates on Internet addicts who are students:

“You know they’ll do really well one semester and then the next semester they’ll get into games and then they’ll get C’s and D’s and then the third time it’s all apps, and then they lie to their parents about it and you know it kind of goes on and on and on. And in some cases [parents] jump on it and get them into treatment right away, but in most cases it takes a couple of years for the parents to really figure out it’s a problem.” (P1).

This extract shows an external appreciation of the problematic behaviour is often the cue for seeking treatment. On the one hand, adolescents and young adults may not realise that they have a problem until they have developed a full-blown addiction. On the other hand, if they do realise that something is wrong, they try to conceal and appear normal to minimise their parents’ and significant others’ concern. The façade of normality is kept up until some life event makes them realise that something has to change, which is illustrated by the following excerpt:

“Something can happen in their life as a wake-up call. And it’s some kind of a traumatic event, (...)it could be something that shakes them up to where their real life is. Where’s my life gone? I’ve been sitting behind this computer screen (...) for the last ten years. And their friends are getting on with their lives, they’re getting married, they’re having kids, they’re buying homes, whatever. And I’m playing. And I think that can happen at some point in their lives and then they start seeking help. (...) they’ve been gaming for all these years getting no one in their life, unhappy with their job, they’re functioning addicts, and they get invited to their friend’s wedding. And now they’re faced with talking to people or class reunion or something, they’re forced talking to people. (...) And it was just a wake-up call. And he basically ended up realising that where’s my life, I’m living in my parents’ house and everybody around me has moved on and I’m still stuck in high

school, like a kid just playing, using drugs. And now this was his wake-up call. He is 25. So I think it can happen at various ages." (P20).

From the interviews it seems that life for individuals suffering from Internet addiction is just floating away as they are so engulfed in their online behaviours that they do not realise there is a life outside of the screen. Something has got to happen for them to acknowledge that they need help. Friends' weddings or class reunions have been suggested as situations which bring about insight. The individual is faced with reflecting upon their life and what they have done with their youth, just to recognise that there might be something missing, that they have not achieved all of those adult things their peers have got, a house, a family, a job. For individuals suffering from Internet addiction, it may be either an external event or worried parents and significant others who cultivate the motivation to change (Prochaska, DiClemente, & Norcross, 1992). It is common for parents to seek professional help for their adolescent or young adult children. The motivation for therapy is often external for younger age groups. A participant states that when her clients come in for treatment, "they're in denial. Very few of them come and say, yes, I have a significant problem and I really want to work on it." (P1). Denial, however, is not only evident prior to problem detection and the actual therapy request. Upon commencement of inpatient treatment, some clients continue concealing their behaviours:

"We've had cases in the inpatient setting where clients handed their mobiles in to us. We found the next [mobile] in a shoe, and they continued playing with the third one. And these are cases where one really has to say that typical addiction behaviour is present, including concealment behaviours etc. on a massive scale."<sup>58</sup> (P3).

Denial and concealment emerge as important indicators for the presence of an actual mental health problem. For most individuals addicted to using the Internet it takes a significant amount of time until the problem is recognised and named. A difficulty for treatment seems to be external therapy motivation. Without therapy motivation, treatment success is questionable. In some cases,

therapists will not admit clients who do not recognise they have a problem as chances for concluding therapy are relatively slim.

#### Problems and conflict

The one symptom that most clearly demarcates problematic use from pathological Internet use is that of problems and conflict. All participants clearly stressed the presence of a large variety of physical, psychological and interpersonal problems that occur as a consequence of Internet addiction. Physical problems include a variety of maladies some of which require medical treatment. A participant speaks of own experience when he mentions the physical problems he has had as a consequence of his pathological online gaming:

“I even got carpal tunnel. I’m a surgeon. (...) the pain was so much it went up to almost my elbow. And so I couldn’t write in medical charts and I could not do surgeries. Now this is eye surgery in someone’s eye ball. Here I am and I was in so much pain that I had to take ten times the maximum medication in order to even function as a doctor.” (P8).

In this case, not only did the excessive engagement result in a serious health condition which caused the individual a high degree of distress, but it also impeded his daily functioning as a professional. In addition to this, a participant remarks how clients have vitamin deficiencies as “every client that’s been tested has been vitamin D deficient. (...) Not surprising as it’s prevalent anyway, but then you get kids who are inside about 24 hours a day.” (P1). The vitamin deficiency is explained by the lack of exposure to sunlight. Many clients presenting with Internet addiction spend large parts of their day inside of the house, sometimes without seeing the light of day for days and weeks on end. Their bodies do not receive the required amount of vitamin D. Moreover, another common physical problem is poor dietary habits:



“(...) in the clients that I’ve seen obesity is not that big of a problem, but poor diet absolutely, lack of nutritional information and healthy nutrition for sure. Lack of physical endurance and any exercise capacity is universal because really everyone who comes to our programme is spending at least eight hours a day in front of the computer and (...) it’s very rare for any of them to have any exercise routine before coming to us.” (P1).

In general, clients treated for Internet addiction deprioritise self-care. They may lack physical health awareness particularly regarding nutrition and they do not exercise their bodies sufficiently. However, with regards to obesity, the participants have different experiences as the following account draws attention to a pervasive problem of obesity in children:

“The most crucial [problem] is obesity. (...) So the impact on (...) diabetes is huge (...). I see that as life threatening. And these children (...) have obesity because they are sedentary and they’re sedentary because they use their devices. And there’s research showing the impact of sedentary lifestyles on obesity. That’s probably my priority concern because we have a researcher here saying this is the first time we will have a generation of children who will not outlive their parents because of these obesity issues. So that’s a big concern.” (P14).

In addition to diversified physical problems, the psychological health of clients is often compromised. Overall, clients appear deprived of a normal healthy life in various ways when they first seek treatment, as the following account demonstrates.

“When they first come into [treatment], they are like high. They’re like drugged. They don’t remember one day to the next. They’re sleep deprived. Their memories have gone. They’re really anxious and fearful of people.” (P1).

Prior to initiating treatment, clients are immersed in their virtual worlds to such an extent that they take on robotic qualities and appear relatively dehumanised. They lose their memory, sleep, and connections to the outside world. The connections they have made are often virtual connections to virtual characters, avatars, rather than real people. They find themselves in a state of

mind that is out of the ordinary. Not only do they develop problems in connecting to others, young clients face difficulties in creating a self-identity:

“(…) a big job of their (…) development work is to create this self-identity. (…) So this is an important aspect that we are seeing in social networking that there is no face to face contact. A self-identity is created and it doesn’t match at all who the child really is. I heard of one four-year old who had no self. He was a video game character, and I played along for a bit and then I said, ok, I want to talk to Kyle. Where’s Kyle? Can we get Kyle out so we can chat with him? And there was no Kyle. (…) And so self-identity formation has to happen in the absence of a device. Our kids are spending eight hours a day with the stuff. So where does the identity [formation] happen?” (P14).

This account demonstrates the perceived emptiness of the self. Rather than exploring their personalities and the way they relate to people and the outside world, children live in a virtual world. If they do not learn to live outside of the Internet, the real ceases to exist. All that is left is an empty shell waiting to be filled with some form of online presence. This is not only the case for children and adolescents who have yet to develop self-identity as “with severe acuteness all forms of activity and also self-definition manifest via the activity in the game”<sup>59</sup> (P18). Furthermore, people who use the Internet excessively tend to be “more dissatisfied with their lives and have higher depression levels”<sup>60</sup> (P17). Therefore, rather than adding to their lives, Internet usage can take away from it for people suffering from Internet addiction. Cognitively, clients suffer from problems associated with their memory and imagination:

“They’ve had so little experience in imaginative play as young children (…), everything has to do with gaming. It’s like they can’t imagine anything else. It’s really a very impoverished imagination. It’s hard for them to think about what they want, it’s hard for them to imagine their lives, what they want to do, what they want for themselves, what they want for relationships, because all of their thinking has been around video games and the Internet stuff.” (P7).

This excerpt illustrates that not only does early excessive Internet use impact upon cognition in terms of memory and imagination in the present, but it appears to have an impact on the future as well. Not being able to envisage a

life, one's goals and wishes for life, leaves some individuals suffering from Internet addiction as they have nothing to strive for. Their life occurs exclusively in the present and the present is on the screen. As children and adolescents start using the Internet from an early age, many of their formative experiences occur on the Internet. Online cues are predominantly salient and clients may struggle to think outside of the virtual box they have created for themselves. From the perspective of cognitive development, the excessive engagement with the Internet can potentially lead to a rewiring of the brain whereby strong connections are formed between game- and Internet-relevant structures. A participant refers specifically to the subsequent problems:

"[T]he detrimental effects of techno-use on child development and their ability to pay attention, learn, behavioural addiction" as they "have problems with developmental (...) processes and cognitive abilities (...) ADHD and behaviour, aggression, and a lot of anxiety (...) motor-development issues" (P14). Children are "developmentally delayed" and excessive Internet use has a negative impact upon their "covert motor coordination, (...) literacy (...), they can't coordinate their eyes, they can't coordinate their hands as well (...) and we're seeing a huge problem with the frontal cortex, like executive functioning, control, memory, concentration" (P14).

Moreover, another significant problem that emerged in the interviews was an increased readiness to use violence in some clients, as illustrated in the section on withdrawal. Aggression appeared as psychological problem as a consequence of Internet addiction. A participant recounts his own experience of being addicted to playing online games:

"Then I got into Worldcraft II again. And then I got my son addicted so we could play together and the bad things that had happened to me before like the physical abuse of the family, the verbal abuse, the anger issues, the temper problems, my hemorrhoids returned because I was sitting down a whole lot of time and then carpal tunnel was then bothering me again. (...) and I realized this is crazy. I'm making my son cry because he can't play as well as me. Of course he can't play as well as me because I have 20.000 hours ahead of him!" (P8).

Temper and anger problems often occur as deciding reason for treatment. Aggression against family members is an unfortunate and relatively common problem. This case, however, also draws attention to further physical problems, namely haemorrhoids, which can lead to rectal bleeding and pain, and carpal tunnel syndrome whereby nerves in the hand are compressed, leading to pain. Another excerpt illustrates the presenting problems of irritability and aggression as a consequence of discontinuation of the problematic behaviour in adolescents:

“One of the problems I realize was the gamers when they were playing a game (...) 14, 16, 18 hours a day and they weren’t attending school or work, employment. Their families were extremely concerned about their combination of neglect and the sort of irritability, aggression, around any attempt to reduce their online gaming. I was hearing (...) about times where aggression reached such a level, the police were called or similarly one simply couldn’t get the client to come to appointments. They neither thought there was a problem nor believed there should be anything done about it, even if they acknowledged that they were excessively engaged.” (P10).

Online gaming has become the *raison d’être* for many clients at the expense of daily life obligations. The attempt to discontinue usage may result in aggressive behaviours that parents and significant others cannot cope with by themselves.

Other than threatening parents and significant others,

“sometimes there was self-harm as well. Some gamers have been described as either threatening themselves with knives or running into the room threatening suicide, running off. So there was (...) higher level risk” (P10).

In these cases, individuals suffering from Internet addiction are at risk of self-harm and suicidal behaviour. Posing a threat to self and others are factors that can result in involuntary admittance to a psychiatric hospital, which highlights the severity of the problem.

In addition to this, young adults who come and seek Internet addiction treatment are often stuck in childhood and adolescents, i.e., they are

developmentally impaired. They suffer from immaturity and have never learned the most rudimentary skills of life, “more basic things like personal hygiene or eating behaviours or sleep patterns that become distorted and more difficult to manage.” (P16). In effect, young Internet addicts do not learn to take appropriate care of themselves. This is furthermore highlighted in the next account which refers to Internet addicts who commence inpatient treatment:

“They also arrive usually without just basic living skills. They don’t know how to cook. They don’t know how to shop for food usually. They don’t know how to make their beds, clean up their rooms, do their laundry, just basic, basic life skills. Some of them know it, but I would say the majority don’t because they’ve been taking care of in their families by their parents or they’ve lived on a campus where those needs were kind of taken care of for them.” (P7).

This excerpt is important in two ways. First, it highlights the difficulties young clients, specifically adolescents and young adults, experience in engaging in rudimentary developmental tasks, developing autonomy and becoming self-sufficient. Second, co-dependent behaviours from parents and significant others facilitate the excessive engagement in Internet usage. It becomes increasingly difficult for the young individuals to develop required life skills and partake in offline life. This is related to a lack of a healthy daily routine with a variety of activities which appears universal in clients:

“They don’t really see what they’re missing. (...) there’s only 24 hours in the day. Really we know that you actually want to go to school. We know you actually want to support yourself and you want to feel good about your body. So we do try and help them realise that they need to fill up their lives with other things. (...) They’re saying: ‘Yeah, I want to exercise. I want to sleep.’ They like having a regular sleep routine because none of them sleep normally.” (P1).

Virtually all clients presenting with the problem of Internet addiction do not have a regular day structure that does not evolve around day and night use of the Internet. This impedes their diurnal rhythms and can lead to negative psychological symptoms, such as insomnia, and a “sleep disorder is often a function of years of chaotic sleep cycles because they’re gaming” (P7). “What

we see is that those severely affected play games until two, three o'clock in the morning and then sleep until midday or longer and the rest of the time is spent on the Internet."<sup>61</sup> (P18). In therapy, alternative behavioural strategies are encouraged. Once clients realise that their behaviours need to change, the first step in the right direction has been achieved (Prochaska, et al., 1992).

In addition to a lack of a regular day structure, the clients' excessive Internet use has detrimental consequences for their professional, academic, and personal lives as neglect of these areas is common among Internet addicts, illustrated subsequently.

"Characteristically it turns out that the affected individuals haven't been going to school for a considerable amount of time. School absenteeism is an essential symptom. And it turns out that they have neglected their pastime activities and hobbies in the past, that they have neglected their social contacts, their circle of friends, that they do not do their household chores, but instead their range of behaviours has become focused on the computer and computer games and Internet games in the past. And parents typically report conflict situations in the family that have evolved around pathological use of the Internet. These conflicts become very chronic. Typically what you'll find are triangulation processes, in such a way that one parent is very soft and lenient with regards to Internet activities and another parent takes up the regulating function in the family, so that no common parental position regarding the child's gaming behaviour is adopted."<sup>62</sup> (P18).

Parents try to intervene; however, the likely result of an attempt at intervention is family conflict. In addition to this, parents have difficulty establishing a common position with regards to their child's Internet usage, which exacerbates the problem. All that matters for the former is and remains their Internet usage:

"Typically, they didn't go to school anymore or school was on stand-by and [school work] was only run with minimal effort, and what was really important to them happened with their online contacts, where they reached particular levels in *World of Warcraft*, equipped specific characters and had successes, and real life didn't really happen anymore. I remember a mother who said 'I don't see him at all anymore and during meals he's never there, when we do something

together, he's not there, and spends all his time at the computer, all of which has resulted in more or less large escalations in the family'."63 (P2).

This excerpt highlights a number of common problems. First, the addicted adolescents' educational commitments suffer as a consequence of excessive Internet use. Second, real life is sacrificed for successes and achievements in online games. Third, familial conflicts ensue because adolescents do not take part in family life anymore. In this case, seeking professional help appears as the last resort:

"(...) when families make use of child- and adolescent psychiatric services, then school faces the axe. Then he hasn't attended school for weeks and months. Then there were nasty hassles in the family right up to aggressive conflicts. That means that we're only deployed when the general counselling or reading of guidebooks or parent- and family counselling hasn't worked, or it hasn't been enough."64 (P6).

Once the family has exhausted all possible resources in order to deal with the problems that emerge as consequences of Internet addiction, they look to a psychotherapist for additional strategies. Psychotherapists need to differentiate between adolescents who do not go to school because they continuously use the Internet and those who do not go to school because they experience school reluctance. A participant elaborates on this:

"So there's always the question: should I go to school or not? I clearly distinguish between whether they are currently in a low, as this happens often in grades nine and ten at least with grammar school pupils because they still have got two or three years ahead of them, and those who have this low because of puberty, no motivation, so that an extreme school reluctance is present, and in this context they refuse to go to school or skip it. But the adolescents know whether they skip school in order to play or whether they skip school because they are not motivated. Often they have a school phobia and they are under immense pressure to perform, particularly grammar school pupils, and then they sit in front of the computer at home because they don't know what to do with the time that they would have spent in school otherwise."65 (P12).

These issues are not just related to adolescents, adults too suffer role conflict. A participant notes when reflecting upon a client who had spent all his money on online poker, and as a consequence “lost his job and his business” (P1). Moreover, individuals suffering from Internet addiction may engage in illegal and morally questionable behaviours: “People stole for video games, people lied for video games, people skipped their work for video games.” (P8). A participant furthermore refers to a colleague and the consequences the latter faced because of his uncontrollable Internet usage:

“I know a physician who lost his medical license because he was playing *Halo* while he was supposed to answer a page and then he didn’t assess the patient within 20 minutes on call and he waited three days. (...) The patient became a paraplegic, 16.5 million dollar law suit. (...) they traced back his IP address. He was on X-Box playing *Halo*.” (P8).

The negligence of this neurosurgeon not only cost him his career and reputation, but it also led to a severe medical condition in his patient. The surgeon lost his licence to practice, whereas his patient may never walk again. This individual’s and most other clients’ priorities are on the Internet, not their careers, their lives, their family or others.

To add to negative physical, psychological, and educational/professional consequences, all participants have emphasised their clients’ lack of a social life as “most of them have few to no friends in the real world and their social life is limited to their parents who they’re in conflict with.” (P1). Interpersonal problems as a consequence of pathological Internet use already emerge in childhood. Children do not “understand how to cope with different stressors and how to interact with other kids (...). Socially they are really immature and very highly reactive. (...) They will turn around and push other kids down. The teachers will say they explode.” (P14). Rather than learning to interact in an amicable way, online interactions may lead to unrealistic expectations offline. Children learn from their computers that the Internet is always available and



will meet their needs, ergo they may expect the same responsiveness from their peers. A participant explains why it is crucial to interact socially face to face, rather than online, by drawing on limbic resonance, a theory that has first been put forward by Lewis, Amini, and Lannon (2000).

“So limbic resonance is really the activation of the limbic system in two individuals who have a caring and loving relationship with one another. And inside that context of that relationship it stimulates the limbic regions of the brain that really allow for the regulation in both individuals, both physiologically and emotionally, and that’s called limbic resonance. Research is showing that the more time people spend online, the more depressed they become. (...) This is my theory that limbic resonance really requires face to face interaction. We’re animals, and we need to see and hear and touch and smell each other, but that many people in that unconscious drive to connect with others try to do it online, but that the online experience even with *Skype* just doesn’t do it because it really does require the stimulation of the senses, more than just what you get with the screen. (...) what happens is that people fail to develop the skills that they need to be successful face to face. They’ve been gaming and spending their time online and they have fallen way behind in terms of the development of those skills that would allow them to be successful and so it’s a vicious cycle. They’re driven more and more to stay on the Internet, try to meet their social needs that way. But I see it as basically analogous to you know a hungry person just eating sugar and eventually they’ll starve to death.” (P7).

In their theory, Lewis et al. (2000) explain concepts of empathy and relatedness and suggest that only in face to face interactions these capacities crucial for interpersonal connection can develop. The lack of physical presence and associated absence of sense stimulation in virtual interactions leaves the individual socially malnourished, leading to underdeveloped social skills, which can result in significant problems with intimacy. The sugar metaphor indicates that online, individuals are presented with integral social experiences quickly, such as rapid self-disclosure and a sense of *communitas*, which however remain superficial and lack social embodiment. In sum, clients presenting with Internet addiction present with a wide variety of problems which make it

increasingly impossible to lead healthy lives, physically, psychologically, and interpersonally.

### Relapse

The final symptom characteristic of addiction psychopathology that appeared from the interviews was relapse. Relapse is a very common addiction symptom that occurs in most, if not all, clients seeking professional help for their addictive Internet behaviours. During therapy, psychotherapists aim to

“strengthen the motivation to deal with possible abstinence” and “relapse is very, very crucial and important, and it is also very, very valuable in the context of therapy because then you can see relapse as an indicator, it shows where the clients are weak and what needs to be worked on specifically.”<sup>66</sup> (P3).

In treatment, relapse is viewed as a temporary lapse, not an indicator of failure. It is important that clients realise that relapse is but a component of recovery.

“Relapse effectively belongs to addiction. So the difference is often whether relapse is permanent or whether therapeutic work is recommenced following relapse. What happens with computer gamers is that many have not achieved an abstinent lifestyle. With gamblers you often have a one-third proportion. This means that one third lives abstinent permanently, one third is abstinent for a certain period of time, and one third goes on living while gaming chronically.”<sup>67</sup> (P13).

The crux for treatment appears to be how the individual perceives relapse, what meaning they attach to it. If clients perceive their relapse as failure, they are likely to discontinue treatment because treatment is experienced as ineffective. However, if clients understand relapse is only a stage in their recovery, the chances of success are better. An example par excellence of a gamer trying to become abstinent is provided below.

“I had a young man that came to see me, and he had tried many times to quit. And then the last time he tried to quit he used *World of Warcraft* and he was really struggling with it. (...) In order to get rid of the game he deleted all his characters as a desperate move to basically end his addiction to the game. In three days he called the company back and he said someone hijacked his account and destroyed a lot of characters and then they restored it. So that’s when he came to me after that experience realising: I can’t do this on my own. I’ve tried, I’ve struggled, I can’t do it, and he had the insight to act.” (P20).

Individuals struggling with Internet addiction will often attempt abstinence, and in many cases this appears impossible if they want to do it independently. Abstinence is a big goal and it is often accompanied by internal struggles. There may be distress and despair, particularly when abstinence attempts are not crowned with success. The same holds true for clients in treatment.

“The other thing why I think that people leave treatment early (...) is that in the area of addiction generally we have what is called a euphoric episode. (...) What that means is that when you start treatment you’re liable to actually stop it relatively quickly. (...) so you become euphoric. ‘Oh I’ve got this sorted. I’m no longer gambling, so why do I need treatment? I’ve been gambling-free for 6 weeks, 12 weeks, 3 months.’ Okay. It’s almost like euphoria. (...) Then the difficulty comes when you start having to look at the fact that ‘oh, I’ve had a lapse. What do I do, I feel ashamed, I feel guilty. So it hasn’t really worked. (...) I thought you’re going to cure me forever’.” (P15).

This quote is an example par excellence illustrating relapse is a crucial factor in therapy. When clients experience relapse they feel ashamed and guilty. Often they have the impression that they have failed. Relapse belongs to addiction and most individuals suffering from addictions experience it, some will experience it many times. It is an important treatment goal to deal with relapse and to decatastrophise it in order for the client to regain his self-appreciation.

### *Diagnosis*

The clinical diagnosis of Internet addiction appeared as main theme under the superordinate topic of addiction. The results of the analysis indicated that the themes pertaining to diagnosis can be subdivided into comorbidities, Internet addiction diagnosis, and Internet addiction as primary disorder. Each of these will be turned to subsequently.

### *Comorbidities*

In a majority of clients suffering from Internet addiction the participants have experienced in their professional work, comorbidities are present. In terms of mental disorders from Axis I, anxiety disorders, specifically social phobia, seem common, as well as persistent depressive moods, ADHD, Asperger's, or Obsessive-Compulsive Disorders (OCD). The following quotes summarise the overall experience of participants with regards to comorbities associated with Internet addiction:

"(...) a young person with a computer addiction (...) in my opinion has a 95% chance, probably even more, to have a comorbid mental disorder, either from the F9 catalogue, ICD-10, behavioural and emotional disorders with onset usually occurring in childhood and adolescence, which can be used well, or the F3 or F4 catalogue, anxiety disorders, depressive disorder, or you can also diagnose a beginning personality disorder."<sup>68</sup> (P18).

"In our children and adolescent psychiatric inpatient setting we've got a selection of highly impaired people, who sometimes have very long records of depression, ADHD, partial performance impairments, dyslexia."<sup>69</sup> (P6).

The previous quote shows high comorbidity rates among clients suffering from Internet addiction, and it also draws attention to the peculiarities of inpatient settings which accommodate patients whose problems are more severe than those of clients who seek outpatient treatment. The presence of comorbidities

has an important effect on treatment procedure and treatment success. Treating comorbidities is beneficial for clients suffering from Internet addiction because when a comorbidity is present and is not treated, it will be difficult to impossible for the therapist to provide real help for the Internet addiction problem. In some cases, pharmacotherapy is provided as an adjunct to psychotherapy to treat comorbidities, as the following excerpt demonstrates:

“(...) calming impulse control-dampening medications can play a role, or with regards to comorbidity, when somebody has got a moderate depression, then you can think about whether an antidepressant is useful, or when this person has a strong social phobia, you would take specific SSRIs which are approved in the medical indication. So these are the stimulating antidepressants. These can also be helpful. Then there’s a new antidepressant which tones the sleep-wake cycle in a different way by means of a melatonin mechanism of action, Agomelatine. This can be helpful as well because they’ve often got a suspended sleep-wake cycle or an entirely reversed sleep-wake cycle. (...) With those who have ADHD symptoms or ADHD respectively, Ritalin can also be helpful, or the antidepressant Atomoxetine, which is specifically approved for the indication ADHD with depression”<sup>70</sup> (P4).

In addition to the commonly experienced comorbidities of anxiety and depressive disorders and a number of less common psychiatric disorders, substance-related addictions are indicated to be a problem as well:

“(...) there’s the effect with behavioural addiction that substance-related addictions appear as comorbidity and vice versa. The research (...) using inpatient sick reports due to addiction has shown that among clients in inpatient settings who undergo therapy for substance-related addictions, the prevalence of Internet addiction is significantly higher than in the normal population.”<sup>71</sup> (P19).

“When I talk to people from programmes where they’re working with drug addiction (...) many of them are also Internet addicts. (...) I think that there’s a real tendency for the drug addicts once they stop their drug addiction to seek their high now in this new acceptable way, which is the gaming and the Internet addiction. (...) And we’ve had so far one client who went into treatment for drug addiction and then was sent to us for treatment of Internet addiction. So I think the two go together a lot. (...) if we’re contacted and asked to treat somebody who

has a dual addiction of drugs and Internet, we will send them for drug treatment first, and it's like they need to deal with that because they have to deal with the withdrawal symptoms, that can be dangerous (...). They really need to deal with that first, and then they can come to us and we can start helping them look at their Internet addiction." (P7).

In those cases where a substance-related addiction is present as comorbidity of Internet addiction, the former requires treatment first because it is often experienced as the more pressing problem by clients. This is also why in in- and outpatient settings specifically targeting clients suffering from Internet addiction, substance-related comorbidities are relatively uncommon. Typically, clients suffering from both substance- and behavioural addictions simultaneously will work on their substance-related addiction first and will receive treatment for the Internet addiction subsequently. Thus, some clients treated for Internet addiction have a history of substance abuse and dependence.

Apart from Axis I disorders, Axis II personality disorder symptoms are common, however personality disorders are less likely to be diagnosed than Axis I mental disorders as the following excerpts demonstrate.

"We do see a lot of dependent personality traits and we do see narcissistic personality traits. We also see schizoid and sometimes kind of antisocial traits. We've had a couple of different clients who have bipolar disorder." (P1).

"Social anxiety is the next point, or social phobia, but also personality disorders. Above all, with this we see schizoid personality disorder. (...) With the personality disorders it's rather tendencies. With the other disorders it's often diagnosable, for example social phobia or agoraphobia, and with depression it's a thing in the middle, where you've sometimes got tendencies, but sometimes it's diagnosable."<sup>72</sup> (P19).

Unlike Axis I disorders, comorbid Axis II conditions require prolonged treatment. Internet addiction treatment however in most cases is very goal-orientated and focuses on present behavioural change. Once the addiction is

under control, clients suffering from personality disorders will often be referred to specialised centres.

As comorbidities seem the norm among clients presenting with the problem of Internet addiction, therapy must address the former. However, in clinical practice, including comorbidity treatment into therapy devised for Internet addiction rarely happens, as the following excerpt demonstrates:

“With the group it’s indeed the case that it’s very strongly focused on media consumption, and the comorbidity is not addressed and considered. Well, that’s the big problem with the short-term manualised programmes, that they don’t integrate an approach for comorbidity, and this leads to the fact that adolescents who conclude the programme successfully lose their crutch function (...). In the end, the comorbidity breaks out and this is a problem for all of those group programmes because then the aim is to sort the wheat from the chaff, and to bring those who have got noticeable comorbidities, into further therapy possibilities, which then in the second step primarily focus on comorbidity.”<sup>73</sup> (P18).

“We have seen very many social phobias, anxiety disorders, but also high functioning autism, Asperger patients, schizoid patients, basically all those who wouldn’t come into psychiatry. This has been my experience over four, five years, that they come with media addiction or Internet addiction, and because of that they’ve had a certain willingness to come into the psychiatric ward.”<sup>74</sup> (P6).

The high numbers of comorbidities highlighted in these quotes, particularly anxiety disorders, also emphasise another reason for treatment seeking. In some cases, the presenting problem of Internet addiction is used as a cue in order to seek treatment for other conditions, i.e., underlying mental and personality disorders. The same holds true for clients who seek treatment for Axis I and II disorders, where the primary problem is Internet addiction:

“(...) often the following happens (...): People came into the ward because of social phobia or an adjustment disorder, and then they went home and shortly thereafter it went wrong again because we haven’t dealt with the media topic.”<sup>75</sup> (P17).

Overall, it is difficult to pinpoint which mental disorder came first. It appears that among the clients, the presence of both, Internet addiction and other Axis I disorders appear as motivating factors to seek therapy, whereas in the course of therapy, the other disorder is diagnosed. From her experience, a participant explains the direction of the relationship between Internet addiction and comorbid conditions:

“(...) my experience is almost universally all clients [with Internet addiction] come to us with diagnoses that are depression and some sort of anxiety disorder and often ADHD. So those three we see very routinely. In my opinion the social anxiety and the depression are usually caused from the Internet addiction, not pre-existing. (...) What I will say is from pre-existing things that we believe, I would say some sort of trauma, or PTSD is what we see quite a bit of as a pre-existing condition. So quite a few of our clients have had (...) psychologically ill parents that they’ve suffered trauma from that. Probably a quarter of our clients have had what we believe some sort of a trauma that we think predisposes them to Internet addiction. And then of course I would say quite a few of them are also less socially competent, shy or more introverted, (...) probably a quarter of our clients have Asperger traits or Asperger’s. So the pre-existing [condition] that I believe contributes is [sic] ADHD, Asperger’s and trauma and lack of social competence or shyness or introversion. The results I believe are mostly depression, social anxiety, and more impulsivity, physical and emotional dependence.” (P1).

It seems a number of personality traits, personality disorders and mental disorders increase the risk for developing Internet addiction. Individuals who are introverted, who suffer from disorders such as PTSD, ADHD and Asperger’s have a higher risk for developing Internet addiction, whereas clients suffering from Internet addiction first appear to have a higher risk for developing depression and social anxiety. Overall, the comorbidities that individuals suffering from Internet addiction present with are common among all addiction patients, as illustrated by the following quote:

“Personally my background is depth psychology, that’s why at the beginning, when it was about the topic of Internet and computer gaming addiction, my focus was on additional problems and



psychopathology and diagnoses. And that's where you can say that they have a lot of depression, anxiety disorders, personality disorders, maybe also ADHS, and it's also really important for treatment. But in the end these are diagnoses which you will often find comorbid with addictive disorders."<sup>76</sup> (P4).

The presence of a variety of comorbidities in Internet addiction stresses its status as behavioural addiction. It draws attention to the fact that in clinical practice, substance-related and behavioural addictions do not normally come in isolation and are often accompanied by additional behavioural or emotional problems.

#### Internet addiction diagnosis

A number of treatment centres has put together their own tools to evaluate the presence of Internet addiction in their clients and to determine whether treatment is needed. A participant explains how Internet addiction is diagnosed:

"There are others around the world that have been looking at [Internet addiction], putting together some diagnostic tools. What we have done here is taken some of the basics, some of that work and just developed it slightly, and really it's a very basic tool asking people about how much time they spend, what the impact has been, what they feel like it's doing and those sorts of things. We prefer to actually meet them face to face and looking at what the social issues are, and what it is that we can do to help." (P16).

"So what we've done then is detailed clinical diagnostics regarding the question: Do they have it or don't they have it, which media aspect is the addictive agent. Of course we have also analysed whether it's computer games or something else."<sup>77</sup> (P4).

In addition to using specifically designed psychometric tests, the presence of psychopathology is established via the client's account of the significant distress and impairment the excessive behaviours have resulted in. With regards to actual clinical diagnosis of Internet addiction, it appears indispensable to

differentiate between problematic use and actual psychopathology, i.e., “addictive behaviours only become addiction when it [*sic*] affects (...) their lives.” (P8).

There is a difficulty in diagnosing adolescents’ Internet addiction in the same way as adults because important developmental stages make diagnosis difficult or even impossible. A participant elaborates on this problem and discusses the solution she has found for her own clinical practice when working with adolescent clients presenting with Internet addiction:

“In the ICD [International Classification of Mental and Behavioural Disorders; (World Health Organization, 1992)] there’s no child diagnosis in this sense, but we use the adult diagnosis and the criteria can be fulfilled by a 13-year old just the same way that they would be fulfilled with a 16- or 18-year old. (...) [The presence of addiction] is tested based on current behaviour. This means that [the adolescent] could have an abstinent period and would not have a diagnosis anymore in this case. However, addiction remains present for life and the only difference is how you live, whether you live in abstinence and are able to do it, or whether you give way to your addiction. And that’s how it works for them as well. It’s also different when they are gaming or not, it depends, some of them don’t have access or the parents have taken their computers away. But this doesn’t mean that the addiction is gone.”<sup>78</sup> (P12).

In addition to this, the multiaxial classification scheme is used in order to determine whether Internet addiction is present in children and adolescents who seek professional help. With adolescents, adult addiction criteria cannot directly be applied.

“That’s why in Germany the multiaxial classification scheme is adopted, going beyond the F9 catalogue, where the F9 category or the ICD-10 diagnosis is just one among six possibilities of operationalization. We also evaluate the level of development. Is it age-appropriate? Is it retarded? Is it overly advanced? We evaluate cognition and intelligence in this multiaxial classification scheme. We also evaluate social conflicts based on an operationalized system, where family support and family problems play a role. And then of course the somatic development. What I want to say with this is that [diagnosing adolescents] is more complex because the psychological

developmental stages are dependent upon age and you will find entirely different preconditions with a 12- or 13-year old in comparison to a 16-, 17-year old and that's why clinical diagnostics are always very much dependent upon development, and the emotional, social, and somatic maturity of the adolescents must also be taken into consideration."<sup>79</sup> (P18).

In adolescents, once the possibility of the influence of developmental stages on behaviour is ruled out, diagnosis can ensue. Having a distinct diagnosis of Internet addiction is important for a number of reasons. Clients and their families will be helped as they appreciate their problems being taken seriously by professionals:

"(...) it was very common that parents would come in and they would say they've been to different therapists, psychiatrists, and they all tell us this is not truly an addiction and they're saying they are just ignoring it and we see it's like an addiction. (...) I think it's very invalidating for the families. And they need proper treatment. I mean that's why they came and saw me because obviously they wanted them to start treatment." (P20).

The failure to appreciate the clients' presenting problem on behalf of some psychiatrists and psychotherapists puts clients and their families in a difficult position. On the one hand, families are aware that a problem exists and they seek help for it. On the other hand, the problem is not officially recognised and therefore, clients and families have to face the additional burden of marginalisation. The lack of proper diagnosis voids the problem and leaves clients and their families more vulnerable, not understood and not taken seriously.

Having a diagnosis is required so therapy can be financed. Public and health political institutions have a strong argument against therapy financing as long as there is no official diagnosis:

"(...) if there is no diagnostic entity in the diagnostic manual, there is no socio-political or health political pressure to act. And we don't solve the problem of pathological Internet use just through highly qualified medical and psychotherapeutic treatment facilities. We need to

establish facility structures with youth welfare services, addiction services and family counselling services in general in order to meet the increasing demand at all. And that's where we see that in Germany, there is little willingness in the cities, councils, communities, and states to establish resources out of public funds."<sup>80</sup> (P18).

Taking these political difficulties into account, therapists are working hard to help their clients also in view of establishing a diagnosis for Internet addiction which will secure therapy financing, a point that is illustrated by the following excerpt:

"In the clinic it's easier for us. (...) There, funding is secured via health insurance. Once somebody is admitted to an inpatient setting, a diagnosis is made. (...) We use pathological gambling as a basis, i.e., an impulse control disorder not otherwise specified. Often we've also got a secondary diagnosis, such as oppositional defiant disorder or emotional disorders, adjustment disorder, social anxiety. We've never had a problem with the health insurance or MDK [Medical Service of the Health Funds] putting their foot down."<sup>81</sup> (P17).

As Internet addiction is not yet officially included in the diagnostic manuals, therapists have to make a detour by diagnosing an impulse control disorder not otherwise specified (ICD-NOS). Upon making this tangential diagnosis, few problems with regards to treatment funding appear in inpatient settings in Germany where Internet addiction is treated. A participant states that Internet addiction has got to be included in the diagnostic manuals in order to "facilitate the process of compensation for treatment via health insurance"<sup>82</sup> (P17). In terms of diagnosis, Internet addiction is seen on par with pathological gambling, the only behavioural addiction that is as yet included in the diagnostic manuals:

"I think and hope that it's realistic [to include Internet addiction in the diagnostic manuals]. Just like pathological gambling is a category that you can use and that exists of course. So as regards the class of problems I would say that pathological gambling and excessive Internet use hold an equal rank, and I hope that this will be accommodated diagnostically at some point adequately."<sup>83</sup> (P2).

Currently, the diagnostic landscape is in the process of change, as the new version of the DSM-5 is about to be published soon, with significant implications for Internet addiction diagnosis:

“At the moment it looks like the proposal is favoured to include pathological gambling in one chapter with the other substance-related addictions as the first behavioural addiction to date. Internet addiction is being discussed as candidate for inclusion, which is enormous, as Internet addiction pulls ahead of sport addiction, shopping addiction, workaholism, sex addiction. And as the DSM-5 should become a dynamic system, i.e., it’s not supposed to be revised only in two decades, it’s possible that this happens more quickly. However, I don’t reckon that it’s going to happen within the next five years.”<sup>84</sup> (P4).

“Basically addiction is a dependence disorder and in the new ICD-10 and in the revised version of the DSM-IV (...) addictive disorders won’t be separated anymore into addictions to psychotropic substances and then some subcategory with substance-unrelated addictions, but everything is going to be subsumed into one group. (...) So addictive disorders with the subcategories psychotropic or behavioural. Pathological gambling is the only substance-unrelated addiction that exists for the purpose of diagnosis today. At least it’s got a number. And everything else is being subsumed under whatever, impulse control disorder or something else, which isn’t true in reality. It’s more or less a category where apparently nobody knew where it belongs. I wouldn’t know where else [Internet addiction] would fit in better [than in the addiction category]. It fulfils the criteria of an addictive disorder in all points. If you will, all diagnostic guidelines or suggestions point in this direction.”<sup>85</sup> (P9).

These quotes illustrate two important factors in diagnosing Internet addiction in the clinical context. Firstly, the American Psychiatric Association’s decision to include pathological gambling in the revised Diagnostic and Statistical Manual for Mental Disorders (DSM-5) puts a previous impulse control disorder on par with other addictions, therewith redefining the concept of addiction. Up to now, addiction denoted substance dependence only. The inclusion of pathological gambling as addiction lays the foundation for the potential inclusion of further behavioural addictions in the future. Secondly, Internet addiction is the only other behavioural addiction that is included as problem

worthy to be accounted for in the appendix of the DSM-5 (Herold, et al., 2012). With this, a voice is given to those who suffer and a case is made for them to be granted appropriate treatment.

### Primary disorder

In most cases of clients seeking professional help for their Internet addiction, comorbidities are present. This raises the question whether and to what extent Internet addiction can be treated as primary disorder, the condition amongst two or more causing the client the most significant impairment. Overall, the participants' accounts indicate that "comorbidity plays a big role for diagnosis" (P4) as Internet addiction can be both, a primary and a secondary disorder and it should be treated accordingly. In the case of Internet addiction, a participant provides the following answer to whether the present comorbidities have to be treated first:

"No. This isn't the case because the addiction is the most restricting disorder and the comorbid disorders are being treated afterwards. (...) This is typical, when you've got an alcoholic, you've got to detoxify him before you can do psychotherapy with him. It's similar with a behavioural addiction so that clients have to have six to eight weeks of complete abstinence so that they can think clearly in order to start psychotherapy. Otherwise this is very difficult to attain."<sup>86</sup> (P19).

When Internet addiction appears as most pressing because it impairs the individual significantly in their everyday life, it needs to be treated directly. Abstinence (or at least partial abstinence) must be attained for treatment to be on a solid footing because abstinence is likely to be experienced as a great personal success and it gives clients' self-esteem a boost, making them ready for treatment. In other cases, it may be necessary to treat comorbid conditions first. A participant draws attention to other disorders which may require

pharmacotherapy prior to being able to deal with their online gambling addiction:

“If someone comes with let’s say an alcohol problem and also does gambling, what we do here generally is we would have to look at which is the core, the main issue. Is it drink, is the main issue with gambling, restricted to gambling, is it gambling that they have an issue with, that when they lose, they drink, is it both. (...) if found out that the major core problem was the alcohol, that they would need detoxing and so on, we really would refer them on to an alcohol unit to overcome that. (...) the limitation here (...) is that we’re not psychiatrically trained. I’m not a psychiatrist. I’m a therapist. So if we have someone who for example has quite a heavy personality disorder, an antisocial/borderline personality disorder, we would do an assessment here, (...) and if we really felt that that is something that they would still need to work with, we would then use the referral pathway (...) [to] provide medication and work with the acute psychosis and so on because it wouldn’t work here. You can’t have a person here who suddenly halfway through the session goes through some kind of episode. We’re not skilled for that.” (P15).

In some cases, particularly with regards to severe mental disorders such as schizophrenia and personality disorders such as borderline PD, pharmacotherapy must be initiated prior to dealing with the Internet addiction. For psychotherapy of Internet addiction, a solid fundament must exist whereby clients must be ready to actively work on their behavioural problems. The quotes above indicate that both recent abstinence and mental and personality disorders at the further end of the spectrum may impede Internet addiction treatment and therefore abstinence must be ensured and comorbidity treated initially. In addition to appearing as secondary disorder, in some cases Internet addiction has been understood as being a symptom of a “diseased system”, illustrated by the next excerpt:

“(...) when persons affected but without illness insight or their significant others came, then we’ve often worked together with systemic therapists (...) who view Internet addiction more like a symptom of a diseased system, so they would look at the system of family or marriage, what can the spouses or parents change who may

have come without the affected person, in order for him to change himself and to gain an insight into his illness."<sup>87</sup> (P4).

In addition to this, participants have pointed to the direction of the causal relationship between Internet addiction and comorbidities as important for which disorder is being treated as primary. The following excerpt illustrates how this direction can vary in client populations who present with Internet addiction:

"I've seen cases clearly without any doubt on my mind that the gaming was the cause. They didn't have any of these issues before they started playing. (...) Later on, it became one of those issues that for example [they] became school avoidant and had issues (...) and then feeling really bad about themselves and became you know socially anxious and withdrawn. That was the result of behavioural consequences, the natural consequences of excessive gaming. They didn't have social anxiety or generalised anxiety disorder prior to when they started playing. It may have been evolving slowly, and this may have then reciprocated, but they didn't have these issues before." (P20).

Excessive gaming can be the cause for the development of other comorbidities and it draws attention to the necessity of tackling the problem at its roots, i.e., the maladaptive behaviours, as this may prove beneficial in reducing secondary symptomatology. The issue of treating Internet addiction as a primary disorder furthermore presents itself from another perspective altogether, namely the efficacy of treatment. From this perspective, the efficacy of treatment has a variety of socio-economic consequences, indicating that the more targeted a treatment is, the shorter and more financially viable it is. This argument is provided by the subsequent account in relation to Germany:

"(...) the economical aspect plays a role here. Core models exist which I believe make sense with regards to pathological Internet use. They start with the least expensive and least invasive therapy form and then continue with more complex therapy forms for those who do not profit from the former sufficiently. (...) In this sense the dream would be to treat the comorbidity first. I'm afraid however this won't catch on economically, socio-economically, and health-economically."<sup>88</sup> (P18).



This excerpt highlights current treatment reality irrespective of whether Internet addiction is appreciated as primary or secondary disorder. In most cases, Internet addiction treatment will be the shorter and more cost-effective treatment if another condition is present and therefore, the pragmatic choice is to treat the former first. From an experienced practitioner's point of view, it might be seen as more viable to treat the comorbid condition first, but economic considerations do not allow for such a decision to be put into practice. In sum, Internet addiction can be understood as both, a primary and a secondary condition, depending upon the direct impacts it has on the client's life.

#### Same but different

An important theme pertaining to the superordinate topic of Internet addiction diagnosis appeared with similarities and differences between addictions. Most participants elaborated on the ways in which they have experienced Internet addiction as similar and/or different to other substance-related and behavioural addictions. The main similarities are outlined below.

"[Addictions] are comparable in very many areas. So it doesn't matter whether it's a substance-related or a behavioural addiction, addictive behaviour is always present in order to compensate deficits or to function as a problem solving strategy (...). A person reaches out for an addictive substance often as a form of a crutch. And the choice for an addictive substance depends on the area in which a crutch is required, and with (...) the Internet this is very, very similar. There is a variety of applications and possibilities to slide into the addictive behaviour. (...) The addictive behaviour is a form of a crutch and the picture of a crutch is that the person has got an additional leg. And if somebody is weak, he picks up a crutch and the leg becomes increasingly weaker, and then the crutch is needed even more. That's where addiction happens. And there are very different crutches for different deficits (...) and different forms of addiction and different applications on the Internet."<sup>89</sup> (P3).

Addictions function as crutches to facilitate the individual's life for the time being. An important motivation for engagement in addictive behaviours appears to be the compensation for deficits. Internet use becomes a dysfunctional coping strategy in the long run as alternative coping mechanisms are unlearned.

"If I compare excessive online users with those who try to avoid their problems by drinking, I find parallels (...). Somebody who is a classical problem drinker, so to say, who has got a problem with his self-esteem, can get a feeling that he's actually much better when drinking, he can launch his own grandiosity in order to live in a world that's somewhat more friendly and harmonious by being inebriated, and you'll also find this in virtual worlds. There you enter a scene where you know the rules very well. There you know exactly what's happening. (...) And you can submerge in this other world. (...) In my opinion there exist parallels phenomenologically."<sup>90</sup> (P2).

In this excerpt, the motivation of escapism is emphasised as a factor that illuminates the similarities between Internet addiction and alcoholism. Clients who suffer from either addiction use the Internet as a safe haven to modify their moods, and to feel better about themselves as their self-esteem is often low. Participants also draw comparisons between addictions regarding certain aspects of personality:

"I see very big parallels in personality structure, i.e., poor self-worth, avoidance of bad feelings, negative emotions, often also a very marked irritability, practically an aggressive attitude (...). In addition to this, definitely rigid patterns which appear very clearly in both addictive behaviours."<sup>91</sup> (P11).

Irrespective of their addictive behaviours, addicts appear not to hold the highest opinion of themselves, and try to cope with problems via engagement in their addiction. If hindered from partaking in it, they will often react with irritability and aggression. In general, they cultivate certain behavioural patterns which appear common among addictions. Moreover, some participants substantiated their clinical experience of addiction similarities by drawing on neurobiological explanations:

“The bottom line is that they are the same with regards to biochemistry, the psychopharmacological reaction (...) in the transmitter system. It’s about the reward system. It’s about the dopaminergic system and that’s what we know today (...) also thanks to imaging techniques that the same brain areas are involved, the mesocortical, the limbic system, etc. (...) after all we know that parallels are indeed present. This means that we know from tests with patients who were alcoholic who are presented with cue pictures in a functional magnetic resonance imaging scanner that they show the same patterns like gambling addicts or Internet addicts.”<sup>92</sup> (P9).

“(...) in terms of how the brain is working, how the brain gets wired, the release of neurochemicals in the brain to which they’re getting addicted – I think they’re very similar. (...) I think that the research now on gambling has demonstrated that gambling and chemical addictions really are very similar in terms of the release of the neurochemicals and the pleasure pathway in the brain and all of that. And so you know we’re struggling to catch up in the field of Internet addiction with those studies. (...) But I think in general it’s a similar biological process at work.” (P7).

“I mean alcohol dependency and computer gaming dependency may have very similar aspects of how the brain is affected. I do believe (...) that the reward centre is the same. Reward centres that are present in heroin addiction, in cocaine addiction are the same rewards centres that are active in gaming addiction, exactly the same. (...) The research has been that they’ve done brain scans on people playing games and they saw the same kind of dopamine responses as with drug addiction. They obviously don’t have the chemical effects on the body, but we do see issues like tolerance in some ways. We do see withdrawal symptoms. So we see many of the same characteristics. So I view them as very, very similar actually.” (P20).

Both substance-related and behavioural addictions affect similar brain structures by impacting upon chemical balance. Following the engagement in addictive behaviours, glucose metabolism in brain areas traditionally associated with substance-related addictions is increased, indicating higher activity specifically in mesocortical and limbic systems, and neurochemicals, such as dopamine, are released. These findings support the contention that biologically, substance-related and behavioural addictions are comparable

(Kuss & Griffiths, 2012c). Similarities between Internet addiction and substance-related addictions in adolescence and young adulthood were also highlighted by the therapists. A participant compares online gaming addiction with cannabis addiction:

“If I wanted to compare it, (...) by now there are many boys, again more boys than girls, who for example start using cannabis already before puberty and that’s where phenomena appear similar to Internet addiction, namely that many areas of life (...) fall by the wayside, school achievement decreases. They just make it or are kicked out and often (...) there’s this comorbidity that both are present. So the boys hang out stoned a lot, and they hang out a lot in front of the computer. (...) These are two addictions with a high (...) personal gain; otherwise the adolescents wouldn’t do it. So consuming cannabis carries a high personal gain for them. To do it in the circle of friends is something positive and the same is true for playing in the circle of friends or alone.”<sup>93</sup> (P5).

Both cannabis and Internet use initially appear as pleasurable and beneficial – adolescents feel a sense of belonging and share the state of intoxication with their friends in real life or online. The negative consequences of both addictions are similar and lead to a decrease in real life achievements and a neglect of other aspects of life. This participant states “for me, addiction is always an expression of weakness, of personal weakness, and it’s a dysfunctional attempt to somehow compensate for personal weakness, to get ahead.”<sup>94</sup> (P5). In addition to this, “addiction hopping” (Shaffer, et al., 2004) may occur, which may indicate an underlying vulnerability for the individual to develop unspecified addictions.

“A change of symptoms can occur here from a behavioural phase, which you can probably realise throughout school years, to a more substance-related phase, which may be better combined with professional or university life. And that’s the (...) question, whether adolescent addiction behaviours overlap with each other, and here the distinction between substance-related and substance-unrelated isn’t that important for the individual client anymore.”<sup>95</sup> (P6).

“I think that there’s a real tendency for the drug addicts once they stop their drug addiction to seek their high now in this new acceptable way, which is gaming and Internet addiction.” (P7).

Addiction hopping is an interesting client problem experienced by some participants during their professional work. Rather than focusing on one excessive behaviour, some clients will swap between a number of these, looking for the kick that fits their individual lives best. In addition to this, it appears Internet and gaming addiction carry less of a stigma relative to substance-related addictions, specifically addictions to illegal drugs. Frequent Internet usage seems more accepted in society because often it may not be as easily recognised as an addictive behaviour, and it is difficult for some to determine differences between normal enthusiasm and potentially pathological levels of use.

In addition to the range of similarities between Internet addiction and substance-related addictions, it is pertinent to specifically discern the potential differences because of acute treatment and somatic long-term damages. One of these differences pertains to addiction initiation, context and personality characteristics, illustrated subsequently.

“[Drug addicts] usually start their drugs when they are older, they’re [sic] not been given drugs when they’re five. They’re starting their drugs when they’re 11, 12, 13, 14 years old, and they have to develop certain skills to get those drugs, so they are often street-wise. They know how to get by out in the world to go get their drugs. They’ve got to go get their drugs, get their marijuana, get their whatever, get their alcohol. And also they tend to often be very social in their drug use. They’re getting together with their friends, they’re sexually active. And all of this gives them a certain maybe distorted but nonetheless some facility with being in the real world and being social. The Internet addicts have started their Internet addiction and their gaming addiction often when they were very little. It’s been approved of within the family. They’ve been given their drug by the family, their gaming drug, and they don’t get to us until they’re now in their twenties. So they’ve had often twenty years of this use and (...) they aren’t social, face to face, they aren’t sexual, they aren’t comfortable out

in the world (...). Their personalities are very different from drug addicts. And it's been going on for much, much longer than it has for most drug addicts. (...) I think the Internet addicts (...) are at such a disadvantage in the world (...) than the drug addicts and alcoholics whose time frame has been shorter usually and because if we're just comparing two 20-year olds, the way in which the brain's *neuronet* has been affected is just going to be different, and I actually think the drug addicts and alcoholics have the advantage." (P7).

From this perspective, the differences between Internet and substance addicts, i.e., personality and pathogenesis, are suggested to lead to a differential impact of the respective addiction on the individual. Internet addiction seems disadvantageous as the individuals have integrated their addiction into their lives from an early age, making it an integral aspect of who they are. In this case, excessive usage has been facilitated and even encouraged by the environment which attaches an additional normative acceptability of the behaviour. However, from a purely biological perspective, it was also argued Internet addiction is less severe relative to substance addictions with regards to consequent neurochemical changes:

"I think a biological dimension plays a role because the drug does more in the so-called reward system, in the addiction memory, than the pathological use of the Internet because the psychotropic substance affects the various neurotransmitter systems directly and then changes complex regulatory mechanisms in the reward system, like we see it with substance-related addictions. We do see in imaging techniques with pathological Internet addiction that processes in the reward system occur, but in my opinion these are not as profound, and changes in the addiction system, the reward system, are often responsible for relapses into the addiction, and these interferences are apparently more severe with substance-related addictions."<sup>96</sup> (P18).

Participants furthermore elaborate on their experience with substance-addicted and Internet addicted clients:

"They have different experiences because with the substance-related disorders acquiring the substance, consumption, the effects of consumption, the peer aspect, consumption in a peer group are important. And with pathological Internet use it's more of a rather narcissistic position they take. What I want to say is that the cannabis

consumer maintains much more social competence and ability for social interaction and willingness to deal with like-minded people even when the addiction has progressed further, whereas with pathological Internet use, the stadium of schizoid isolation, a completely narcissistic self-awareness, comes to the foreground relatively quickly. So that's where I think they don't find as many parallels in the addiction, that's where the group processes differ from each other."<sup>97</sup> (P18).

"I think that the grave difference with a substance-related addiction is that it is often practiced secretly for a long time, and that's not the case with Internet addiction, because the family will quickly discern that they retrieve and withdraw, and sit in front of the screen."<sup>98</sup> (P11).

The first quote again stresses the imminent social aspect of substance-related addictions which stands in contrast to the almost antisocial or socially isolated position of the Internet addict. The second quote draws attention to the secrecy that surrounds substance-related drug addiction habits. Particularly if the addictive substance is an illegal drug, concealment behaviours can be common, whereas Internet addiction often occurs before the parents' very eyes.

In light of the differences, a participant refers to the importance of further research into the similarities and differences between substance-related and behavioural addictions as the current research base is rather scarce. He mentions Parkinson's Disease medication has in some cases led to the development of behavioural addictions, but not substance-related ones:

"It's a phenomenon that I find absolutely fascinating, (...) that the side effects of Parkinson medication, i.e., dopamine agonists, can lead to behavioural addictions. There are many cases of this as well as studies, However, it does not lead to substance-related addictions with the side effects. So there are people who receive dopamine agonists as Parkinson patients and they've never had anything to do with gambling and then they become addicted to gambling. We had a patient who has developed an addiction to the Internet because of such a medication."<sup>99</sup> (P4).

Interestingly, neurochemicals taken in order to alleviate the symptoms of a neurological disease induce a behavioural addiction, but appear not to have any

effect on substance-related addictions. This indicates although neurochemical processes involved in substance-related and behavioural addictions seem similar in many ways as they engage similar brain structures, there appear important differences, which should be explored in future research.

Finally, a participant draws attention to the fact that Internet addiction is an addiction in the most traditional sense and makes a point about the tremendous impact it has on the individual's life:

“Addiction is about life. (...) It's about the life of now. It's about the entire spectrum of human life, also about the question: what do I live for? (...). This is something very special with an addictive disorder. It's about existential things. (...) That's why therapy needs to be more encompassing.”<sup>100</sup> (P3).

### **Discussion**

In this study, a voice was given to twenty psychotherapists to investigate their experience of the presenting problem of Internet addiction. The findings illustrate the convergences and divergences in professionals' understanding of a newly emergent psychopathology. The interviews revealed the emergence of two superordinate themes, risk and addiction and indicate a number of risk factors that make individuals particularly vulnerable to developing Internet addiction from the therapists' experience. Based on Griffiths and Wood's framework for factors that drive the acquisition, development and maintenance of problematic gambling (2000), risk factors were categorised into individual, situational, and structural. The first individual risk factor was the client's age. It has been shown that early exposure to the Internet can increase Internet addiction risk, which is in line with previous research (Guan & Subrahmanyam, 2009). Moreover, the results of a longitudinal study show adolescents' engagement in online communication specifically correlated with compulsive Internet use six months later (van den Eijnden, Meerkerk, Vermulst,



Spijkerman, & Engels, 2008a). This indicates that in addition to being potentially problematic overall, specific Internet uses may contribute further. In this research it has been shown that parents use the Internet as “babysitter” so that children and adolescents learn to cope with their emotions via Internet use, just like “Skinner’s rats” have learned to press the lever for food (Skinner, 1969). Overall, it has been shown children and adolescents in treatment may lack cognitive capabilities of self-reflection and planning which prevents their understanding of consequences of their behaviours. Because of ongoing and not yet completed cognitive development children appear particularly vulnerable to develop problematic behaviours (Casey, et al., 2005; Galvan et al., 2006). Even at adult age, clients presenting with the problem of Internet addiction appear immature and dependent, which may indicate that early and continuous exposure impacts negatively on development even beyond adolescence.

In addition to this, male gender appeared as potential risk factor for Internet addiction because the majority of clients seeking help for this problem were identified as males, which is in line with the literature (e.g., Leung & Lee, 2012b; Tsai, et al., 2009). The propensity for boys and young men to be addicted to the Internet has been linked to their usage of “uncanny” online games that provide them with the possibility of success, mastery and competition. In earlier research (Ko, Yen, et al., 2005a), a number of factors were implicated in higher prevalence for males, namely older age, lower self-esteem, and lower daily life satisfaction. In this study, the motivations of establishing social contacts and achievement have been linked to increased gaming use among males, a finding that parallels the psychotherapists’ accounts. Problematic usage in males is noticed earlier as they disconnect from their real life and contacts entirely, whereas girls’ online and offline activities typically revolve around social engagement. The analysis has further revealed the problem may be hidden or underreported among females as Internet addiction appears as a “quiet

addiction” in this group. A recent study representative of the German population revealed that among 14-16 year old adolescents, the prevalence of problematic Internet use was higher in females with 17.2% than in males with 13.7% (Rumpf, et al., 2011). This finding is yet to be replicated. It does however suggest that Internet addiction among female adolescents is indeed underreported. Actual usage among genders appears to differ because rather than using online games to excess, females present with problems of excessive online social network usage, which has now been supported by research into *Facebook* addiction (Andreassen, Torsheim, et al., 2012).

The final individual risk factor that emerged was the idiosyncratic profile of clients who present with Internet addiction. The standard profile was a young male who is introverted and has shy personality characteristics, low self-esteem and low social competency. In order to compensate for deficiencies in real life, he escapes into the online matrix which offers everything he cannot easily attain, namely success, company, and fulfilment. This notion of a perfect virtual reality has been likened to the Wachowski siblings’ cyberpunk science fiction movie in which machines have taken over the world. The few humans that have not been enslaved by machines escape their dull and grey existence by entering an exciting and colourful alternative reality in cyberspace, in which they become a heroes with superpowers. A second analogy was drawn with Japan’s hikikomori (Tamaki, 2013), young males who isolate themselves completely in order to spend their lives in online games. Recently, research has emerged that appears to stress hikikomori as new mental health problem, specifically highlighting severe social withdrawal and associated detrimental consequences for the individual (Kondo et al., 2013; Tateno, Park, Kato, Umene-Nakano, & Saito, 2012). Among the possible causes for hikikomori, dependent and immature children and adolescents have been identified (Roh, 2012),

paralleling the therapists' experiences with clients presenting with the problem of Internet addiction.

The notion of the hikikomori ties in well with the second category of risk factors identified, namely situational. Neglect was described as lack of parental guidance, monitoring and, importantly, attention. Characteristics of a "broken home" such as single parenthood or an absent father figure put some young clients at risk for Internet addiction via compensation mechanisms in such a way that "use of digital media is the culture of the household" (P7). Previous research has found mother's and father's positive parenting attitude, family communication and family cohesion serve as protective factors for Internet addiction (Park, et al., 2008), indicating that the absence of these may leave adolescents with less resources which could be compensated by excessive Internet use. Moreover, research has shown attachment avoidance and attachment anxiety increase the risk for Internet addiction (Kang, Park, Park, & Park, 2012), supporting the contention that attachment problems may contribute to Internet addiction risk. Overall, it was contended that awareness needs to be raised because parents and caregivers are not always aware of the possible dangers of Internet overuse. Public health campaigns are called for which provide information targeting at risk groups, their parents and significant others, as they are few and far between currently (Kwon, 2011).

Specific attention has been furthermore drawn to students as they find themselves confronted with important life changes when starting their studies. They appear as a population at risk because of factors such as flexible hours, freedom from parental interference, and disconnection from their familiar social environments (Kandell, 1998). The analysis revealed students long for fulfilling fundamental developmental tasks and acquiring skills such as mastery, autonomy and independence which mark the transition from adolescence to adulthood. Going to university, students separate from their

adolescent lives and find themselves in a liminal phase in which previous rules and regulations cease to exist. University life becomes a rite of passage (van Genneep, 1960). The subversion of heretofore upheld regulations leaves young adults in a state of imminent ambiguity, allowing them to experiment and reconfigure their lives, which may make some of them increasingly vulnerable to developing Internet addiction (Widyanto & Griffiths, 2006).

The final situational characteristic that emerged as risk factor was an environmental trigger that elicits excessive Internet usage as mood modifying coping mechanism. Environmental triggers have been classed as “proximal antecedents” which when paired with repeated object interaction and subjective shifts under the presence of certain biopsychosocial predisposing factors, can lead to the manifestation of an addiction (Shaffer, et al., 2004). Therefore, given a pre-existing vulnerability, an individual learns to engage in the Internet in order to modify his or her mood when real life is frustrating, demanding, and depressing. Proximal antecedents can include situations where clients have been mobbed previously, as discerned in the analysis, including emotional and physical violence and rejection. Internet use is learned as dysfunctional coping strategy and can then lead to its manifestation as Internet addiction. In this way, the Internet is used as form of self-medication (Young, 1999).

In addition to individual and situational risk factors, structural characteristics of the Internet were found to increase the risk for Internet addiction, with clients often presenting with specific Internet usages. The majority of cases were males suffering from an addiction to playing online games. Online games, and specifically MMORPGs have been identified as particularly risky as they provide the players with a variety of incentives, ranging from social engagement and competition to achievement and success. The structural characteristics of MMORPGs, i.e., their mechanics (Kuss, et al.,

2012), the imminent high and negative reinforcement structures (Chumbley & Griffiths, 2006), adult content and rare in-game items (King, et al., 2010a), and avatar identification (Smahel, et al., 2008) seem to engulf these games with a higher addictive potential than other games (Kuss & Griffiths, 2012a). In addition to this, the analyses showed socialisation is a crucial usage motivation which, particularly when paired with peer pressure and the fear of social exclusion, increases the risk of Internet addiction. Research reveals that if combined with prolonged use, the engagement in online social networks increases the risk for Internet addiction (Rusconi et al., 2012); and connection and the maintenance of social contacts appear as reasons for excessive online social network use (Kuss & Griffiths, 2011).

In light of the different behavioural possibilities the Internet offers, the analysis revealed that participants were inconclusive about whether it is necessary to establish separate diagnostic categories for the different usages. The literature is divided as some researchers argue that the concept of Internet addiction is too broad and should be fragmented with regards to specific Internet applications (Morahan-Martin, 2005), which is in line with the APA's efforts of establishing Internet Gaming Disorder (rather than Internet Use Disorder) as diagnostic category worthy of further investigation (Herold, et al., 2012). Still, participants have drawn attention to polymediamania, denoting Internet use for the sheer sake of it. To the author's knowledge, research has not yet taken this into consideration and therefore, this finding may open further avenues for investigation.

Besides the first superordinate theme of risk, addiction was identified as key theme. Participants referred to symptoms and criteria required to make a clinical diagnosis of Internet addiction. The criteria identified included salience, which denotes a mental preoccupation with the Internet where the clients' thinking revolves around use and they experience feelings of loss if offline.

Incentive salience has been implicated as increasing the motivation to engage in addictive behaviours in addicted individuals (Flagel, Akil, & Robinson, 2009). Tolerance referred to the increased amount of time needed in order to experience the same amount or pleasure so that a neurochemical equilibrium is recreated (Koob & Le Moal, 1997). Time spent gaming has been identified as predictor of MMORPG addiction (Hussain, Griffiths, & Baguley, 2012a), indicating addicted gamers spend more time in game and possibly gradually increase it. Mood modification appeared as initial usage motivation so that the Internet was used as a form of escape and self-medication, and the latter has been shown to predict online gaming addiction (Kuss, et al., 2012). Clients furthermore experienced a loss of control over their behaviours over time, which has appeared as a core symptom of compulsive Internet use (Meerkerk, et al., 2009). Upon cessation of usage, withdrawal symptoms are experienced, which find expression in physiological and psychological symptoms, and depressive-aggressive reactions to abstinence. The following withdrawal symptoms identified in the literature were supported by the accounts: Aggression and oppositional behaviour (Chiu, et al., 2004), sleep abnormalities (Dworak, Schierl, Bruns, & Struder, 2007), and decrease in mood (Romano, Osborne, Truzoli, & Reed, 2013). Many clients deny and conceal their problematic usage patterns. Research indicates denial appears as important component of alcohol dependence and it is explained by cognitive failure more than by a rejection of the truth (Rinn, Desai, Rosenblatt, & Gastfriend, 2002), indicating individuals suffering from Internet addiction cannot but conceal their behaviours. Relatedly, most participants highlighted initial external therapy motivation, in such a way that often a wake-up call is needed to realise that a problem is present and to initiate motivation for change (Prochaska, et al., 1992). Moreover, the most telling symptom reported was problems and conflict, across all domains of living, with detrimental consequences of physical, psychological and interpersonal well-being and health. In the DSM-

IV-TR, the distinguishing feature of all mental disorders from problematic behaviours is the presence of distress or disability, i.e., the impairment in at least one area of the person's functioning (American Psychiatric Association, 2000). From the perspective of chartered and experienced psychotherapists practicing in various countries, significant impairment and distress were present in the clients that present with Internet addiction. Following the APA's definition, Internet addiction appears as psychopathology. Finally, relapse was experienced as common among clients presenting with Internet addiction. It was explained that dealing with relapse is crucial for treatment success as it needs to be decatastrophised in order to restore clients' already broken self-esteem. Relapse is an important aspect in becoming abstinent because the individual will most definitely experience it, often many times (Prochaska, et al., 1992). In sum, the presenting symptoms of clients with Internet addiction fulfil all criteria for scientifically established and practically utilised diagnoses of substance dependence (American Psychiatric Association, 2000) and the dependence syndrome (World Health Organization, 1992), indicating Internet addiction should be classed as behavioural dependence or addiction.

In a clinical context, it is necessary to evaluate the presence of potential comorbid conditions. The analysis has shown Internet addiction often presents with a variety of comorbid conditions and symptoms, highlighted by relevant studies, such as depression (Kim, Ryu, et al., 2006), ADHD (Batthyány, et al., 2009), anxiety (Yen, et al., 2008), Asperger's (Romano, et al., 2013), substance abuse (Yen, Yen, et al., 2007), as well as personality disorders and traits, such as narcissism (Kim, Namkoong, et al., 2008), schizoid and self-defeating personality disorders (Shaw & Black, 2008). The causal relationship between comorbid conditions is important, and which disorder affects the client most significantly at present determines the components, setting and course of treatment. Both Internet addiction and certain comorbid conditions function in

isolation as therapy motivators, whereas only in the course of therapy the other mental disorder is discovered. Depending on the experienced psychotherapists' view, the primary condition requires treatment initially whereas treatment for the secondary condition follows. If comorbidity is not taken into account, the specific choice of treatment may exacerbate comorbid conditions and affect the individuals negatively. Therefore a patient-centred rather than a disorder-centred perspective is necessary in healthcare taking into account potential comorbid conditions and symptoms (van Weel & Schellevis, 2006).

In terms of diagnosis, this study indicates adolescents require a stronger focus on the multiaxial system of the diagnostic manuals relative to adults seeking help for Internet addiction in order to pay respect to psychosocial development and degree of maturity. In any case, being able to establish and recognise the diagnosis of Internet addiction is significant for individuals, otherwise they are marginalised. The clients' alliance with the therapist is a key for feeling understood and it has been found to significantly impact upon subsequent treatment success (Dore & Alexander, 1996). Moreover, establishing an Internet addiction diagnosis has important implications for therapy financing because if no diagnosis is made, psychotherapists have difficulties justifying the necessity of treatment to insurance providers and socio-political health institutions (Rumpf, et al., 2011). Therefore, if "it's got a number" (P9), it has got a valid reason to be treated.

### *Limitations*

Regarding the method applied in this research, notwithstanding the rigour of Interpretative Phenomenological Analysis, it is not without its limitations. One could claim the aforementioned strengths of IPA are also the method's weaknesses. For instance, using IPA does neither allow for (i) the testing nor (ii) the development of a theory, which would be possible via a quantitative and a grounded theory approach to data collection and analysis,



respectively. Still, the aim in this chapter was to explore how psychotherapists make sense of the presenting problem of Internet addiction from a phenomenological-interpretivist point of view. IPA is the only method that adequately fulfils this goal.

Moreover, notwithstanding the meticulous two-way translation process applied in this research, it still needs to be noted translations inherently involve both a loss and a gain of meaning subtleties of linguistic lexemes across languages (Newmark, 1988). Therefore, the translations include both differences and similarities (Harkness & Schoua-Glusberg, 1998). Nonetheless, the principal investigator (rather than an external translator) performed the initial translation and analysis, thus decreasing the possibility of loss of meaning because of the researcher's proximity to the actual data, and increasing the reliability of the analysis in turn (Twinn, 1997).

### *Implications*

The relevance of the present study pertains to multiple domains, namely research, clinical practice, as well as prevention efforts. In terms of research, it has opened up a new perspective on Internet addiction, emphasising the necessity of understanding a clinical phenomenon from the perspective of the practitioner and the therapy setting. Most research on Internet addiction to date is survey research of community or specialised samples, such as students. However, the problem needs to be analysed where it presents itself – namely in the health care settings. Researchers are encouraged to conduct treatment research while paying close attention to experiential components of treatment from the clients' and psychotherapists' perspectives.

With respect to clinical practice, this research emphasises the necessity of personal evaluation of the individual client's case for initiation, choice, course and order of treatment components. Sharing professional experiences with the

presenting problem of Internet addiction will benefit young practitioners confronted with the problem for the first time. With regards to clients seeking help for the problems, this research has highlighted the need for Internet addiction to be taken seriously so as not to marginalise those affected and negatively impact upon mood and self-esteem further than the addiction already does. Parents and significant others may benefit from this research as it strongly advocates the establishment of a relevant knowledge base of potential problems related to Internet overuse. Moreover, this will encourage taking measures to disseminate this knowledge in order to prevent Internet-related problems from turning into a full blown psychopathology particularly in children and adolescents who are at higher risk of developing Internet addiction. They can be specifically targeted by awareness and prevention campaigns.

### **Conclusion**

The prevailing contribution to knowledge from this research is the psychotherapists' perspective in experiencing and evaluating the presenting problem of Internet addiction. To date, no other research has provided an in-depth qualitative exploration of Internet addiction from the practitioner's point of view, and therefore, the present study sheds light upon a yet under-researched perspective of this psychopathology. The method applied, IPA, provided an insight into the interpretation of clients' experience with Internet addiction viewed from the position of the researcher. In this way, the interpretational levels were twofold, resulting in a double hermeneutic. On the one hand, the lived experience of psychotherapists in practice has been analysed. On the other hand, this analysis was interpreted and presented via a second interpretive layer. In order to meet the requirements of validity in this research as presented by Yardley (2000), an attempt has been made to present

the participants' accounts in a valid manner, specifically paying attention to the context, i.e., the clinical setting, analytical rigour of and commitment to the present study, and a presentation of findings that is most transparent and coherent on a topic that has impact and importance.

## **PART III**

### **GENERAL DISCUSSION**

This doctoral research project aimed to assess the prevalence, risk, theory and presenting problem of Internet addiction in order to understand who gets hooked on the Internet, how common Internet addiction is, how it can be conceptualised and how it presents itself in the context of psychotherapy. The unique contribution to knowledge was the assessment of the interplay between certain personality traits and the usage of specific Internet applications in contributing to an elevated risk of Internet addiction, and the phenomenological exploration of the presenting problem of Internet addiction from the perspective of the psychotherapist. As the Internet becomes increasingly ubiquitous and mobile, Internet addiction appears as a potential problem in adolescents and students. From the reported negative consequences, it appears Internet addiction can have a variety of detrimental outcomes for young people that may require professional intervention. Researchers have now identified a number of activities and personality traits associated with Internet addiction. In this research, the prevalence and risk of Internet addiction were assessed in two large independent samples of adolescents in the Netherlands and university students in the UK. The first empirical study presented in Chapter 4 aimed to synthesise previous findings by (i) assessing the prevalence of potential Internet addiction in a large sample of adolescents, and (ii) investigating the interactions between personality traits and the usage of particular Internet applications as risk factors for Internet addiction in a total of 3,105 adolescents in the Netherlands. They filled out a self-report questionnaire including the Compulsive Internet Use Scale and the

Quick Big Five Scale. The results indicate that 3.7% of the sample were classified as potentially addicted to the Internet. The use of online gaming and social applications (online social networking sites and Twitter) increased the risk for Internet addiction, whereas extraversion and conscientiousness appeared as protective factors in high frequency online gamers (Kuss, van Rooij, et al., 2013).

The second empirical study presented in Chapter 5 aimed (i) to assess the prevalence of clinically significant levels of Internet addiction, and to (ii) discern the interplay between personality traits and specific Internet uses in increasing the risk for Internet addiction using a cross-sectional online survey with data from 2,257 students of an English university. Results indicated 3.2% of the students were classified as being addicted to the Internet. The included personality traits and uses of online activities explained 21.5% of the variance in Internet addiction. A combination of online shopping and neuroticism decreased the risk for Internet addiction, whereas a combination of online gaming and openness to experience increased it. In addition to this, frequent usage of online shopping and social online activities, as well as high neuroticism and low agreeableness significantly increased the chances of being addicted to the Internet (Kuss, Griffiths, et al., 2013). Taken together, the results of the first two empirical studies revealed comparable prevalence rates of Internet addiction, with adolescents scoring slightly higher on the respective measure. The difference between adolescents' and adults' scores on Internet addiction can be explained by a number of factors, including measurement artefacts, more willingness and/or better insight into potentially problematic behaviours. Furthermore, the findings showed the use of online gaming and online social applications increased the risk for Internet addiction across both samples. Online gaming addiction has been widely researched (e.g., Kuss & Griffiths, 2012a), whereas the addiction to using social applications remains

relatively understudied to date (Kuss & Griffiths, 2011), suggesting a viable avenue for future research.

The two studies presented in the subsequent chapters have established a theoretical framework to facilitate a conceptualisation of Internet addiction that emerged from the relevant literature and that was applied to the data collected. Study three in Chapter 6 aimed to test a parsimonious Internet addiction components model based on Griffiths' addiction components (2005), including salience, mood modification, tolerance, withdrawal, conflict, and relapse using two validated measures of Internet addiction (Compulsive Internet Use Scale [CIUS], Meerkerk et al., 2009, and Assessment for Internet and Computer Game Addiction Scale [AICA-S], Wölfling et al., 2010) in two independent samples ( $n_s = 3,105$  and  $2,257$ ). The fit of the model was analysed using Confirmatory Factor Analysis. Results indicated the Internet addiction components model fit the data in both samples well. The two sample/two instrument approach provides converging evidence concerning the degree to which the components model can organize the self-reported behavioural components of Internet addiction. The results suggest the psychopathology of addiction is a syndrome (Shaffer, et al., 2004) as Internet addiction appears to share criteria with other addictions, but it differs in its expression (Kuss, Shorter, van Rooij, Griffiths, & Schoenmakers, 2013).

Study four in Chapter 7 aimed to establish the construct validity of the Internet addiction components model via a nomological network by testing the predictive accuracy of personality traits on the Internet addiction components factor. Internet addiction and personality traits were assessed in two independent samples of 3,105 adolescents in the Netherlands and 2,257 university students in England. The results indicate low agreeableness and high neuroticism/low emotional stability predicted the Internet addiction components factor in both samples. Furthermore, low conscientiousness and

low resourcefulness predicted it in the adolescent sample only. In sum, the main contribution of this chapter is the establishment of a nomological network for the Internet addiction components model, which can serve as the basis for future research endeavours regarding its extension and consequent complementation as well as its applications in other relevant settings, such as the therapeutic context.

The final study presented in Chapter 8 aimed to explore how Internet addiction therapy experts experience the presenting problem of Internet addiction. A total of 20 psychotherapists from six different countries (i.e., Germany, UK, USA, Canada, Austria and Switzerland) were interviewed regarding their individual experience of treating patients suffering from Internet addiction. Data were analysed using Interpretative Phenomenological Analysis. Two superordinate themes were identified during the analysis: “risk” and “addiction”. The first superordinate theme represents the individual, situational and structural factors that may put a person at risk for developing Internet addiction. Individual factors appeared to be age, gender, and their individual profile. Situational factors included neglect, being students, and having a trigger that sets Internet addiction development into motion. Structural characteristics referred to different Internet applications the excessive use of which may be pathogenic, with online gaming standing out as particularly problematic. The second superordinate theme noted Internet addiction as actual psychopathology, containing addiction symptoms, criteria and diagnosis, and drawing on the similarities of Internet addiction with other addictions. Symptoms included salience, tolerance, mood modification, loss of control, withdrawal, denial and concealment, and relapse. Diagnosis was subdivided into comorbidities, Internet addiction diagnosis, and Internet addiction as primary disorder. From the therapists’ professional experience, the frequent co-occurrence of other mental disorders, such as depression, anxiety

disorders, and ADHD was noted, indicating Internet addiction can be both a primary and secondary disorder.

The final theme pertaining to the superordinate topic of Internet addiction diagnosis appeared with similarities and differences between addictions. On the one hand, addictions were understood as crutches as they were perceived to facilitate the individual's life for the time being. On the other hand, there appeared differences between addictions in initiation, context and personality characteristics. These differences are relevant regarding acute treatment and somatic long-term differences. Overall, the findings illustrated the convergences and divergences in professionals' understanding of a newly emergent psychopathology. They furthermore strengthened the results of the empirical studies presented in Chapters 4 and 5 as the Internet addiction treatment experts highlighted the existence and severity of Internet addiction as psychopathology requiring professional therapy. In this context, it must be noted that a potential therapist bias might have been present on behalf of the participants. The nature of their therapeutic practice in the context of Internet addiction treatment may have led the participants to experience the presenting problem of Internet addiction as particularly problematic relative to colleagues who do not actively deliver treatment for this condition. This potential bias, however, emerges through the treatment context which in turn indicates that clients who seek help for their Internet addiction-related problems experience their condition as distressing and as significantly impairing their functioning. Accordingly, the reported presenting problem of Internet addiction fulfils the conditions for a mental disorder classification as outlined by the American Psychiatric Association (2013).

Moreover, risk groups were identified as adolescents and university students. This research suggests young adults who are addicted to using the Internet may be stuck in a liminal phase between adolescence and adulthood in



such a way that they try to escape from real life responsibilities and existential questions by excessively engaging in virtual worlds. For vulnerable individuals, the participation in alternative online realities may over time replace the engagement in activities that were experienced as rewarding in the embodied world, hooking the individuals to the Internet even more, and simultaneously exacerbating the emerging problems in real life. Internet addiction symptoms are experienced, and once the individual (or their significant other or parent) realises they cannot overcome the problems themselves, professional help is sought. The Internet addiction treatment experts experienced Internet addiction as distinct to other addictions, while at the same time sharing important characteristics that are deemed worthy of medical and therapeutic consideration. The issue of diagnosis has been discussed, stressing the necessity of an official status so health care providers and insurance companies receive a socio-political incentive to provide financial and medical assistance to those in need. Overall, Internet addiction was understood as psychopathology experienced as significantly impairing and distressing by clients, making it a mental disorder as defined by the APA (2000).

### *Methodology*

In this doctoral research project, mixed methods have been employed, integrating advanced quantitative with sophisticated qualitative methods. Large sets of data derived from self-report surveys were collected and analysed in the first empirical section. Relative to actual clinical assessment by specially qualified professionals, the employed methodology necessitates additional caution in the evaluation of results as self-reports do not suffice for a determination of clinical diagnosis. However, in favour of self-reports, it needs to be stated that their usage is very common in psychological research as it has a number of advantages over other methods, such as interviews (Frankfort-

Nachmias & Nachmias, 1996). Surveys reduce interviewer bias, are anonymous, allow for considered answers rather than immediate responses, and are accessible to wider samples. Furthermore, they are more cost-effective as they do not require professional training for administration.

The disadvantages include simple (and therefore possibly limited) questions, lack of probing, limited control, and a relatively low response rate (Frankfort-Nachmias & Nachmias, 1996). In terms of the applicability of self-reports in clinical assessment situations, it has been found there does not appear to be a significant difference between self-rating and clinical rating with regards to major depressive disorder (Polaino & Senra, 1991), suggesting self-reports may realistically reflect the symptom experience of individuals suffering from psychopathology. In addition to this, the usage of psychometric tools to evaluate patients' mental health status prior to treatment initiation is common practice in modern clinical psychology (Cheshire & Pilgrim, 2004; Ruben, 1999). Moreover, it has been shown that self-reported symptom severity distinguished medical outpatients with mental disorders significantly from patients without mental disorders (Jackson, O'Malley, & Kroenke, 1998), supporting the usefulness of self-reports for initial psychiatric evaluation of a patient's mental health status. This indicates self-reports are a valuable tool in initial psychopathology assessment.

In addition to self-reports, in this research interviews with experts in the field of Internet addiction treatment have been conducted. Interviews have a number of advantages over self-report surveys. These include the possibility of explanation on behalf of the researcher and elaboration on behalf of the interviewee. Moreover, the establishment of rapport between both parties may increase the interviewee's willingness to disclose detailed and potentially sensitive information relevant for the research in question, while at the same time the interview is experienced as more rewarding than filling out a

questionnaire. Moreover, interviews are advantageous in terms of their flexibility, sensitivity to context, and depth of data gathered (Phellas, Bloch, & Seale, 2012). Also, in accordance with the research objectives, the use of Interpretative Methodological Analysis in this research allowed for exploring Internet addiction treatment experts' understanding and experience of the presenting problem by providing in-depth, "thick descriptions" (Geertz, 1973). Utilising thick descriptions allowed for the presentation of the data as based within their "cultural" context, i.e., mental healthcare, purporting an understanding of Internet addiction as psychopathology that requires professional help, and adding to its conceptualisation as societal research phenomenon. With its predetermined and scheduled structure, IPA appears more reliable than alternative qualitative techniques, such as content analysis, as one of IPA's methodological aims is to be replicable (Smith, 2004). What is more, IPA is particularly conscious of researcher reflexivity, as a double-layer of interpretation (i.e., double hermeneutics) is not only acknowledged, but actively encouraged because "the researcher is trying to make sense of the participants trying to make sense of their world" (Smith & Osborn, 2003, p. 53). This dynamic research process results in both insider and outsider interpretations of the data (Smith, et al., 2009). Therefore, the knowledge gained from the interviews is understood both as empirical-phenomenological by being based on the participants' perspective, and relativist by being constructed as it is embedded within a social, professional, and personal context. Accordingly, IPA is concerned with individual cognition, but diverts drastically from the behaviourist paradigm adopted by cognitive psychology by deploying interviews rather than experiments to understand thinking processes (Smith & Osborn, 2003).

The mixing of quantitative with qualitative methods is a challenging endeavour particularly as these methods can be understood as separate

scientific paradigms, when viewed from Kuhn's (1970) influential philosophy of science perspective. One could claim these methods are incommensurate as their unit of analysis (i.e., words versus numbers), their epistemological position (i.e., knowledge derived from meaning versus behaviours) and their source of scientific knowledge (i.e., induction versus deduction) are inherently incompatible. Accordingly, the adherence to a single method could be seen as the epitome of normal science, indicating a scientific revolution is necessary to integrate the seemingly incongruous positions of quantitative and qualitative research. This integration overcomes the limitations of a single methodology, namely the mere approximation of the truth because of its inevitable incompleteness. The usage of mixed methods, on the other hand, allows for the corroboration, elaboration, and complementation of findings (Brannen, 2005).

The qualitative study has corroborated the initial quantitative studies by suggesting Internet addiction exists for a small minority of Internet users, some of whom seek professional help for the problems associated with their Internet use. Moreover, it has corroborated the theoretical model of Internet addiction established in Chapters six and seven by showing (i) patients treated for their Internet addiction experience salience, mood modification, withdrawal, tolerance, conflict, and relapse, and (ii) certain personality characteristics may increase the vulnerability for Internet addiction for some individuals. The qualitative study furthermore elaborated on the initial findings by presenting the perspective of psychotherapists, clinical experts in the field of Internet addiction, by highlighting their experience of the presenting problem.

Finally, the studies of the prevalence and risk factors associated with Internet addiction have been complemented by the phenomenological study of the clinical picture of Internet addiction. This study has taken Internet addiction out of the realm of two non-clinical populations and placed it into the clinical context. Unquestionably, the notion of context is of particular merit, as in the

surveyed normal populations, psychopathological tendencies were assessed, whereas with the expert population, psychopathology was established using clinical criteria and procedures, as well as expert evaluations. Ergo the context of the respective studies throws a specific light upon the problem in question, and thereby the qualitative study complements the quantitative studies by adding a contextual layer saturated with meaning. Accordingly, the rationale for using mixed methods was to present a holistic scientifically grounded picture of Internet addiction.

### *Limitations and future research*

A number of limitations and avenues for future research have emerged. This brief section will highlight a number of those, in addition to the ones presented in each of the empirical chapters. The present research is of a cross-sectional nature and therefore it offered insights about the associations between the assessed variables, not about causal relationships. Accordingly, similar longitudinal research endeavours are encouraged so the direction of the variables' relationships can be discerned. This will shed further light upon the etiology and psychosocial stressors which contribute to the development of Internet addiction. Another reason for the necessity of longitudinal analyses is to discern whether Internet addiction is a transitory phenomenon which appears problematic only for a restricted period of time in some cases, as suggested by King et al. (2013).

Furthermore, the lack of a time criterion in the AICA-S and the absence of a tolerance criterion in the CIUS as used in the present research suggests future studies will benefit from specifying a time period in which symptoms occur, and from analysing whether tolerance is indeed a valid criterion for Internet addiction diagnosis. The presence of symptoms over the same 12-month period

has been established as relevant for a substance dependence diagnosis in the DSM IV-TR and similarly tolerance has been noted as relevant symptom for both substance dependence (American Psychiatric Association, 2000) as well as the new research diagnosis of Internet Gaming Disorder (American Psychiatric Association, 2013).

Moreover, it is advised to assess the findings of the quantitative studies in this research using qualitative techniques in order to get an in-depth insight into the interrelationships between the usage of specific Internet applications such as gaming and particular personality traits in increasing the risk for Internet addiction. One such research avenue concerns the question of why and how openness to experience may lead to the excessive engagement in online activities. Also, the question of why openness to experience is a predictor of marijuana use and online gaming, and not of any other form of drug use, as indicated by previous research (Terracciano, et al., 2008), should be addressed by future research. Hypothetically, Internet addiction shares risk factors with cannabis addiction rather than other substance addictions, which would furthermore strengthen the view of addiction as a syndrome (Shaffer, et al., 2004). Research is needed to substantiate this conjecture.

Another aspect requiring similar scientific endeavours concerns the relationship between introversion (or negative extraversion) and excessive online gaming as the present research has shown that in the adolescent sample, introversion increased the risk of Internet addiction among online gamers and not frequent users of other Internet applications. This could indicate that extraversion is a protective factor in online gamers. This hypothesis needs further scientific evaluation.

Moreover, future studies are required to assess the reasons for why high neuroticism appears as protective factor in frequent online shoppers.

Potentially, individuals scoring high on neuroticism use shopping as self-medication and thus alleviate feelings of loneliness, depression and anxiety. In order to establish whether this is indeed the case, additional research is required.

The potentially pathogenic effects of excessive social network site use appear as another fruitful avenue for study. This research project has indicated that the use of social networking sites can lead to symptoms associated with addiction in both adolescent and student populations. Furthermore, the interviewed psychotherapists elaborated on the sometimes hidden problem of girls' excessive SNS use, indicating research should pay respect not only to online gaming, but also SNS addiction. Particularly female populations appear to be vulnerable to using social online applications to excess and to developing associated problems. Reasons for and consequences of these relationships need to be discerned.

Further, it is recommended to validate the Internet addiction components model established in Chapter 6 and extended in Chapter 7 in clinical samples and to test it for sensitivity and specificity. The next step is to add the respective Internet applications into the model, and including three-way gender interactions. This will allow building a strong basis for future research including the Internet addiction components model and its nomological network. Moreover, it may pave the way for the model's utilisation as efficient tool in pre-clinical assessment.

### *Implications*

This research has implications for prevention, research, and clinical practice. First, the findings corroborate the APA's inclusion of Internet Gaming Disorder as diagnosis in the appendix of the DSM-5 (2013). Its inclusion allows

diagnosing, communicating, studying, treating, and making prognoses of Internet addiction (American Psychiatric Association, 2000; Kemper, 2008; te Wildt, 2009). If adopted, the utilisation of an agreed-upon diagnosis will increase the reliability of research into Internet addiction. It will purport the development of a gold standard of Internet addiction measurement and thus allow researchers to compare findings across studies. The presented literature reviews have shown assessment remains the main problem in current Internet addiction research and the first step to overcome this problem is to establish and adhere to officially recognised criteria for diagnosis.

From a mental health perspective, it is of utmost importance to identify the factors that contribute to the risk for Internet addiction and at the same time discern those that have a protective function. Ultimately, this will further a general understanding of why the excessive engagement in a behaviour leads to pathogenesis in one individual, but not in another. Vulnerability and resilience appear as significant aspects that require consideration in further studies. This will facilitate the initiation of targeted prevention offers prior to the manifestation of psychopathology in adolescence.

Regarding treatment, the acknowledgement of Internet addiction as first and only behavioural addiction following its long-established predecessor pathological gambling will facilitate the financing of specialised therapy on behalf of health care and insurance providers. Moreover, it will create the foundation upon which innovative social policies can be developed which have at their heart the allocation of financial and human resources for the prevention, research, and treatment of Internet addiction. The recognition of Internet addiction as condition that requires professional support can serve as incentive to develop and initiate targeted prevention and focused treatment initiatives. These will be informed by the findings of the present research, as it has indicated that (i) Internet addiction symptoms are prevalent in adolescent and



student populations, (ii) certain personality traits and Internet application usages are risk factors for Internet addiction, (iii) the Internet addiction components model may facilitate initial assessment, and (iv) the presenting problem of Internet addiction is relevant for contemporary psychotherapeutic practice.

For the individual, the official recognition of Internet addiction as actual psychopathology may lead to destigmatisation as Internet addiction is understood as disease, not as weakness of character, similar to popular connotations of substance-related addictions (Musalek, 2005). With the DSM-5 (American Psychiatric Association, 2013), Internet Gaming Disorder is situated within the diagnostic category of Addictive Disorders, and it emphasises that excessive use of the Internet can lead to significant impairment and distress for some individuals as a consequence of addiction. Addiction denotes a chronic neurobiological disease which is linked to a reward system deficiency (Comings & Blum, 2000) and which results in compulsive reward-seeking behaviours that are continued despite significant negative bio-psychosocial consequences (American Society of Addiction Medicine, 2012). A recent systematic literature review of neuroimaging studies of Internet addiction (Kuss & Griffiths, 2012c) suggests that Internet addiction is similar to substance-related addictions on a variety of levels. Molecularly, Internet addiction has been linked to a reward deficiency due to decreased dopaminergic activity. In terms of neural circuitry, the excessive use of the Internet can modify brain morphometry by increasing metabolism in brain areas traditionally associated with substance-related addictions. Behaviourally, research indicates that cognitive impairment may be the result of Internet addiction. For these reasons, Internet addiction should be acknowledged as chronic neurobiological disease. Accordingly, this doctoral research project offers additional support for understanding Internet addiction

as disease, not as a transient and easily dispensable by-product of a technophilic generation's new media consumption.

*Final remarks*

This doctoral research project emphasised the importance of research into potentially pathological usages of the Internet by drawing on two large datasets of particularly vulnerable groups as well as the professional experience of international Internet addiction treatment experts. It was examined how common Internet addiction is and who is at risk for developing it. Moreover, a model for Internet addiction was developed and tested. Finally, this research has reported the problem of Internet addiction as it presents itself in treatment settings within Europe, the USA and Canada. In sum, the findings support the inclusion of Internet addiction in the DSM-5 and they call for specificity and reliability in diagnosis and assessment.

## References

- Aboujaoude, E., Koran, L. M., Gamel, N., Large, M. D., & Serpe, R. T. (2006). Potential markers for problematic Internet use: A telephone survey of 2,513 adults. *CNS Spectrums*, 11(10), 750-755.
- Ahuja, M., Gupta, B., & Raman, P. (2003). An empirical investigation of online consumer purchasing behavior. *Communications of the ACM*, 46(12), 145-151.
- Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park: Sage.
- Ak, S., Koruklu, N., & Yilmaz, Y. (2013). A study on Turkish adolescent's Internet use: Possible predictors of Internet addiction. *CyberPsychology, Behavior and Social Networking*, 16(3), 205-209.
- Al-Qudah, K. (2001). Internet addiction among students at Jordanian universities. *Journal of Arabic and Human Sciences*, 4(2), 71-88.
- Allison, S. E., von Wahlde, L., Shockley, T., & Gabbard, G. O. (2006). The development of the self in the era of the Internet and role-playing fantasy games. *American Journal of Psychiatry*, 163(3), 381-385.
- American Psychiatric Association. (1994). *Diagnostic and Statistical Manual for Mental Disorders* (4th ed.). Washington, D. C.: American Psychiatric Association.
- American Psychiatric Association. (2000). *Diagnostic and Statistical Manual for Mental Disorders IV, Text-Revision*. Washington, D. C.: American Psychiatric Association.
- American Psychiatric Association. (2012a). R 40 Internet Use Disorder. *DSM-5 development*. Retrieved 07.09.2012, from <http://www.dsm5.org/ProposedRevision/Pages/proposedrevision.aspx?rid=573#>
- American Psychiatric Association. (2012b). DSM-5: The future of psychiatric diagnosis. *DSM-5 development*. Retrieved 28.04.2012, from <http://www.dsm5.org/Pages/Default.aspx>
- American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders (DSM-5)*. Arlington, VA: American Psychiatric Association.
- American Society of Addiction Medicine. (2012). The voice of addiction medicine. Retrieved 20.06.2013, from <http://www.asam.org/>
- Anderson, C. A., Gentile, D. A., & Buckley, K. (2007). *Violent video game effects on children and adolescents: Theory, research, and public policy*. New York: Oxford University Press.
- Anderson, K. J. (2001). Internet use among college students: An exploratory study. *Journal of American College Health*, 50(1), 21-26.
- Andreassen, C. S., Griffiths, M. D., Hetland, J., & Pallesen, S. (2012). Development of a work addiction scale. *Scandinavian Journal of Psychology*, 53(3), 265-272.
- Andreassen, C. S., Torsheim, T., Brunborg, G. S., & Pallesen, S. (2012). Development of a Facebook Addiction Scale. *Psychological Reports*, 110(2), 1-17.
- Andrews-Hanna, J. R., Mackiewicz Seghete, K. L., Claus, E. D., Burgess, G. C., Ruzic, L., & Banich, M. T. (2011). Cognitive control in adolescence: Neural underpinnings and relation to self-report behaviors. *Plos One*, 6(6), e21598.
- Ang, R. P., Chong, W. H., Chye, S., & Huan, V. S. (2012). Loneliness and generalized problematic Internet use: Parents' perceived knowledge of adolescents' online activities as a moderator. *Computers in Human Behavior*, 28(4), 1342-1347.
- Anthonya, L. M., Clarke, M. C., & Anderson, S. J. (2000). Technophobia and personality subtypes in a sample of South African university students. *Computers in Human Behavior*, 16, 31-44.
- Appel, M., Holt, P., Stiglbauer, B., & Batinic, B. (2012). Parents as a resource: Communication quality affects the relationship between adolescents' internet use and loneliness. *Journal of Adolescence*, 35(6), 1641-1648.
- Armstrong, L., Phillips, J. G., & Saling, L. L. (2000). Potential determinants of heavier internet usage. *International Journal of Human-Computer Studies*, 53(4), 537-550.

- Arnett, J. (1994). Sensation seeking: A new conceptualization and a new scale. *Personality & Individual Differences, 16*, 289-296.
- Bakken, I. J., Wenzel, H. G., Gotestam, K. G., Johansson, A., & Oren, A. (2009). Internet addiction among Norwegian adults: A stratified probability sample study. *Scandinavian Journal of Psychology, 50*(2), 121-127.
- Barker, V. (2009). Older adolescents' motivations for social network site use: The influence of gender, group identity, and collective self-esteem. *CyberPsychology & Behavior, 12*(2), 209-213.
- Batthyány, D., Müller, K. W., Benker, F., & Wölfling, K. (2009). Computer game playing: Clinical characteristics of dependence and abuse among adolescents. *Wiener Klinische Wochenschrift, 121*(15-16), 502-509.
- Batthyány, D., & Pritz, A. (Eds.). (2009). *Rausch ohne Drogen. Substanzungebundene Süchte*. Wien: Springer.
- Bear, S., Bogusz, E., & Green, D. A. (2011). Stuck on screens: Patterns of computer and gaming station use in youth seen in a psychiatric clinic. *Journal of the Canadian Academy of Child and Adolescent Psychiatry, 20*(2), 86-95.
- Beard, K. W. (2005). Internet addiction: A review of current assessment techniques and potential assessment questions. *Cyberpsychology & Behavior, 8*(1), 7-14.
- Beard, K. W., & Wolf, E. M. (2001). Modification in the proposed diagnostic criteria for internet addiction. *Cyberpsychology & Behavior, 4*(3), 377-383.
- Bechara, A. (2003). Risky business: Emotion, decision-making and addiction. *Journal of Gambling Studies, 19*, 23-51.
- Beck, A. T., & Steer, R. (1993). *Manual for the Beck Depression Inventory*. San Antonio, TX: The Psychological Corporation.
- Bener, A., Al-Mahdi, H. S., Ali, A. I., Al-Nufal, M., Vachhani, P. J., & Tewfik, I. (2011). Obesity and low vision as a result of excessive Internet use and television viewing. *International Journal of Food Sciences and Nutrition, 62*(1), 60-62.
- Beranuy, M., Carbonell, X., & Griffiths, M. (2012). A qualitative analysis of online gaming addicts in treatment. *International Journal of Mental Health and Addiction, 11*, 149-161.
- Bergmark, K. H., Bergmark, A., & Findahl, O. (2011). Extensive Internet involvement: Addiction or emerging lifestyle? *International Journal of Environmental Research and Public Health, 8*(12), 4488-4501.
- Berlin, I. (1969). *Four essays on liberty*. London: Oxford University Press.
- Bethlehem, J. (2008). *How accurate are self-selection web surveys?* The Hague, NL: Statistics Netherlands.
- Beutel, M. E., Braehler, E., Glaesmer, H., Kuss, D. J., Woelfling, K., & Mueller, K. W. (2011). Regular and problematic leisure-time Internet use in the community: Results from a German population-based survey. *Cyberpsychology, Behavior and Social Networking, 14*(5), 291-296.
- Beutel, M. E., Hoch, C., Wölfling, K., & Müller, K. W. (2011). Klinische Merkmale der Computerspiel- und Internetsucht am Beispiel der Inanspruchnehmer einer Spielsuchtambulanz. *Zeitschrift für Psychosomatische Medizin und Psychotherapie, 57*, 77-90.
- Billieux, J., Rochat, L., Ceschi, G., Carré, A., Offerlin-Meyer, I., Defeldre, A.-C., et al. (2012). Validation of a short French version of the UPPS-P Impulsive Behaviour Scale. *Comprehensive Psychiatry, 54*(5), 609-615.
- Billieux, J., & Van der Linden, M. (2012). Problematic use of the Internet and self-regulation: A review of the initial studies. *The Open Addiction Journal, 5*(Suppl 1: M4), 24-29.
- Billieux, J., Van der Linden, M., Achab, S., Khazaal, Y., Paraskevopoulos, L., Zullino, D., et al. (2013). Why do you play World of Warcraft? An in-depth exploration of self-reported motivations to play online and in-game behaviours in the virtual world of Azeroth. *Computers in Human Behavior, 29*(1), 103-109.

- Birmaher, B., Khetarpal, S., Brent, D., Cully, M., Balach, L., Kaufman, J., et al. (1997). The Screen for Child Anxiety-Related Emotional Disorders (SCARED): Scale construction and psychometric characteristics. *Journal of the American Academy of Child and Adolescent Psychiatry*, 36(4), 545-553.
- Black, D. W., Belsare, G., & Schlosser, S. (1999). Clinical features, psychiatric comorbidity, and health-related quality of life in persons reporting compulsive computer use behavior. *Journal of Clinical Psychiatry*, 60(12), 839-844.
- Blanco, C., Moreyra, P., Nunes, E. V., Saiz-Ruiz, J., & Ibanez, A. (2001). Pathological gambling: Addiction or compulsion? *Seminars in Clinical Neuropsychiatry*, 6, 167-176.
- Blum, K., Cull, J. G., Braverman, E. R., & Comings, D. E. (1996). Reward deficiency syndrome. *American Scientist*, 84(2), 132-145.
- Blum, K., Wood, R., Sheridan, P., Chen, T., & Comings, D. (1995). Dopamine D2 receptor gene variants: Association and linkage studies in impulsive, addictive and compulsive disorders. *Pharmacogenetics*, 5, 121-141.
- Bollen, K. A. (1989). *Structural equations with latent variables*. New York, NY: Wiley.
- Boomsma, A. (2000). Reporting analyses of covariance structures. *Structural Equation Modeling - A Multidisciplinary Journal*, 7(3), 461-483.
- Brannen, J. (2005). Mixing methods: The entry of qualitative and quantitative approaches into the research process. *International Journal of Social Research Methodology*, 8(3), 173-184.
- Brislin, R. W. (1980). Translation and content analysis of oral and written material. In H. C. Triandis & J. W. Berry (Eds.), *Handbook of cross-cultural psychology* (Vol. 2, pp. 389-444). Boston: Allyn & Bacon.
- Brooks, D. (2012). *The social animal: The hidden sources of love, character, and achievement*. New York, NY: Random House Trade.
- Brown, R. I. F. (1991). Gaming, gambling and other addictive play. In J. H. Kerr & M. J. Apter (Eds.), *Adult play: A reversal theory approach* (pp. 101-118). Amsterdam: Swets & Zeitlinger.
- Brown, R. I. F. (1993). Some contributions of the study of gambling to the study of other addictions. In W. R. Eadington & J. A. Cornelius (Eds.), *Gambling behavior and problem gambling* (pp. 241-272). Reno: University of Nevada.
- Brown, T. A. (2006). *Confirmatory factor analysis for applied research*. New York: Guilford.
- Brown, T. A., & Barlow, D. H. (2005). Dimensional versus categorical classification of mental disorders in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders and beyond: Comment on the special section. *Journal of Abnormal Psychology*, 114(4), 551-556.
- Brüder Grimm. (1956). Die Kinder zu Hameln. In Brüder Grimm (Ed.), *Deutsche Sagen* (Vol. 1). München: Artemis & Winkler.
- Buchman, D. D., & Funk, J. B. (1996). Video and computer games in the 90s: Children's time commitment & game preference. *Children Today*, 24, 12-15.
- Buhrmester, D., Furman, W., Wittenberg, M. T., & Reis, H. T. (1988). Five domains of interpersonal competence in peer relationships. *Journal of Personality and Social Psychology*, 55, 991-1008.
- Buss, A. H., & Perry, M. (1992). The Aggression Questionnaire. *Journal of Personality and Social Psychology*, 63, 452-459.
- Butcher, J. N., Dahlstrom, W. G., Graham, J. R., Tellegen, A., & Kaemmer, B. (1989). *The Minnesota Multiphasic Personality Inventory-2 (MMPI-2): Manual for administration and scoring*. Minneapolis, MN: University of Minnesota Press.
- Byun, S., Ruffini, C., Mills, J. E., Douglas, A. C., Niang, M., Stepchenkova, S., et al. (2009). Internet addiction: Metasynthesis of 1996-2006 quantitative research. *CyberPsychology & Behavior*, 12(2), 203-207.
- Caillois, R. (1961). *Man, play and games*. Paris: Simon and Schuster.



- Canan, F., Ataoglu, A., Ozcetin, A., & Icmeli, C. (2012). The association between Internet addiction and dissociation among Turkish college students. *Comprehensive Psychiatry, 53*(5), 422-426.
- Cao, H., Sun, Y., Wan, Y., Hao, J., & Tao, F. (2011). Problematic Internet use in Chinese adolescents and its relation to psychosomatic symptoms and life satisfaction. *BMC Public Health, 11*.
- Caplan, S. E. (2002). Problematic Internet use and psychosocial well-being: Development of a theory-based cognitive-behavioral measurement instrument. *Computers in Human Behavior, 18*(5), 553-575.
- Caplan, S. E. (2003). Preference for online social interaction: A theory of problematic Internet use and psychosocial well-being. *Communication Research, 30*(6), 625-648.
- Caplan, S. E., Williams, D., & Yee, N. (2009). Problematic Internet use and psychosocial well-being among MMO players. *Computers in Human Behavior, 25*(6), 1312-1319.
- Carbonell, X., Chamarro, A., Griffiths, M., Oberst, U., Cladellas, R., & Talam, A. (2012). Problematic Internet and cell phone use in Spanish teenagers and young students. *Anales De Psicología, 28*(3), 789-796.
- Carlson, N. (2010). At last - The full story of how Facebook was founded. Business Insider. Retrieved 02.08.2012, from <http://www.businessinsider.com/how-facebook-was-founded-2010-3#>
- Casey, B. J., Tottenham, N., Liston, C., & Durston, S. (2005). Imaging the developing brain: What have we learned about cognitive development? *Trends in Cognitive Sciences, 9*, 104-110.
- Castells, M. (1996). *The rise of the network society*. Oxford: Blackwell.
- Castiglione, J. (2008). Internet abuse and possible addiction among undergraduates: A developing concern for library and university administrators. *Library Review, 57*(5), 358-371.
- Chamorro-Premuzic, T., Furnham, A., Dissou, G., & Heaven, P. (2005). Personality and preference for academic assessment: A study with Australian University students. *Learning and Individual Differences, 15*, 247-256.
- Chan, P. A., & Rabinowitz, T. (2006). A cross-sectional analysis of video games and attention deficit hyperactivity disorder symptoms in adolescents. *Annals of General Psychiatry, 5*(1), 16-26.
- Chapman, E., & Smith, J. A. (2002). Interpretative phenomenological analysis and the new genetics. *Journal of Health Psychology, 7*(2), 125-130.
- Chappell, D., Eatough, V., Davies, M. N. O., & Griffiths, M. D. (2006). Everquest - It's just a computer game right? An interpretative phenomenological analysis of online gaming addiction. *International Journal of Mental Health and Addiction, 4*, 205-216.
- Charlton, J. P. (2002). A factor-analytic investigation of computer 'addiction' and engagement. *British Journal of Psychology, 93*, 329-344.
- Charlton, J. P., & Danforth, I. D. W. (2007). Distinguishing addiction and high engagement in the context of online game playing. *Computers in Human Behavior, 23*(3), 1531-1548.
- Charlton, J. P., & Danforth, I. D. W. (2010). Validating the distinction between computer addiction and engagement: Online game playing and personality. *Behaviour & Information Technology, 29*(6), 601-613.
- Charmaz, K. (2006). *Constructing grounded theory: A practical guide through qualitative analysis*. London: Sage.
- Chen, S. H., Weng, L. C., Su, Y. J., Wu, H. M., & Yang, P. F. (2003). Development of Chinese Internet Addiction Scale and its psychometric study. *Chinese Journal of Psychology, 45*, 279-294.
- Cheng, S. S., Liu, E. Z. F., & Shieh, R. S. (2012). Identifying the indicators attracting users to online question and answer discussion forums. *Social Behavior and Personality, 40*(2), 283-292.
- Cheshire, K., & Pilgrim, D. (2004). *A short introduction to clinical psychology*. London: Sage.
- Cheung, L. M., & Wong, W. S. (2011). The effects of insomnia and internet addiction on depression in Hong Kong Chinese adolescents: An exploratory cross-sectional analysis. *Journal of Sleep Research, 20*(2), 311-317.

- Chiang, I. P., & Su, Y.-H. (2012). Measuring and analyzing the causes of problematic Internet use. *Cyberpsychology, Behavior and Social Networking*, 15(11), 591-596.
- Chiu, S. I., Lee, J. Z., & Huang, D. H. (2004). Video game addiction in children and teenagers in Taiwan. *CyberPsychology & Behavior*, 7(5), 571-581.
- Choi, D., Kim, H., & Kim, J. (2000). A cognitive and emotional strategy for computer game design. *Journal of MIS Research*, 10, 165-187.
- Choi, D. S., & Kim, J. (2004). Why people continue to play online games: In search of critical design factors to increase customer loyalty to online contents. *Cyberpsychology & Behavior*, 7(1), 11-24.
- Choi, K., Son, H., Park, M., Han, J., Kim, K., Lee, B., et al. (2009). Internet overuse and excessive daytime sleepiness in adolescents. *Psychiatry and Clinical Neurosciences*, 63(4), 455-462.
- Choo, H., Gentile, D. A., Sim, T., Li, D., Khoo, A., & Liau, A. K. (2010). Pathological video-gaming among Singaporean youth. *Annals Academy of Medicine Singapore*, 39, 822-829.
- Chou, C., Condron, L., & Belland, J. C. (2005). A review of the research on Internet addiction. *Educational Psychology Review*, 17(4), 363-388.
- Chou, C., & Hsiao, M. C. (2000a). Internet addiction, usage, and gratifications: The Taiwan college students' case. *Computers & Education*, 35, 65-80.
- Chou, C., & Hsiao, M. C. (2000b). Internet addiction, usage, gratification, and pleasure experience: The Taiwan college students' case. *Computers & Education*, 35(1), 65-80.
- Chou, T. J., & Ting, C. C. (2003). The role of flow experience in cyber-game addiction. *CyberPsychology & Behavior*, 6(6), 663-675.
- Christakis, D. A. (2010). Internet addiction: A 21st century epidemic? *BMC Medicine*, 8(61).
- Chuang, Y. C. (2006). Massively multiplayer online role-playing game-induced seizures: A neglected health problem in Internet addiction. *CyberPsychology & Behavior*, 9(4), 451-456.
- Chumbley, J., & Griffiths, M. (2006). Affect and the computer game player: The effect of gender, personality, and game reinforcement structure on affective responses to computer game-play. *CyberPsychology & Behavior*, 9(3), 308-316.
- Church, A. T., & Lonner, W. J. (1998). The cross-cultural perspective in the study of personality. *Journal of Cross-Cultural Psychology*, 29(1), 32-62.
- Clark, M., & Calleja, K. (2008). Shopping addiction: A preliminary investigation among Maltese university students. *Addiction Research & Theory*, 16(6), 633-649.
- Clymo, P. (1996). Home video game playing in schoolchildren: A study of incidence and patterns of play. *Youth Studies Australia*, 15, 59.
- Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112(1), 155-159.
- Comings, D. E., & Blum, K. (2000). Reward deficiency syndrome: Genetic aspects of behavioral disorders. In H. B. M. Uylings, C. G. VanEden, J. P. C. DeBruin, M. G. P. Feenstra & C. M. A. Pennartz (Eds.), *Cognition, emotion and autonomic responses: The integrative role of the prefrontal cortex and limbic structures* (Vol. 126, pp. 325-341). Amsterdam: Elsevier.
- Conner, B. T., Stein, J. A., Longshore, D., & Stacy, A. W. (1999). Associations between drug abuse treatment and cigarette use: Evidence of substance replacement. *Experimental and Clinical Psychopharmacology*, 7(1), 64-71.
- Conners, C. K., Sitarenios, G., Parker, J. D., & Epstein, J. N. (1998). The revised Conners' Parent Rating Scale (CPR-R): Factor structure, reliability, and criterion validity. *Journal of Abnormal Child Psychology*, 26(4), 257-268.
- Connor, K. M., Davidson, J. R. T., Churchill, L. E., Sherwood, A., & Weisler, R. H. (2000). Psychometric properties of the Social Phobia Inventory (SPIN): New self-rating scale. *The British Journal of Psychiatry*, 176(4), 379-386.
- Conrad, P. (1987). The experience of illness: Recent and new directions. *Research in the Sociology of Health Care*, 6, 1-31.

- Conti, M. A., Jardim, A. P., Hearst, N., Cordás, T. A., Tavares, H., & Nabuco de Abreu, C. (2012). Evaluation of semantic equivalence and internal consistency of a Portuguese version of the Internet Addiction Test (IAT). *Revista De Psiquiatria Clínica*, 39(3), 106-110.
- Cooper, M. L., Russell, M., & George, W. H. (1988). Coping, expectancies, and alcohol abuse: A test of social learning formulations. *Journal of Abnormal Psychology*, 97(2), 218-230.
- Costa, P. T., & McCrae, R. R. (1985). *The NEO personality inventory manual*. Odessa, FL: Psychological Assessment Resources.
- Costa, P. T., & McCrae, R. R. (1992a). *NEO PI-R professional manual*. Odessa, TX: Psychological Assessment Resources.
- Costa, P. T., & McCrae, R. R. (1992b). *Revised NEO personality inventory (NEO-PI-R) and the NEO Five-Factor inventory (NEO-FFI): Professional manual*. Odessa, FL: Psychological Assessment Resources.
- Crick, N. R. (1995). Relational aggression: The role of intent attributions, feelings of distress, and provocation type. *Development and Psychopathology*, 7(2), 313-322.
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16(3), 297-334.
- Cronbach, L. J., & Meehl, P. E. (1955). Construct validity in psychological tests. *Psychological Bulletin*, 52(4), 281-302.
- Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York: HarperCollins.
- Cuhadar, C. (2012). Exploration of problematic Internet use and social interaction anxiety among Turkish pre-service teachers. *Computers & Education*, 59(2), 173-181.
- Cultrara, A., & Har-El, G. (2002). Hyperactivity-induced suprahyoid muscular hypertrophy secondary to excessive video game play: A case report. *Journal of Oral and Maxillofacial Surgery*, 60(3), 326-327.
- Custer, R. (1987). The diagnosis and scope of pathological gambling. In T. Galski (Ed.), *The handbook of pathological gambling* (pp. 3-7). Springfield: Thomas.
- Danforth, I. D. W. (2003). *Addiction to online games: Classification and personality correlates*. doctoral dissertation. Whitman College. Washington.
- Davis, R. A., Flett, G. L., & Besser, A. (2002). Validation of a new scale for measuring problematic Internet use: Implications for pre-employment screening. *Cyberpsychology & Behavior*, 5(4), 331-345.
- de Graaf, R., Bijl, R. V., Spijker, J., Beekman, A. T., & Vollebergh, W. A. (2003). Temporal sequencing of lifetime mood disorders in relation to comorbid anxiety and substance use disorders — Findings from the Netherlands Mental Health Survey and Incidence Study. *Social Psychiatry and Psychiatric Epidemiology*, 38, 1-11.
- Delafrooz, N., Paim, L. H., & Khatibi, A. (2010). Students' online shopping behavior: An empirical study. *Journal of American Science*, 6(1), 137-147.
- Demetrovics, Z., Szeredi, B., & Rozsa, S. (2008). The three-factor model of Internet addiction: The development of the Problematic Internet Use Questionnaire. *Behavior Research Methods*, 40(2), 563-574.
- Deryakulu, D., & Olkun, S. (2007). Analysis of computer teachers' online discussion forum messages about their occupational problems. *Educational Technology & Society*, 10(4), 131-142.
- Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction with Life Scale. *Journal of Personality Assessment*, 49, 71-75.
- Digman, J. M., & Takemoto-Chock, N. K. (1981). Factors in the natural language of personality: Re-analysis, comparison and interpretation of six major studies. *Multivariate Behavioral Research*, 16(2), 149-170.



- Do, Y., K., Shin, E., Bautista, M. A., & Foo, K. (2013). The associations between self-reported sleep duration and adolescent health outcomes: What is the role of time spent on Internet use? *Sleep Medicine, 14*(2), 195-200.
- Donath, J., & boyd, d. (2004). Public displays of connection. *Bt Technology Journal, 22*(4), 71-82.
- Dong, G., Wang, J., Yang, X., & Zhou, H. (2012). Risk personality traits of Internet addiction: A longitudinal study of Internet-addicted Chinese university students. *Asia-Pacific Psychiatry*, e-pub ahead of print.
- Dong, G., Zhou, H., & Zhao, X. (2011). Male Internet addicts show impaired executive control ability: Evidence from a color-word Stroop task. *Neuroscience Letters, 499*(2), 114-118.
- Dongdong, L., Liau, A., & Khoo, A. (2011). Examining the influence of actual-ideal self-discrepancies, depression, and escapism, on pathological gaming among massively multiplayer online adolescent gamers. *Cyberpsychology, Behavior & Social Networking, 14*(9), 535-539.
- Dore, M. M., & Alexander, L. B. (1996). Preserving families at risk of child abuse and neglect: The role of the helping alliance. *Child Abuse and Neglect, 20*(4), 349-361.
- Douglas, A. C., Mills, J. E., Niang, M., Stepchenkova, S., Byun, S., Ruffini, C., et al. (2008). Internet addiction: Meta-synthesis of qualitative research for the decade 1996-2006. *Computers in Human Behavior, 24*(6), 3027-3044.
- Dowling, N. A., & Brown, M. (2010). Commonalities in the psychological factors associated with problem gambling and Internet dependence. *Cyberpsychology, Behavior and Social Networking, 13*(4), 437-441.
- Drake, R. E., McLaughlin, P., Pepper, B., & Minkoff, K. (1991). Dual diagnosis of major mental illness and substance disorder: An overview. *New Directions for Mental Health Services, 1991*(50), 3-12.
- Du, Y. S., Jiang, W. Q., & Vance, A. (2010). Longer term effect of randomized, controlled group cognitive behavioural therapy for Internet addiction in adolescent students in Shanghai. *Australian and New Zealand Journal of Psychiatry, 44*(2), 129-134.
- Ducheneaut, N., Yee, N., Nickell, E., & Moore, R. J. (2006). Building an MMO with mass appeal - A look at gameplay in World of Warcraft. *Games and Culture, 1*(4), 218-317.
- Dworak, M., Schierl, T., Bruns, T., & Struder, H. K. (2007). Impact of singular excessive computer game and television exposure on sleep patterns and memory performance of school-aged children. *Pediatrics, 120*(5), 978-985.
- Egan, V., Deary, I., & Austin, E. (2000). The NEO-FFI: Emerging British norms and item-level analysis suggest N, A and C are more reliable than O and E. *Personality & Individual Differences, 29*, 907-920.
- Eijnden, R. J. J. M., Spijkerman, R., Vermulst, A. A., van Rooij, A. J., & Engels, R. J. J. M. (2010). Compulsive Internet use among adolescents: Bidirectional parent-child relationships. *Journal of Abnormal Child Psychology, 38*(1), 77-89.
- El-Guebaly, N., Patten, S. B., Currie, S., Williams, J. V. A., Beck, C. A., Maxwell, C. J., et al. (2006). Epidemiological associations between gambling behavior, substance use & mood and anxiety disorders. *Journal of Gambling Studies, 22*(3), 275-287.
- Ellison, N. B., Steinfield, C., & Lampe, C. (2007). The benefits of Facebook "friends": Social capital and college students' use of online social network sites. *Journal of Computer-Mediated Communication, 12*(4).
- Engels, R. C. M. E., Finkenauer, C., Meeus, W., & Dekovic, M. (2001). Parental attachment and adolescents' emotional adjustment: The associations with social skills and relational competence. *Journal of Counseling Psychology, 48*, 428-439.

- Entertainment Software Association. (2012). 2012 sales, demographic and usage data - Essential facts about the computer and video game industry. Retrieved 07.09.2012, from [http://www.theesa.com/newsroom/release\\_detail.asp?releaseID=174](http://www.theesa.com/newsroom/release_detail.asp?releaseID=174)
- ESA. (2010). Essential facts about the computer and video game industry. Retrieved 21.04.2011, from [http://www.theesa.com/facts/pdfs/ESA\\_Essential\\_Facts\\_2010.PDF](http://www.theesa.com/facts/pdfs/ESA_Essential_Facts_2010.PDF)
- Eysenck, H. J., & Eysenck, S. B. G. (1975). *Manual of the Eysenck Personality Questionnaire*. London: Hodder & Stoughton.
- Eysenck, H. J., & Eysenck, S. G. B. (1996). *Manual of the Eysenck Personality Scales (EPS adult)* (revised ed.). London: Hodder & Stoughton Educational.
- Farrell, E. (1990). *Hanging in and dropping out: Voices of at-risk high school students*. New York: Teachers College Press.
- First, M. B. (2005). Clinical utility: A prerequisite for the adoption of a dimensional approach in DSM. *Journal of Abnormal Psychology, 114*(4), 560-564.
- First, M. B., Gibbon, M., Spitzer, R. L., & Williams, J. B. W. (1996). *Structured Clinical Interview for DSM-IV Axis I Disorders: Clinician Version (SCID-CV): Administration booklet* Washington, D. C.: American Psychiatric Press.
- First, M. B., Gibbon, M., Spitzer, R. L., Williams, J. B. W., & Benjamin, L. S. (1997). *Structural Clinical Interview for DSM-IV (R) Axis II Personality Disorders (SCID-II)*. Washington, D.C.: American Psychiatric Press.
- Fisher, S. (1994). Identifying video game addiction in children and adolescents. *Addictive Behaviors, 19*, 545-553.
- Fisoun, V., Floros, G., Geroukalis, D., Ioannidi, N., Farkonas, N., Sergentani, E., et al. (2012). Internet addiction in the island of Hippocrates: The associations between internet abuse and adolescent off-line behaviours. *Child and Adolescent Mental Health, 17*(1), 37-44.
- Fisoun, V., Floros, G., Siomos, K., Geroukalis, D., & Navridis, K. (2012). Internet addiction as an important predictor in early detection of adolescent drug use experience: Implications for research and practice. *Journal of Addiction Medicine, 6*(1), 77-84.
- Flagel, S. B., Akil, H., & Robinson, T. E. (2009). Individual differences in the attribution of incentive salience to reward-related cues: Implications for addiction. *Neuropharmacology, 56*(1), 139-148.
- Flora, D. B., & Curran, P. J. (2004). An empirical evaluation of alternative methods of estimation for confirmatory factor analysis with ordinal data. *Psychological Methods, 9*(4), 466-491.
- Frankfort-Nachmias, C., & Nachmias, D. (1996). *Research methods in the social sciences* (5 ed.). London: St Martin's Press.
- Fu, K.-W., Chan, W. S. C., Wong, P. W. C., & Yip, P. S. F. (2010). Internet addiction: Prevalence, discriminant validity and correlates among adolescents in Hong Kong. *British Journal of Psychiatry, 196*(6), 486-492.
- Funk, J., Fox, C., Chan, M., & Curtiss, K. (2008). The development of the Children's Empathic Attitudes Questionnaire using classical and Rasch analyses. *Journal of Applied Developmental Psychology, 29*(3), 187-196.
- Galvan, A., Hare, T. A., Parra, C. E., Penn, J., Voss, H., Glover, G., et al. (2006). Earlier development of the accumbens relative to orbitofrontal cortex might underlie risk-taking behavior in adolescents. *Journal of Neuroscience, 26*(25), 6885-6892.
- Gamez-Guadix, M., Villa-George, F. I., & Calvete, E. (2012). Measurement and analysis of the cognitive-behavioral model of generalized problematic Internet use among Mexican adolescents. *Journal of Adolescence, 35*(6), 1581-1591.
- Gautier, T. (1835). *Mademoiselle de Maupin*. London: Penguin.
- Geertz, C. (1973). *Interpretation of cultures*. New York, NY: Basic Books.

- Gentile, D. A. (2009). Pathological video-game use among youth ages 8 to 18: A national study. *Psychological Science*, 20(5), 594-602.
- Gentile, D. A., Choo, H., Liau, A., Sim, T., Li, D. D., Fung, D., et al. (2011). Pathological video game use among youths: A two-year longitudinal study. *Pediatrics*, 127(2), E319-E329.
- Gentile, D. A., Lynch, P. J., Linder, J. R., & Walsh, D. A. (2004). The effects of violent video game habits on adolescent hostility, aggressive behaviours, and school performance. *Journal of Adolescence*, 27(1), 5-22.
- Gerris, J. R. M., Houtmans, M. J. M., Kwaaitaal-Roosen, E. M. G., Schipper, J. C., Vermulst, A. A., & Janssens, J. M. A. M. (1998). *Parents, adolescents and young adults in Dutch families: a longitudinal study*. Nijmegen, NL: Institute of Family Studies, University of Nijmegen.
- Ghamari, F., Mohammadbeigi, A., Mohammadsalehi, N., & Hashiani, A. A. (2011). Internet addiction and modeling its risk factors in medical students, iran. *Indian Journal of Psychological Medicine*, 33(2), 158-162.
- Glasner-Edwards, S., & Rawson, R. (2010). Evidence-based practices in addiction treatment: Review and recommendations for public policy. *Health Policy*, 97(2-3), 93-104.
- Glombiewski, J. A., Sawyer, A. T., Gutermann, J., Koenig, K., Rief, W., & Hofmann, S. G. (2010). Psychological treatments of fibromyalgia: A meta-analysis. *Pain*, 151, 280-295.
- Goldberg, C. (1986). Understanding the impaired practitioner. *Psychotherapy in Private Practice*, 4(3), 25-34.
- Goldberg, I. (1996). Internet Addictive Disorder (IAD) diagnostic criteria. Retrieved 17.04.2013, from <http://www.webcitation.org/query?url=http%3A%2F%2Fwww.psychom.net%2Fiadcriteria.html&date=2013-02-06>
- Goldberg, L. R. (1992). The development of markers for the Big Five factor structure. *Psychological Assessment*, 4, 26-42.
- Gong, J., Chen, X., Zeng, J., Li, F., Zhou, D., & Wang, Z. (2009). Adolescent addictive internet use and drug abuse in Wuhan, China. *Addiction Research & Theory*, 17(3), 291-305.
- Gossop, M., Darke, S., Griffiths, P., Hando, J., Powis, B., Hall, W., et al. (1995). The Severity of Dependence Scale (SDS): Psychometric properties of the SDS in English and Australian samples of heroin, cocaine and amphetamine users. *Addiction*, 90, 607-614.
- Grant, J. E., Levine, L., Kim, D., & Potenza, M. N. (2005). Impulse control disorders in adult psychiatric inpatients. *American Journal of Psychiatry*, 162(11), 2184-2186.
- Gray, L., Thomas, N., & Lewis, L. (2010). Teachers' use of educational technology in U.S. public schools: 2009 (NCES 2010-040). Washington, D. C.: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.
- Greenfield, D. N. (1999). *Virtual addiction*. Oakland, CA: New Harbinger.
- Griffiths, M. (1993). Tolerance in gambling: An objective measure using the psychophysiological analysis of male fruit machine gamblers. *Addictive Behaviors*, 18, 365-372.
- Griffiths, M. (2000). Internet addiction - Time to be taken seriously? *Addiction Research*, 8(5), 413-418.
- Griffiths, M. (2005a). Relationship between gambling and video-game playing: A response to Johansson and Gotestam. *Psychological Reports*, 96, 644-664.
- Griffiths, M., & Wood, R. T. A. (2000). Risk factors in adolescence: The case of gambling, videogame playing, and the Internet. *Journal of Gambling Studies*, 16(2/3), 199-225.
- Griffiths, M. D. (1996). Internet addiction: An issue for clinical psychology? *Clinical Psychology Forum*, 97, 32-36.
- Griffiths, M. D. (2002). *Gambling and gaming addictions in adolescence*. Oxford: BPS Blackwell.
- Griffiths, M. D. (2005b). A "components" model of addiction within a biopsychosocial framework. *Journal of Substance Use*, 10, 191-197.
- Griffiths, M. D. (2008). Diagnosis and management of video game addiction. *New Directions in Addiction Treatment and Prevention*, 12, 27-41.

- Griffiths, M. D. (2010a). The use of online methodologies in data collection. *International Journal of Mental Health and Addiction*, 8(1), 8-20.
- Griffiths, M. D. (2010b). The role of context in online gaming excess and addiction: Some case study evidence. *International Journal of Mental Health and Addiction*, 8(1), 119-125.
- Griffiths, M. D., Davies, M. N. O., & Chappell, D. (2004). Demographic factors and playing variables in online computer gaming. *CyberPsychology & Behavior*, 7(4), 479-487.
- Griffiths, M. D., & Meredith, A. (2009). Videogame addiction and its treatment. *Journal of Contemporary Psychotherapy*, 39(4), 247-253.
- Griffiths, M. D., & Parke, J. (2010). Adolescent gambling on the Internet: A review. *International Journal of Adolescent Medicine and Health*, 22(1), 58-75.
- Griffiths, M. D., Szabo, A., & Terry, A. (2005). The exercise addiction inventory: A quick and easy screening tool for health practitioners. *British Journal of Sports Medicine*, 39(6), e30.
- Grüsser, S. M., & Thalemann, C. N. (2006). *Verhaltenssucht - Diagnostik, Therapie, Forschung*. Bern: Hans Huber.
- Grüsser, S. M., Thalemann, R., Albrecht, U., & Thalemann, C. N. (2005). Exzessive Computernutzung im Kindesalter - Ergebnisse einer psychometrischen Erhebung. *Wiener Klinische Wochenschrift*, 117(5-6), 188-195.
- Grüsser, S. M., Thalemann, R., & Griffiths, M. D. (2007). Excessive computer game playing: Evidence for addiction and aggression? *CyberPsychology & Behavior*, 10(2), 290-292.
- Grüsser, S. M., Wölfling, K., Düffert, S., & et al. (2007). *Questionnaire on differentiated assessment of addiction (QDAA)*. Göttingen: Hogrefe.
- Guan, S.-S. A., & Subrahmanyam, K. (2009). Youth Internet use: Risks and opportunities. *Current Opinion in Psychiatry*, 22(4), 351-356.
- Guo, J., Chen, L., Wang, X., Liu, Y., Chui, C. H. K., He, H., et al. (2012). The relationship between Internet addiction and depression among migrant children and left-behind children in China. *Cyberpsychology, Behavior and Social Networking*, 15(11), 585-590.
- Ha, J. H., Yoo, H. J., Cho, I. H., Chin, B., Shin, D., & Kim, J. H. (2006). Psychiatric comorbidity assessed in Korean children and adolescents who screen positive for Internet addiction. *Journal of Clinical Psychiatry*, 67(5), 821-826.
- Hagger-Johnson, G. E., & Whiteman, M. C. (2007). Conscientiousness facets and health behaviors: A latent variable modeling approach. *Personality & Individual Differences*, 43(5), 1235-1245.
- Hahn, A., & Jerusalem, M. (2001). Internetsucht: Validierung eines Instruments und explorative Hinweise auf personale Bedingungen (Internet addiction: Validation of an instrument and explorative evidence on personal causes. In A. Theobald, M. Dreyer & T. Starsetzki (Eds.), *Handbuch zur Online-Marktforschung. Beiträge aus Wissenschaft und Praxis* (pp. 213-233). Wiesbaden: Gabler.
- Han, D. H., Hwang, J. W., & Renshaw, P. F. (2010). Bupropion sustained release treatment decreases craving for video games and cue-induced brain activity in patients with Internet video game addiction. *Experimental and Clinical Psychopharmacology*, 18(4), 297-304.
- Han, D. H., Lee, Y. S., Na, C., Ahn, J. Y., Chung, U. S., Daniels, M. A., et al. (2009). The effect of methylphenidate on Internet video game play in children with attention-deficit/hyperactivity disorder. *Comprehensive Psychiatry*, 50(3), 251-256.
- Han, D. H., Lee, Y. S., Yang, K. C., Kim, E. Y., Lyoo, I. K., & Renshaw, P. F. (2007). Dopamine genes and reward dependence in adolescents with excessive internet video game play. *Journal of Addiction Medicine*, 1(3), 133-138.
- Harakeh, Z., Scholte, R. H. J., DeVries, H., & Engels, R. C. M. E. (2006). Association between personality and adolescent smoking. *Addictive Behaviors*, 31(2), 232-245.



- Harkness, J. A., & Schoua-Glusberg, A. (1998). Questionnaires in translation. *ZUMA-Nachrichten Spezial*, 87-126.
- Hawkins, J. D., & Fitzgibbon, J. J. (1993). Risk factors and risk behaviors in prevention of adolescent substance abuse. *Adolescent Medicine State of the Art Reviews: Adolescent Substance Abuse and Addictions*, 4, 249-262.
- Hayduk, L. A., & Glaser, D. N. (2000). Jiving the four-step, waltzing around factor analysis, and other serious fun. *Structural Equation Modeling*, 7(1), 1-35.
- Heinström, J. (2005). Fast surfing, broad scanning and deep diving: The influence of personality and study approach on students' information-seeking behavior. *Journal of Documentation*, 61(2), 228-247.
- Hellman, M., Schoenmakers, T. M., Nordstrom, B. R., & van Holst, R. J. (2013). Is there such a thing as online video game addiction? A cross-disciplinary review. *Addiction Research & Theory*, 21(2), 102-112.
- Herold, E., Connors, E., & Moore, T. (2012). American Psychiatric Association board of trustees approves DSM-V. News release. Arlington, VA: American Psychiatric Association.
- Hoeft, F., Watson, C. L., Kesler, S. R., Bettinger, K. E., & Reiss, A. L. (2008). Gender differences in the mesocorticolimbic system during computer game-play. *Journal of Psychiatric Research*, 42(4), 253-258.
- Hofmann, W., Vohs, K. D., & Baumeister, R. F. (2012). What people desire, feel conflicted about, and try to resist in everyday life. *Psychological Science*, 23(6), 582-588.
- Holden, C. (2001). Compulsive behaviors: "Behavioral" addictions: Do they exist? *Science*, 294(5544), 980-982.
- Hooper, D., Coughlan, J., & Mullen, M. R. (2008). Structural equation modelling: Guidelines for determining model fit. *Electronic Journal of Business Research Methods*, 6(1), 53-60.
- Hsu, S. H., Wen, M. H., & Wu, M. C. (2009). Exploring user experiences as predictors of MMORPG addiction. *Computers & Education*, 53(2), 990-999.
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling - A Multidisciplinary Journal*, 6(1), 1-55.
- Huang, R. L., Lu, Z., Liu, J. J., You, Y. M., Pan, Z. Q., Wei, Z., et al. (2009). Features and predictors of problematic internet use in Chinese college students. *Behaviour & Information Technology*, 28(5), 485-490.
- Huang, X., Zhang, H., Li, M., Wang, J., Zhang, Y., & Tao, R. (2010). Mental health, personality, and parental rearing styles of adolescents with Internet addiction disorder. *Cyberpsychology Behavior and Social Networking*, 13(4), 401-406.
- Huang, Y.-R. (2006). Identity and intimacy crises and their relationship to Internet dependence among college students. *CyberPsychology & Behavior*, 9(5), 571-576.
- Huang, Z., Wang, M., Qian, M., Zhong, J., & Tao, R. (2007). Chinese Internet Addiction Inventory: Developing a measure of problematic Internet use for Chinese college students. *Cyberpsychology & Behavior*, 10(6), 805-811.
- Huesmann, L. R., & Eron, L. D. (1986). *Television and the aggressive child: A cross-national comparison*. Hillsdale, NJ: Erlbaum.
- Huesmann, L. R., & Guerra, N. G. (1997). Children's normative beliefs about aggression and aggressive behavior. *Journal of Personality and Social Psychology*, 72(2), 408-419.
- Hussain, Z., Griffiths, M., & Baguley, T. (2012a). Online gaming addiction: Classification, prediction and associated risk factors. *Addiction Research and Theory*, 20(5), 359-371.
- Hussain, Z., & Griffiths, M. D. (2009a). The attitudes, feelings, and experiences of online gamers: A qualitative analysis. *CyberPsychology & Behavior*, 12(6), 747-753.

- Hussain, Z., & Griffiths, M. D. (2009b). Excessive use of Massively-Multi-Player Online Role-Playing Games: A pilot study. *International Journal of Mental Health and Addiction*, 7, 563-571.
- Hussain, Z., Griffiths, M. D., & Baguley, T. (2012b). Online gaming addiction: Classification, prediction and associated risk factors. *Addiction Research & Theory*, 20(5), 359-371.
- Husserl, E. (2012 [1931]). *Ideas: General introduction into pure phenomenology*. London: Routledge.
- Hwang, S. T. (1995). *Development of diagnostic criteria for personality disorder*. master's thesis. Yonsei University. Seoul.
- Inderbitzen, H. M., & Foster, S. L. (1992). The teenage inventory of social skills: Development, reliability, and validity. *Psychological Assessment*, 4, 451-459.
- International Telecommunication Union. (2012). Internet users. Retrieved 21.11.2012, from <http://www.itu.int/ITU-D/ict/statistics/index.html>
- International Telecommunication Union. (2013). The world in 2013. ICT facts and figures. Geneva, Switzerland: International Telecommunication Union.
- Jackson, J. L., O'Malley, P. G., & Kroenke, K. (1998). Clinical predictors of mental disorders among medical outpatients - Validation of the "S4" model. *Psychosomatics*, 39(5), 431-436.
- Jang, K. S., Hwang, S. Y., & Choi, J. Y. (2008). Internet addiction and psychiatric symptoms among Korean adolescents. *Journal of School Health*, 78(3), 165-171.
- Jarman, M., Smith, J. A., & Walsh, S. (1997). The psychological battle for control: A qualitative study of health-care professionals' understandings of the treatment of anorexia nervosa. *Journal of Community & Applied Social Psychology*, 7(2), 137-152.
- Jellinek, E. M. (1946). Phases in the drinking history of alcoholics: Analysis of a survey conducted by the official organ of the Alcoholics Anonymous. *Quarterly Journal of Studies on Alcohol*, 7, 1-88.
- Johansson, A., & Gotestam, K. G. (2004). Internet addiction: Characteristics of a questionnaire and prevalence in Norwegian youth (12-18 years). *Scandinavian Journal of Psychology*, 45(3), 223-229.
- Johansson, A., & Göttestam, K. G. (2004). Problems with computer games without monetary reward: Similarity to pathological gambling. *Psychological Reports*, 95(2), 641-650.
- Johnson, G. M. (2010). Young children's Internet use at home and school: Patterns and profiles. *Journal of Early Childhood Research*, 8(3), 282-298.
- Johnson, S. (2011). NPD Group: Total 2010 game software sales flat compared to 2009. Retrieved 3.2.2012, from <http://www.g4tv.com/thefeed/blog/post/709764/npd-group-total-2010-game-software-sales-flat-compared-to-2009/>
- Joinson, A. N. (1998). Causes and effects of disinhibition on the Internet. In J. Gackenback (Ed.), *The psychology of the Internet* (pp. 43-60). New York, NY: Academic Press.
- Jöreskog, K. G. (2005). Structural equation modeling with ordinal variables using LISREL. Scientific Software International, from [www.ssicentral.com/lisrel/techdocs/ordinal.pdf](http://www.ssicentral.com/lisrel/techdocs/ordinal.pdf)
- Kalivas, P. W., & Volkow, N. D. (2005). The neural basis of addiction: A pathology of motivation and choice. *American Journal of Psychiatry*, 162, 1403-1413.
- Kaltiala-Heino, R., Lintonen, T., & Rimpela, A. (2004). Internet addiction? Potentially problematic use of the Internet in a population of 12-18 year-old adolescents. *Addiction Research & Theory*, 12(1), 89-96.
- Kandel, D. B., & Davies, M. (1986). Adult sequelae of adolescent depressive symptoms. *Archives of General Psychiatry*, 43, 255-262.
- Kandel, D. B., & Davies, M. N. O. (1982). Epidemiology of depressive mood in adolescents: An empirical study. *Archives of General Psychiatry*, 39, 1205-1212.

- Kandell, J. J. (1998). Internet addiction on campus: The vulnerability of college students. *CyberPsychology & Behavior, 1*(1), 11-17.
- Kang, J., Park, H., Park, T., & Park, J. (2012). Path analysis for attachment, Internet addiction, and interpersonal competence of college students. In T.-h. Kim, S. Mohammed, C. Ramos, J. Abawajy, B.-H. Kang & D. Ślęzak (Eds.), *Computer applications for web, human computer interaction, signal and image processing, and pattern recognition* (Vol. 342, pp. 217-224). Berlin, Heidelberg: Springer
- Kemper, U. (2008). *Annäherung an den Suchtbegriff*. Geesthacht: Neuland.
- Kessler, R. C., Avenevoli, S., Costello, E. J., Georgiades, K., Green, J. G., Gruber, M. J., et al. (2012). Prevalence, persistence, and sociodemographic correlates of DSM-IV disorders in the National Comorbidity Survey Replication Adolescent Supplement. *Archives of General Psychiatry, 69*(4), 372-380.
- Kheirkhah, F., Juibary, A. G., & Gouran, A. (2010). Internet addiction, prevalence and epidemiological features in Mazandaran Province, Northern Iran. *Iranian Red Crescent Medical Journal, 12*(2), 133-137.
- Kim, D. I., Jeng, Y. J., Lee, E. A., Kim, D. M., & Joe, Y. M. (2008). Development of Internet Addiction Proneness Scale - Short Form (KS-Scale). *Korean Journal of Counseling, 9*, 1703-1722.
- Kim, E. J., Namkoong, K., Ku, T., & Kim, S. J. (2008). The relationship between online game addiction and aggression, self-control and narcissistic personality traits. *European psychiatry: The journal of the Association of European Psychiatrists, 23*(3), 212-218.
- Kim, K., Ryu, E., Chon, M. Y., Yeun, E. J., Choi, S. Y., Seo, J. S., et al. (2006). Internet addiction in Korean adolescents and its relation to depression and suicidal ideation: A questionnaire survey. *International Journal of Nursing Studies, 43*(2), 185-192.
- Kim, M. G., & Kim, J. (2010). Cross-validation of reliability, convergent and discriminant validity for the problematic online game use scale. *Computers in Human Behavior, 26*(3), 389-398.
- Kim, S. W., Shin, I. S., Kim, J. M., Yang, S. J., Shin, H. Y., & Yoon, J. S. (2006). Association between attitude toward medication and neurocognitive function in schizophrenia. *Clinical Neuropharmacology, 29*, 197-205.
- Kim, Y.-R., Son, J.-W., Lee, S.-I., Shin, C.-J., Kim, S.-K., Ju, G., et al. (2012). Abnormal brain activation of adolescent internet addict in a ball-throwing animation task: Possible neural correlates of disembodiment revealed by fMRI. *Progress in Neuro-Psychopharmacology & Biological Psychiatry, 39*(1), 88-95.
- Kim, Y., Park, J. Y., Kim, S. B., Jung, I.-K., Lim, Y. S., & Kim, J.-H. (2010). The effects of Internet addiction on the lifestyle and dietary behavior of Korean adolescents. *Nutrition Research and Practice, 4*(1), 51-57.
- King, D., Delfabbro, P., & Griffiths, M. (2010a). The convergence of gambling and digital media: Implications for gambling in young people. *Journal of Gambling Studies, 26*, 175-187.
- King, D. L., & Delfabbro, P. (2009a). Understanding and assisting excessive players of video games: A community psychology perspective. *The Australian Community Psychologist, 21*(1), 62-74.
- King, D. L., & Delfabbro, P. (2009b). Motivational differences in problem video game play. *Journal of CyberTherapy & Rehabilitation, 2*(2), 139-149.
- King, D. L., Delfabbro, P. H., & Griffiths, M. D. (2010b). Video game structural characteristics: A new psychological taxonomy. *International Journal of Mental Health and Addiction, 8*, 90-106.
- King, D. L., Delfabbro, P. H., & Griffiths, M. D. (2011). The role of structural characteristics in problematic video game play: An empirical study. *International Journal of Mental Health and Addiction, 9*(3), 320-333.

- King, D. L., Delfabbro, P. H., & Griffiths, M. D. (2012). Clinical interventions for technology-based problems: Excessive Internet and video game use. *Journal of Cognitive Psychotherapy: An International Quarterly*, 26, 43-56.
- King, D. L., Delfabbro, P. H., & Griffiths, M. D. (2013). Trajectories of problem video gaming among adult regular gamers: An 18-month longitudinal study. *Cyberpsychology, Behavior & Social Networking*, 16(1), 72-76.
- King, D. L., Delfabbro, P. H., Griffiths, M. D., & Gradisar, M. (2011). Assessing clinical trials of Internet addiction treatment: A systematic review and CONSORT evaluation. *Clinical Psychology Review*, 31(7), 1110-1116.
- King, D. L., Delfabbro, P. H., Griffiths, M. D., & Gradisar, M. (2012). Cognitive-behavioural approaches to outpatient treatment of Internet addiction in children and adolescents. *Journal of Clinical Psychology: In Session*, 68, 1185-1195.
- King, D. L., Delfabbro, P. H., & Zajac, I. T. (2011). Preliminary validation of a new clinical tool for identifying problem video game playing. *International Journal of Mental Health and Addiction*, 9(1), 72-87.
- Kittinger, R., Correia, C. J., & Irons, J. G. (2012). Relationship between facebook use and problematic Internet use among college students. *Cyberpsychology, Behavior & Social Networking*, 15(6), 324-327.
- Kline, R. B. (2005). *Principles and practices of structural equation modeling* (2nd ed.). New York, NY: Guilford.
- Knutson, B., & Cooper, J. C. (2005). Functional magnetic resonance imaging of reward prediction. *Current Opinion in Neurology*, 18, 411-417.
- Ko, C.-H., Hsiao, S., Liu, G.-C., Yen, J.-Y., Yang, M.-J., & Yen, C.-F. (2010). The characteristics of decision making, potential to take risks, and personality of college students with Internet addiction. *Psychiatry Research*, 175(1-2), 121-125.
- Ko, C.-H., Yen, J.-Y., Yen, C.-F., Chen, C.-C., Yen, C.-N., & Chen, S.-H. (2005). Screening for internet addiction: An empirical study on cut-off points for the Chen internet addiction scale. *Kaohsiung Journal of Medical Sciences*, 21(12), 545-551.
- Ko, C.-H., Yen, J.-Y., Yen, C.-F., Chen, C.-S., Weng, C.-C., & Chen, C.-C. (2008). The association between Internet addiction and problematic alcohol use in adolescents: The Problem Behavior Model. *CyberPsychology & Behavior*, 11(5), 571-576.
- Ko, C. H., Liu, G. C., Hsiao, S. M., Yen, J. Y., Yang, M. J., Lin, W. C., et al. (2009). Brain activities associated with gaming urge of online gaming addiction. *Journal of Psychiatric Research*, 43(7), 739-747.
- Ko, C. H., Yen, J. Y., Chen, C. C., Chen, S. H., Wu, K., & Yen, C. F. (2006). Tridimensional personality of adolescents with Internet addiction and substance use experience. *Canadian Journal of Psychiatry*, 51(14), 887-894.
- Ko, C. H., Yen, J. Y., Chen, C. C., Chen, S. H., & Yen, C. F. (2005a). Gender differences and related factors affecting online gaming addiction among Taiwanese adolescents. *Journal of Nervous and Mental Disease*, 193(4), 273-277.
- Ko, C. H., Yen, J. Y., Chen, C. C., Chen, S. H., & Yen, C. F. (2005b). Proposed diagnostic criteria of Internet addiction for adolescents. *Journal of Nervous and Mental Disease*, 193(11), 728-733.
- Ko, C. H., Yen, J. Y., Chen, C. S., Chen, C. C., & Yen, C. F. (2008). Psychiatric comorbidity of Internet addiction in college students: An interview study. *CNS Spectrums*, 13(2), 147-153.
- Ko, C. H., Yen, J. Y., Chen, C. S., Yeh, Y. C., & Yen, C. F. (2009). Predictive values of psychiatric symptoms for Internet addiction in adolescents: A 2-year prospective study. *Archives of Pediatrics & Adolescent Medicine*, 163(10), 937-943.



- Ko, C. H., Yen, J. Y., Liu, S. C., Huang, C. F., & Yen, C. F. (2009). The associations between aggressive behaviors and Internet addiction and online activities in adolescents. *Journal of Adolescent Health, 44*(6), 598-605.
- Ko, C. H., Yen, J. Y., Yen, C. F., Chen, C. S., & Chen, C. C. (2012). The association between Internet addiction and psychiatric disorder: A review of the literature. *European Psychiatry, 27*(1), 1-8.
- Ko, C. H., Yen, J. Y., Yen, C. F., Chen, C. S., & Wang, S. Y. (2008). The association between Internet addiction and belief of frustration intolerance: The gender difference. *Cyberpsychology & Behavior, 11*(3), 273-278.
- Kondo, N., Sakai, M., Kuroda, Y., Kiyota, Y., Kitabata, Y., & Kurosawa, M. (2013). General condition of hikikomori (prolonged social withdrawal) in Japan: Psychiatric diagnosis and outcome in mental health welfare centres. *International Journal of Social Psychiatry, 59*(1), 79-86.
- Koo, C., Wati, Y., Lee, C. C., & Oh, H. Y. (2011). Internet-addicted kids and South Korean government efforts: Boot-camp case. *Cyberpsychology Behavior and Social Networking, 14*(6), 391-394.
- Koob, G. F., & Le Moal, M. (1997). Drug abuse: Hedonic homeostatic dysregulation. *Science, 278*(5335), 52-58.
- Koob, G. F., & Le Moal, M. (2001). Drug addiction, dysregulation of reward, and allostasis. *Neuropsychopharmacology, 24*, 97-129.
- Kormas, G., Critselis, E., Janikian, M., Kafetzis, D., & Tsitsika, A. (2011). Risk factors and psychosocial characteristics of potential problematic and problematic internet use among adolescents: A cross-sectional study. *BMC Public Health, 11*.
- Kraemer, H. C. (2007). DSM categories and dimensions in clinical and research contexts. *International Journal of Methods in Psychiatric Research, 16*, S8-S15.
- Krueger, R. F. (2005). Continuity of axes I and II - Toward a unified model of personality, personality disorders, and clinical disorders. *Journal of Personality Disorders, 19*(3), 233-261.
- Kubey, R. W., Lavin, M. J., & Barrows, J. R. (2001). Internet use and collegiate performance decrements: Early findings. *Journal of Communication, 51*(2), 366-382.
- Kuhn, T. (1970). *The structure of scientific revolutions*. Chicago: University of Chicago Press.
- Kukar-Kinney, M., Ridgway, N. M., & Monroe, K. B. (2009). The relationship between consumers' tendencies to buy compulsively and their motivations to shop and buy on the Internet. *Journal of Retailing, 85*(3), 298-307.
- Kuss, D. J. (2012). Substance and behavioral addictions: Beyond dependence. *Journal of Addiction Research and Therapy, 56*, e001.
- Kuss, D. J., & Griffiths, M. D. (2011). Online social networking and addiction - A review of the psychological literature. *International Journal of Environmental Research and Public Health, 8*(9), 3528-3552.
- Kuss, D. J., & Griffiths, M. D. (2012a). Internet gaming addiction: A systematic review of empirical research. *International Journal of Mental Health and Addiction, 10*(2), 278-296.
- Kuss, D. J., & Griffiths, M. D. (2012b). Online gaming addiction in children and adolescents: A review of empirical research. *Journal of Behavioral Addictions, 1*(1), 3-22.
- Kuss, D. J., & Griffiths, M. D. (2012c). Internet and gaming addiction: A systematic literature review of neuroimaging studies. *Brain Sciences, 2*, 347-374.
- Kuss, D. J., & Griffiths, M. D. (2012d). Internet gambling addiction. *Encyclopedia of Cyber Behavior* (pp. 735-753). Pennsylvania: IGI Global.
- Kuss, D. J., Griffiths, M. D., & Binder, J. F. (2013). Internet addiction in students: Prevalence and risk factors. *Computers in Human Behavior, 29*(3), 959-966.

- Kuss, D. J., Louws, J., & Wiers, R. W. W. (2012). Online gaming addiction? Motives predict addictive play behavior in Massively Multiplayer Online Role-Playing Games *Cyberpsychology, Behavior & Social Networking*, *15*(9), 480-485.
- Kuss, D. J., Shorter, G. W., van Rooij, A. J., Griffiths, M. D., & Schoenmakers, T. (2013). Assessing Internet addiction using the parsimonious Internet addiction components model. Under revision.
- Kuss, D. J., van Rooij, A., Shorter, G. W., Griffiths, M. D., & van de Mheen, D. (2013). Internet addiction in adolescents: Prevalence and risk factors. *Computers in Human Behavior*, *29*(5), 1987-1996.
- Kwon, J.-H., Chung, C.-S., & Lee, J. (2011). The effects of escape from self and interpersonal relationship on the pathological use of Internet games. *Community Mental Health Journal*, *47*(1), 113-121.
- Kwon, J. H. (2011). Toward the prevention of adolescent Internet addiction. In K. S. Young & C. Nabuco de Abreu (Eds.), *Internet addiction. A handbook and guide to evaluation and treatment* (pp. 223-244). Hoboken, NJ: John Wiley & Sons.
- La Greca, A. M., & Stone, W. L. (1993). Social anxiety scale for children-revised: Factor structure and concurrent validity. *Journal of Clinical Child Psychology*, *22*, 17-27.
- Lam, L. T., Peng, Z., Mai, J., & Jing, J. (2009a). The association between internet addiction and self-injurious behaviour among adolescents. *Injury Prevention*, *15*(6), 403-408.
- Lam, L. T., Peng, Z. W., Mai, J. C., & Jing, J. (2009b). Factors associated with Internet addiction among adolescents. *Cyberpsychology & Behavior*, *12*(5), 551-555.
- Lanthier, R. P., & Windham, R. C. (2004). Internet use and college adjustment: The moderating role of gender. *Computers in Human Behavior*, *20*, 591-606.
- Larkin, M., & Griffiths, M. D. (2002). Experiences of addiction and recovery: The case for subjective accounts. *Addiction Research & Theory*, *10*(3), 281-311.
- Lee, G., Lee, J., & Kwon, S. (2011). Use of social-networking sites and subjective well-being: A study in South Korea. *Cyberpsychology, Behavior & Social Networking*, *14*(3), epub ahead of print.
- Lee, H. C., & Ahn, C. Y. (2002). Development of the Internet game addiction diagnostic scale. *The Korean Journal of Health Psychology*, *7*, 211-239.
- Lee, S., & Mysyk, A. (2004). The medicalization of compulsive buying. *Social Science & Medicine*, *58*, 1709-1718.
- Lemmens, J. S., Valkenburg, P. M., & Peter, J. (2009). Development and validation of a game addiction scale for adolescents. *Media Psychology*, *12*(1), 77-95.
- Lemmens, J. S., Valkenburg, P. M., & Peter, J. (2011a). Psychosocial causes and consequences of pathological gaming. *Computers in Human Behavior*, *27*(1), 144-152.
- Lemmens, J. S., Valkenburg, P. M., & Peter, J. (2011b). The effects of pathological gaming on aggressive behavior. *Journal of Youth and Adolescence*, *40*(1), 38-47.
- Lenhart, A., Purcell, K., Smith, A., & Zickuhr, K. (2012). Social media & mobile Internet use among teens and young adults. *PEW Internet & American Life Project*. Washington, D. C.: Pew Research Center.
- Lesieur, H. R., & Blume, S. B. (1987). The South Oaks Gambling Screen (SOGS): A new instrument for the identification of pathological gamblers. *American Journal of Psychiatry*, *144*, 1184-1188.
- Leung, L. (2004). Net-generation attributes and seductive properties of the Internet as predictors of online activities and Internet addiction. *CyberPsychology & Behavior*, *7*(3), 333-348.
- Leung, L. (2007). Stressful life events, motives for Internet use, and social support among digital kids. *CyberPsychology & Behavior*, *10*(2), 204-214.

- Leung, L., & Lee, P. S. N. (2012a). The influences of information literacy, internet addiction and parenting styles on internet risks. *New Media & Society*, *14*(1), 117-136.
- Leung, L., & Lee, P. S. N. (2012b). Impact of Internet literacy, Internet addiction symptoms, and Internet activities on academic performance. *Social Science Computer Review*, *30*(4), 403-418.
- Lewis, T., Amini, F., & Lannon, R. (2000). *A general theory of love*. New York, NY: Vintage.
- Liau, A. K., Chow, D., Tan, T. K., & Senf, K. (2011). Development and validation of the Personal Strengths Inventory using exploratory and confirmatory factor analysis. *Journal of Psychoeducational Assessment*, *29*(1), 14-26.
- Liberatore, K. A., Rosario, K., Colon-De Marti, L. N., & Martinez, K. G. (2011). Prevalence of Internet addiction in Latino adolescents with psychiatric diagnosis. *Cyberpsychology, Behavior and Social Networking*, *14*(6), 399-402.
- Lićwinko, J., Krajewska-Kułać, E., & Łukaszuk, C. (2011). Internet addiction among academic youth in Białystok. *Progress in Health Sciences*, *1*(1), 124-130.
- Lin, C.-H., Lin, S.-L., & Wu, C.-P. (2009). The effects of parental monitoring and leisure boredom on adolescents' Internet addiction. *Adolescence*, *44*(176), 993-1004.
- Lin, F., Zhou, Y., Du, Y., Qin, L., Zhao, Z., Xu, J., et al. (2012). Abnormal white matter integrity in adolescents with Internet Addiction Disorder: A tract-based spatial statistics study. *Plos One*, *7*(1), e30253.
- Lin, M.-P., Ko, H.-C., & Wu, J. Y.-W. (2008). The role of positive/negative outcome expectancy and refusal self-efficacy of Internet use on Internet addiction among college students in Taiwan. *Cyberpsychology & Behavior*, *11*(4), 451-457.
- Lin, M.-P., Ko, H.-C., & Wu, J. Y.-W. (2011). Prevalence and psychosocial risk factors associated with Internet addiction in a nationally representative sample of college students in Taiwan. *Cyberpsychology, Behavior and Social Networking*, *14*(12), 741-746.
- Lin, S. S. J., & Tsai, C.-C. (1999). *Internet addiction among high schoolers in Taiwan*. Paper presented at the American Psychological Association Annual Meeting, Boston.
- Lin, S. S. J., & Tsai, C. C. (2002). Sensation seeking and internet dependence of Taiwanese high school adolescents. *Computers in Human Behavior*, *18*(4), 411-426.
- Linder, J. R., Crick, N. R., & Collins, W. A. (2002). Relational aggression and victimization in young adults' romantic relationships: Associations with perceptions of parent, peer, and romantic relationship quality. *Social Development*, *11*(1), 69-86.
- Littel, M., Luijten, M., van den Berg, I., van Rooij, A., Keemink, L., & Franken, I. (2012). Error-processing and response inhibition in excessive computer game players: An ERP study. *Addiction Biology*, *17*(5), 934-947.
- Little, R. J. A., & Rubin, D. B. (2002). *Statistical analysis with missing data*. New York: Wiley & Sons.
- Liu, C.-Y., & Kuo, F.-Y. (2007). A study of Internet addiction through the lens of the interpersonal theory. *Cyberpsychology & Behavior*, *10*(6), 799-804.
- Liu, C., Liao, M., & Smith, D. C. (2012). An empirical review of Internet addiction outcome studies in China. *Research on Social Work Practice*, *22*(3), 282-292.
- Liu, J., Gao, X. P., Osunde, I., Li, X., Zhou, S. K., Zheng, H. R., et al. (2010). Increased regional homogeneity in internet addiction disorder: A resting state functional magnetic resonance imaging study. *Chinese Medical Journal*, *123*(14), 1904-1908.
- Liu, M., Ko, H., & Wu, J. (2008). The role of positive/negative outcome expectancy and refusal self-efficacy of Internet use on Internet addiction among college students in Taiwan. *CyberPsychology & Behavior*, *11*, 451-457.
- Liu, M., & Peng, W. (2009). Cognitive and psychological predictors of the negative outcomes associated with playing MMOGs (massively multiplayer online games). *Computers in Human Behavior*, *25*, 1306-1311.

- Liu, T., & Potenza, M. N. (2007). Problematic Internet use: Clinical implications. *CNS Spectrums*, 12(6), 453-466.
- Liu, T. C., Desai, R. A., Krishnan-Sarin, S., Cavallo, D. A., & Potenza, M. N. (2011). Problematic Internet use and health in adolescents: Data from a high school survey in Connecticut. *Journal of Clinical Psychiatry*, 72(6), 836-845.
- Lopez-Fernandez, O., Freixa-Blanxart, M., & Luisa Honrubia-Serrano, M. (2013). The Problematic Internet Entertainment Use Scale for Adolescents: Prevalence of problem Internet use in Spanish high school students. *Cyberpsychology, Behavior and Social Networking*, 16(2), 108-118.
- Lopez-Moreno, J. A., Gonzalez-Cuevas, G., Moreno, G., & Navarro, M. (2008). The pharmacology of the endocannabinoid system: functional and structural interactions with other neurotransmitter systems and their repercussions in behavioral addiction. *Addiction Biology*, 13(2), 160-187.
- Lortie, C. L., & Guitton, M. J. (2013). Internet addiction assessment tools: Dimensional structure and methodological status. *Addiction*, 108(7), 1207-1216.
- Lu, H. P., & Wang, S. M. (2008). The role of Internet addiction in online game loyalty: An exploratory study. *Internet Research*, 18(5), 499-519.
- MacCallum, R. C. (1986). Specification searches in covariance structure modeling. *Psychological Bulletin*, 100(1), 107-120.
- MacCallum, R. C., & Austin, J. T. (2000). Applications of structural equation modeling in psychological research. *Annual Review of Psychology*, 51, 201-226.
- Mangen, S. (1999). Qualitative research methods in cross-national settings. *International Journal of Social Research Methodology*, 2(2), 109-124.
- Mantovani, F. (2001). Cyber-attraction: The emergence of computer-mediated communication in the development of interpersonal relationships. In L. Anolli, R. Ciceri & G. Riva (Eds.), *Say not to say: New perspectives on miscommunication* (pp. 236-250). Amsterdam: IOS.
- Marsh, H. W., Hau, K. T., Balla, J. R., & Grayson, D. (1998). Is more ever too much? The number of indicators per factor in confirmatory factor analysis. *Multivariate Behavioral Research*, 33(2), 181-220.
- Matthews, G., Deary, I. J., & Whiteman, M. C. (2009). *Personality traits* (3rd ed.). Cambridge: Cambridge University Press.
- McCleron, F. J., Hiott, F. B., Westman, E. C., Rose, J. E., & Levin, E. D. (2006). Transdermal nicotine attenuates depression symptoms in nonsmokers: A double-blind, placebo-controlled trial. *Psychopharmacology*, 189(1), 125-133.
- McLellan, A. T., & Meyers, K. (2004). Contemporary addiction treatment: A review of systems problems for adults and adolescents. *Biological Psychiatry*, 56(10), 764-770.
- Meerkerk, G. J., Van Den Eijnden, R. J., Vermulst, A. A., & Garretsen, H. F. L. (2009). The Compulsive Internet Use Scale (CIUS): Some psychometric properties. *CyberPsychology & Behavior*, 12(1), 1-6.
- Meerkerk, G. J., Van den Eijnden, R. J. J. M., Vermulst, A. A., & Garretsen, H. F. L. (2007). The relationship between personality, psychosocial wellbeing and compulsive Internet use: The Internet as cyber Prozac? *Pwned by the Internet - Explorative research into the causes and consequences of compulsive Internet use* (pp. 86-101). Rotterdam: Erasmus Universiteit Rotterdam.
- Mehdizadeh, S. (2010). Self-presentation 2.0: Narcissism and self-esteem on facebook. *Cyberpsychology, Behavior and Social Networking*, 13(4), 357-364.
- Mehroof, M., & Griffiths, M. D. (2010). Online gaming addiction: The role of sensation seeking, self-control, neuroticism, aggression, state anxiety, and trait anxiety. *CyberPsychology & Behavior*, 13(3), 313-316.



- Milani, L.,  
 Osualdella, D., & Di Blasio, P. (2009). Quality of interpersonal relationships and problematic Internet use in adolescence. *CyberPsychology & Behavior*, 12(6), 681-684.
- Mirowsky, J., & Ross, C. E. (1992). Age and depression. *Journal of Health & Social Behavior*, 33, 187-205.
- Moore, D. (1995). *The Emperor's virtual clothes: The naked truth about the internet culture*. Chapel Hill, North California: Alogonquin.
- Morahan-Martin, J. (2005). Internet abuse. Addiction? Disorder? Symptom? Alternative explanations? *Social Science Computer Review*, 23(1), 39-48.
- Morahan-Martin, J., & Schumacher, P. (2000). Incidence and correlates of pathological Internet use among college students. *Computers in Human Behavior*, 16(1), 13-29.
- Morgan, C., & Cotten, S. (2003). The relationship between Internet activities and depressive symptoms in a sample of college freshmen. *CyberPsychology & Behavior*, 6(2), 133-142.
- Morrison, C. M., & Gore, H. (2010). The relationship between excessive Internet use and depression: A questionnaire-based study of 1,319 young people and adults. *Psychopathology*, 43(2), 121-126.
- Morrow, P. R. (2006). Telling about problems and giving advice in an Internet discussion forum: Some discourse features. *Discourse Studies*, 8(4), 531-548.
- Mortensen, T. E. (2006). WoW is the new MUD: Social gaming from text to video. *Games and Culture*, 1(4), 397-413.
- Mottram, A. J., & Fleming, M. J. (2009). Extraversion, impulsivity, and online group membership as predictors of problematic Internet use. *Cyberpsychology & Behavior*, 12(3), 319-321.
- Mueser, K. T., Drake, R. E., & Wallach, M. A. (1998). Dual diagnosis: A review of etiological theories. *Addictive Behaviors*, 23, 717-734.
- Müller, K. W., Ammerschläger, M., Freisleder, F. J., Beutel, M. E., & Wölfling, K. (2012). Addictive Internet use as a comorbid disorder among clients of an adolescent psychiatry - Prevalence and psychopathological symptoms. [Suchtartige Internetnutzung als komorbide Störung im jugendpsychiatrischen Setting.]. *Zeitschrift für Kinder- und Jugendpsychiatrie und Psychotherapie*, 40(5), 331-339.
- Müller, K. W., & Wölfling, K. (2011). Computer game and Internet addiction: Aspects of diagnostics, phenomenology, pathogenesis, and therapeutic intervention. *Suchttherapie*, 12(2), 57-63.
- Murali, V., & George, S. (2007). Lost online: An overview of internet addiction. *Advances in Psychiatric Treatment*, 13(1), 24-30.
- Muris, P. (2001). A brief questionnaire for measuring self-efficacy in youths. *Journal of Psychopathology and Behavioral Assessment*, 23(3), 145-149.
- Musalek, M. (2005). Unser therapeutisches Handeln im Spannungsfeld zwischen Warum und Wozu - Krankheitskonzepte und ihre Auswirkung auf die tägliche Praxis. *Wiener Klinische Wochenschrift*, 28(3-4), 5-22.
- Muthén, B., & Asparouhov, T. (2002). Latent variable analysis with categorical outcomes: Multiple-group and growth modeling in Mplus. Unpublished manuscript. Retrieved 22.11.2012, from <https://www.statmodel.com/download/webnotes/CatMGLong.pdf>
- Muthén, L. K. (2012). Model fit index WRMR. Retrieved 23.11.2012, from <http://www.statmodel.com/discussion/messages/9/5096.html?1321986275>
- Muthén, L. K., & Muthén, B. O. (2011). *Mplus user's guide. Sixth edition*. Los Angeles, CA: Muthén & Muthén.
- Myers, D. (1990). A Q-study of game player aesthetics. *Simulation & Gaming*, 21, 375-396.
- Mythily, S., Qiu, S., & Winslow, M. (2008). Prevalence and correlates of excessive internet use among youth in Singapore. *Annals Academy of Medicine Singapore*, 37(1), 9-14.

- Nadel, H., Spellmann, M., Alvarez-Canino, T., Lausell-Bryant, L. L., & Landsberg, G. (1996). The cycle of violence and victimization: A study of the school-based intervention of a multidisciplinary youth violence-prevention program. *American Journal of Preventive Medicine*, 12(5), 109-119.
- Newmark, P. (1988). *A textbook of translation*. London: Prentice Hall.
- Ng, B. D., & Wiemer-Hastings, P. (2005). Addiction to the Internet and online gaming. *CyberPsychology & Behavior*, 8(2), 110-113.
- Ni, X., Yan, H., Chen, S., & Liu, Z. (2009). Factors influencing Internet addiction in a sample of freshmen university students in China. *Cyberpsychology & Behavior*, 12(3), 327-330.
- Nichols, L. A., & Nicki, R. (2004). Development of a psychometrically sound Internet addiction scale: A preliminary step. *Psychology of Addictive Behaviors*, 18(4), 381-384.
- Niemz, K., Griffiths, M., & Banyard, P. (2005). Prevalence of pathological Internet use among university students and correlations with self-esteem, the general health questionnaire (GHQ), and disinhibition. *CyberPsychology & Behavior*, 8(6), 562-570.
- Nyikos, E., Szeredi, B., & Demetrovics, Z. (2001). Egy új viselkedéses addikció: Az Internethasználat személyiségpszichológiai korrelátumai [A new behavioral addiction: The personality psychological correlates of Internet use]. *Pszichoterápia*, 10, 168-182.
- Orford, J. (2001). Addiction as excessive appetite. *Addiction*, 96(1), 15-31.
- Orford, J., Morison, V., & Somers, M. (1996). Drinking and gambling: A comparison with implications for theories of addiction. *Drug and Alcohol Review*, 15(1), 47-56.
- Otten, R., Engels, R. C. M. E., & Van den Eijnden, R. J. J. M. (2008). Smoking behavior in asthmatic and non-asthmatic adolescents: The role of smoking models and personality. *Substance Use & Misuse*, 43(3-4), 341-360.
- Park, M.-H., Park, E. J., Choi, J., Chai, S., Lee, J.-H., Lee, C., et al. (2011). Preliminary study of Internet addiction and cognitive function in adolescents based on IQ tests. *Psychiatry Research*, 190(2-3), 275-281.
- Park, S. K., Kim, J. Y., & Cho, C. B. (2008). Prevalence of Internet addiction and correlates with family factors among South Korean adolescents. *Adolescence*, 43(172), 895-909.
- Parke, J., & Griffiths, M. D. (2006). The psychology of the fruit machine: The role of structural characteristics (revisited). *International Journal of Mental Health and Addiction*, 4, 151-179.
- Patton, J. H., Stanford, M. S., & Barratt, E. S. (1995). Factor structure of the Barratt Impulsiveness Scale. *Journal of Clinical Psychology*, 51(6), 768-774.
- Paulhus, D. L., & Vazire, S. (2009). The self-report method. In R. W. Robins, R. C. Fraley & R. F. Krueger (Eds.), *Handbook of research methods in personality psychology* (pp. 224-239). New York: Guilford.
- Peng, W., & Liu, M. (2010). Online gaming dependency: A preliminary study in China. *CyberPsychology, Behavior and Social Networking*, 13(3), 329-333.
- Peters, C. S., & Malesky, L. A. (2008). Problematic usage among highly-engaged players of massively multiplayer online role playing games. *CyberPsychology & Behavior*, 11(4), 480-483.
- Phellas, C. N., Bloch, A., & Seale, C. (2012). Structured methods: Interviews, questionnaires and observation. In C. Seale (Ed.), *Researching society and culture* (3rd ed., pp. 181-205). London: Sage.
- Polaino, A., & Senra, C. (1991). Measurement of depression - Comparison between self-reports and clinical assessments of depressed outpatients. *Journal of Psychopathology and Behavioral Assessment*, 13(4), 313-324.
- Poli, R., & Agrimi, E. (2012). Internet addiction disorder: Prevalence in an Italian student population. *Nordic Journal of Psychiatry*, 66(1), 55-59.
- Poppelreuter, S., & Gross, W. (Eds.). (2000). *Nicht nur Drogen machen süchtig - Entstehung und Behandlung von stoffungebundenen Süchten*. Weinheim: Beltz.

- Porter, G., Starcevic, V., Berle, D., & Fenech, P. (2010). Recognizing problem video game use. *Australian and New Zealand Journal of Psychiatry*, 44(2), 120-128.
- Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of how people change. Applications to addictive behaviours. *American Psychologist*, 47(9), 1102-1114.
- Rau, P. L. P., Peng, S. Y., & Yang, C. C. (2006). Time distortion for expert and novice online game players. *Cyberpsychology & Behavior*, 9(4), 396-403.
- Regier, D. A., Farmer, M. E., Rae, D. S., Locke, B. Z., Keith, S. J., Judd, L. L., et al. (1990). Comorbidity of mental disorders with alcohol and other drug abuse. Results from the Epidemiologic Catchment Area (ECA) Study. *JAMA*, 264(19), 2511-2518.
- Rehbein, F., & Borchers, M. (2009). Süchtig nach virtuellen Welten? Exzessives Computerspielen und Computerspielabhängigkeit in der Jugend (Addicted to virtual worlds? Excessive video gaming and video game addiction in adolescents. *Kinderärztliche Praxis*, 80, 42-49.
- Rehbein, F., Kleimann, M., & Mößle, T. (2010). Prevalence and risk factors of video game dependency in adolescence: Results of a German nationwide survey. *CyberPsychology, Behavior and Social Networking*, 13(3), 269-277.
- Resnick, M. D., Bearman, P. S., Blum, R. W., Bauman, K. E., Harris, K. M., Jones, J., et al. (1997). Protecting adolescents from harm: Findings from the National Longitudinal Study on Adolescent Health. *JAMA - Journal of the American Medical Association*, 278(10), 823-832.
- Reuter, J., Raedler, T., Rose, M., Hand, I., Glascher, J., & Büchel, C. (2005). Pathological gambling is linked to reduced activation of the mesolimbic reward system. *Nature Neuroscience*, 8, 147-148.
- Rheingold, H. (1993). *The virtual community: Homesteading on the electronic frontier*. Cambridge, Massachusetts: MIT.
- Ricoeur, P. (1970). *Freud and philosophy: An essay on interpretation*. New Haven: Yale University Press.
- Riggio, R. (1989). *The social skill inventory manual* (Research ed.). Palo CA: Consulting Psychologists Press.
- Rinn, W., Desai, N., Rosenblatt, H., & Gastfriend, D. R. (2002). Addiction denial and cognitive dysfunction: A preliminary investigation. *The Journal of Neuropsychiatry & Clinical Neurosciences*, 14(1), 52-57.
- Roh, S. (2012). *Hikikomori and Internet addiction in Korea*. Paper presented at the 1st International Workshop on Internet Addiction, Yokohama. [http://www.kurihama-med.jp/tiar/pdf/20120330\\_no1\\_workshop\\_report3.pdf](http://www.kurihama-med.jp/tiar/pdf/20120330_no1_workshop_report3.pdf)
- Romano, M., Osborne, L. A., Truzoli, R., & Reed, P. (2013). Differential psychological impact of internet exposure on internet addicts. *Plos One*, 8(2), e55162-e55162.
- Rosenberg, M., Schooler, C., & Schoenbach, C. (1989). Self-esteem and adolescent problems: Modeling reciprocal effects. *American Sociological Review*, 54, 1004-1018.
- Ross, C., Orr, E. S., Sisic, M., Arseneault, J. M., Simmering, M. G., & Orr, R. R. (2009). Personality and motivations associated with Facebook use. *Computers in Human Behavior*, 25(2), 578-586.
- Ruben, D. H. (1999). Diagnosing alcoholism and its addictive patterns using self-report rating scales. *Alcoholism Treatment Quarterly*, 17(3), 37-46.
- Rugle, L., & Melamed, L. (1993). Neuropsychological assessments of attention problems in pathological gamblers. *The Journal of Nervous and Mental Disease*, 181, 107-112.
- Rumpf, H. J., Meyer, C., Kreuzer, A., & John, U. (2011). Prävalenz der Internetabhängigkeit (PINTA). Bericht an das Bundesministerium für Gesundheit. Greifswald und Lübeck: Universität zu Lübeck, Universitätsmedizin Greifswald.
- Rusconi, A. C., Valeriani, G., Carlone, C., Raimondo, P., Quartini, A., de' Fornari, M. A. C., et al. (2012). Internet addiction disorder and social networks: Statistical analysis of correlation and study of the association with social interaction anxiousness. [Article]. *Rivista Di Psichiatria*, 47(6), 498-507.

- Russell, D. (1996). The UCLA Loneliness Scale (Version 3): Reliability, validity, and factor structure. *Journal of Personality Assessment*, 66, 20-40.
- Russell, D., Peplau, L. A., & Cutrona, C. E. (1980). The revised UCLA Loneliness Scale: Concurrent and discriminant validity evidence. *Journal of Personality and Social Psychology*, 39, 472-480.
- Salguero, R. A. T., & Moran, R. M. B. (2002). Measuring problem video game playing in adolescents. *Addiction*, 97(12), 1601-1606.
- Sax, L. (2007). *Boys adrift. The five factors driving the growing epidemic of unmotivated boys and underachieving young men*. New York, NY: Basic Books.
- Schreiber, J. B., Stage, F. K., King, J., Nora, A., & Barlow, E. A. (2006). Reporting Structural Equation Modeling and Confirmatory Factor Analysis results: A review. *The Journal of Educational Research*, 99(6), 323-337.
- Schulz, K. F., Altman, D. G., & Moher, D. (2010). CONSORT 2010 statement: Updated guidelines for reporting parallel group randomized trials. *Annals of Internal Medicine*, 152, 1-8.
- Seah, M., & Cairns, P. (2007). *From immersion to addiction in videogames*. Paper presented at the Proceedings of the 22nd British HCI Group Annual Conference on People and Computers: Culture, Creativity, Interaction - Volume I, Liverpool, UK.
- Shaffer, H. J., & Kidman, R. (2003). Shifting perspectives on gambling and addiction. *Journal of Gambling Studies*, 19(1), 1-6.
- Shaffer, H. J., LaPlante, D. A., LaBrie, R. A., Kidman, R. C., Donato, A. N., & Stanton, M. V. (2004). Toward a syndrome model of addiction: Multiple expressions, common etiology. *Harvard Review of Psychiatry*, 12(6), 367-374.
- Shaw, M., & Black, D. W. (2008). Internet addiction: Definition, assessment, epidemiology and clinical management. *CNS Drugs*, 22(5), 353-365.
- Sheer, V. C. (2010). Hong Kong adolescents' use of MSN vs. ICQ for developing friendships online: Considering media richness and presentational control. *Chinese Journal of Communication*, 3(2), 223-240.
- Shek, D. T. L., & Yu, L. (2012). Internet addiction phenomenon in early adolescents in Hong Kong. *The Scientific World Journal*, 2012, 104304-104304.
- Sherer, M., Maddux, J. E., Mercandante, B., Prentice-Dunn, S., Jacobs, B., & Rogers, R. W. (1982). The Self-Efficacy Scale: Construction and validation. *Psychological Reports*, 51, 663-671.
- Shinebourne, P., & Smith, J. A. (2009). Alcohol and the self: An interpretative phenomenological analysis of the experience of addiction and its impact on the sense of self and identity. *Addiction Research & Theory*, 17(2), 152-167.
- Silbereisen, R. K., & Kastner, P. (1998). Jugend und Problemverhalten. Entwicklungspsychologische Perspektiven. In R. Oerter & L. Montada (Eds.), *Entwicklungspsychologie. Ein Lehrbuch*. München: Psychologie Verlags Union.
- Simkova, B., & Cincera, J. (2004). Internet addiction disorder and chatting in the Czech Republic. *CyberPsychology & Behavior*, 7(5), 536-539.
- Siomos, K., Floros, G., Fisoun, V., Evaggelia, D., Farkonas, N., Sergeantani, E., et al. (2012). Evolution of Internet addiction in Greek adolescent students over a two-year period: the impact of parental bonding. *European child & adolescent psychiatry*, 21(4), 211-219.
- Siomos, K. E., Dafouli, E. D., Braimiotis, D. A., Mouzas, O. D., & Angelopoulos, N. V. (2008). Internet addiction among Greek adolescent students. *Cyberpsychology & Behavior*, 11(6), 653-657.
- Skinner, B. F. (1969). *Contingencies of reinforcement: A theoretical analysis*. Englewood Cliffs, N. J.: Prentice-Hall.
- Skoric, M. M., Teo, L. L. C., & Neo, R. L. (2009). Children and video games: Addiction, engagement, and scholastic achievement. *CyberPsychology & Behavior*, 12(5), 567-572.
- Smahel, D., Blinka, L., & Ledabyl, O. (2008). Playing MMORPGs: Connections between addiction and identifying with a character. *CyberPsychology & Behavior*, 11(6), 715-718.



- Smith, G. W., Farrell, M., Bunting, B. P., Houston, J. E., & Shevlin, M. (2001). Patterns of polydrug use in Great Britain: Findings from a national household population survey. *Drug and Alcohol Dependence, 113*(2-3), 222-228.
- Smith, J. A. (2004). Reflecting on the development of interpretative phenomenological analysis and its contribution to qualitative research in psychology. *Qualitative Research in Psychology, 1*, 39-54.
- Smith, J. A., Flowers, P., & Larkin, M. (2009). *Interpretative phenomenological analysis. Theory, method and research*. London: Sage.
- Smith, J. A., Flowers, P., & Osborn, M. (1997). Interpretative Phenomenological Analysis and the psychology of health and illness. In L. Yardley (Ed.), *Material discourses of health and illness* (pp. 68-91). London: Routledge.
- Smith, J. A., Jarman, M., & Osborn, M. (1999). Doing interpretative phenomenological analysis. In M. Murray & K. Chamberlain (Eds.), *Qualitative health psychology* (pp. 218-240). London: Sage.
- Smith, J. A., & Osborn, B. (2003). Interpretative phenomenological analysis. In J. A. Smith (Ed.), *Qualitative psychology: A practical guide to research methods* (2nd ed., pp. 53-80). London: Sage.
- Smithson, J., Sharkey, S., Hewis, E., Jones, R., Emmens, T., Ford, T., et al. (2011). Problem presentation and responses on an online forum for young people who self-harm. *Discourse Studies, 13*(4), 487-501.
- So, Y. K., Noh, J. N., Kim, Y. S., Ko, S. G., & Koh, Y. J. (2002). The reliability and validity of Korean parent and teacher ADHD rating scale. *Journal of the Korean Neuropsychiatric Association, 41*, 283-289.
- Solomon, R. L. (1980). The opponent-process theory of acquired motivation: The costs of pleasure and the benefits of pain. *American Psychologist, 35*(8), 691-712.
- Soper, W. B., & Miller, M. J. (1983). Junk-time junkies: An emerging addiction among students. *School Counselor, 31*(1), 40-43.
- Springer, A. (2009). Sollen "stoffungebundene Süchte" als eigenständige Krankheitskategorie gelten? In D. Batthyány & A. Pritz (Eds.), *Rausch ohne Drogen* (pp. 19-44). New York, NY: Springer.
- Stavropoulos, V., Alexandraki, K., & Motti-Stefanidi, F. (2013). Recognizing internet addiction: Prevalence and relationship to academic achievement in adolescents enrolled in urban and rural Greek high schools. *Journal of Adolescence, 36*(3), 565-576.
- Steiger, J. H. (2000). Point estimation, hypothesis testing, and interval estimation using the RMSEA: Some comments and a reply to Hayduk and Glaser. *Structural Equation Modeling, 7*(2), 149-162.
- Steiger, J. H. (2007). Understanding the limitations of global fit assessment in structural equation modeling. *Personality & Individual Differences, 42*(5), 893-898.
- Storey, L. (2007). Doing Interpretative Phenomenological Analysis. In E. Lyons & A. Coyle (Eds.), *Analysing qualitative data in psychology* (pp. 51-64). London: Sage.
- Sun, P., Johnson, C. A., Palmer, P., Arpawong, T. E., Unger, J. B., Xie, B., et al. (2012). Concurrent and predictive relationships between compulsive Internet use and substance use: Findings from vocational high school students in China and the USA. *International Journal of Environmental Research and Public Health, 9*(3), 660-673.
- Sung, J., Lee, J., Noh, H. M., Park, Y. S., & Ahn, E. J. (2013). Associations between the risk of Internet addiction and problem behaviors among Korean adolescents. *Korean Journal of Family Medicine, 34*(2), 115-122.
- Tamaki, S. (2013). *Hikikomori: Adolescence without end*. Minneapolis, MN: University of Minnesota Press.
- Tangney, P. J., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grads, and interpersonal success. *Journal of Personality, 72*, 272-322.

- Tateno, M., Park, T. W., Kato, T. A., Umene-Nakano, W., & Saito, T. (2012). Hikikomori as a possible clinical term in psychiatry: A questionnaire survey. *BMC Psychiatry, 12*.
- Taylor, T. L. (2006). *Play between worlds. Exploring online game culture*. Cambridge, MA: MIT.
- te Wildt, B. T. (2009). Internetabhängigkeit - Symptomatik, Diagnostik und Therapie. In D. Batthyány & A. Pritz (Eds.), *Rausch ohne Drogen. Substanzungebundene Süchte*. New York, NY: Springer.
- te Wildt, B. T. (2011). Internet dependency: Symptoms, diagnosis and therapy. In K. Cornelius & D. Hermann (Eds.), *Virtual worlds and criminality* (pp. 61-78). Berlin: Springer.
- Terracciano, A., Löckenhoff, C. E., Crum, R. M., Bienvenu, O. J., & Costa, P. T. (2008). Five-Factor Model personality profiles of drug users. *BMC Psychiatry, 8*(22).
- Terry, A., Szabo, A., & Griffiths, M. (2004). The exercise addiction inventory: A new brief screening tool. *Addiction Research & Theory, 12*(5), 489-499.
- Thalemann, C. (2009). *Pathologische Computernutzung bei Schülern verschiedener Schultypen der 8. und 10. Klassenstufe*. Doctoral dissertation, Medizinische Fakultät Charité, Berlin.
- Thalemann, R., Albrecht, U., Thalemann, C., & Grüsser, S. M. (2004). Kurzbeschreibung und psychometrische Kennwerte des "Fragebogens zum Computerspielverhalten bei Kindern (CSVK)". *Zeitschrift für Psychologie und Medizin, 16*, 226-233.
- Thalemann, R., Wölfling, K., & Grüsser, S. M. (2007). Specific cue reactivity on computer game-related cues in excessive gamers. *Behavioral Neuroscience, 121*(3), 614-618.
- Thatcher, A., Wretschko, G., & Fridjhon, P. (2008). Online flow experiences, problematic Internet use and Internet procrastination. *Computers in Human Behavior, 24*(5), 2236-2254.
- The Nielsen Company. (2012a). State of the media: U.S. digital consumer report: The Nielsen Company.
- The Nielsen Company. (2012b). Australian online landscape review: The Nielsen Company.
- The NPD Group. (2010). 2009 US video game industry and PC game software retail sales reach \$20.2 billion. Retrieved 21.04., 2011, from [http://www.npd.com/press/releases/press\\_100114.html](http://www.npd.com/press/releases/press_100114.html)
- Thomas, N. J., & Martin, F. H. (2010). Video-arcade game, computer game and Internet activities of Australian students: Participation habits and prevalence of addiction. *Australian Journal of Psychology, 62*(2), 59-66.
- Treuer, T., Fabian, Z., & Furedi, J. (2001). Internet addiction associated with features of impulse control disorder: Is it a real psychiatric disorder? *Journal of Affective Disorders, 66*(2-3), 283-283.
- Tsai, C. C., & Lin, S. S. J. (2003). Internet addiction of adolescents in Taiwan: An interview study. *Cyberpsychology & Behavior, 6*(6), 649-652.
- Tsai, H. F., Cheng, S. H., Yeh, T. L., Shih, C. C., Chen, K. C., & Yang, Y. C. (2009). The risk factors of Internet addiction - A survey of university freshmen. *Psychiatry Research, 167*(3), 294-299.
- Tsitsika, A., Critselis, E., Louizou, A., Janikian, M., Freskou, A., Marangou, E., et al. (2011). Determinants of Internet addiction among adolescents: A case-control study. *The Scientific World Journal, 11*, 866-874.
- Turkle, S. (2003). Virtuality and its discontents: Searching for community in cyberspace. In J. Turow & A. L. Kavanaugh (Eds.), *The wired homestead. An MIT sourcebook on the Internet and the family* (pp. 385-398). Massachusetts: Massachusetts Institute of Technology.
- Turner, V. W. (1967). Betwixt and between: The liminal period in Rites de Passage. In V. W. Turner (Ed.), *The forest of symbols. Aspects of Ndembu ritual*. New York, NY: Cornell University.
- Twinn, S. (1997). An exploratory study examining the influence of translation on the validity and reliability of qualitative data in nursing research. *Journal of Advanced Nursing, 26*(2), 418-423.

- University of Massachusetts Medical School, D. o. P. (2007). ADHD self-report. Retrieved 29.03.2011, from <http://healthnet.umassmed.edu/mhealth/ADHDSelfReport.pdf>
- van den Eijnden, R., Meerkerk, G. J., Vermulst, A. A., Spijkerman, R., & Engels, R. (2008a). Online communication, compulsive Internet use, and psychosocial well-being among adolescents: A longitudinal study. *Developmental Psychology, 44*(3), 655-665.
- van den Eijnden, R. J., Spijkerman, R., Vermulst, A. A., van Rooij, A. J., & Engels, R. C. M. E. (2010). Compulsive Internet use among adolescents: Bidirectional parent-child relationships. *Journal of Abnormal Child Psychology, 38*, 77-89.
- van den Eijnden, R. J. J. M., Meerkerk, G.-J., Vermulst, A. A., Spijkerman, R., & Engels, R. C. M. E. (2008b). Online communication, compulsive Internet use, and psychosocial well-being among adolescents: A longitudinal study. *Developmental Psychology, 44*(3), 655-665.
- van der Aa, N., Overbeek, G., Engels, R. C. M. E., Scholte, R. H. J., Meerkerk, G. J., & van den Eijnden, R. J. J. M. (2009). Daily and compulsive Internet use and well-being in adolescence: A diathesis-stress model based on Big Five personality traits. *Journal of Youth and Adolescence, 38*, 765-776.
- van Gennep, A. (1960). *The rites of passage*. Chicago: University of Chicago.
- van Rooij, A. J., Schoenmakers, T. M., van de Eijnden, R., & van de Mheen, D. (2010). Compulsive Internet use: The role of online gaming and other Internet applications. *Journal of Adolescent Health, 47*(1), 51-57.
- van Rooij, A. J., Schoenmakers, T. M., Vermulst, A. A., van den Eijnden, R., & van de Mheen, D. (2011a). Online video game addiction: Identification of addicted adolescent gamers. *Addiction, 106*(1), 205-212.
- van Rooij, A. J., Schoenmakers, T. M., Vermulst, A. A., van den Eijnden, R. J. J. M., & van de Mheen, D. (2011b). Online video game addiction: Identification of addicted adolescent gamers. *Addiction, 106*(1), 205-212.
- van Weel, C., & Schellevis, F. G. (2006). Comorbidity and guidelines: Conflicting interests. *Lancet, 367*(9510), 550-551.
- Veen, W., & Vrakking, B. (2006). *Homo zappiens: Growing up in a digital age*. London: Network Continuum Education.
- Vermulst, A. A., & Gerris, J. R. M. (2009). *Quick Big Five (QBF). Persoonlijkheidstest*. Nijmegen, The Netherlands: Behavioural Science Institute, University of Nijmegen.
- Volkow, N. D., & Fowler, J. S. (2000). Addiction: A disease of compulsion and drive: Involvement of the orbitofrontal cortex. *Cerebral Cortex, 10*, 318-325.
- Volkow, N. D., Fowler, J. S., Wang, G.-J., Swanson, J. M., & Telang, F. (2007). Dopamine in drug abuse and addiction - Results of imaging studies and treatment implications. *Archives of Neurology, 64*(11), 1575-1579.
- Volkow, N. D., Fowler, J. S., & Wang, G. J. (2003). The addicted human brain: Insights from imaging studies. *Journal of Clinical Investigation, 111*(10), 1444-1451.
- Waldeck, T. L., & Miller, L. S. (1997). Gender and impulsivity differences in licit substance use. *Journal of Substance Abuse Treatment, 9*, 269-275.
- Wan, C. S., & Chiou, W. B. (2006a). Psychological motives and online games addiction: A test of flow theory and humanistic needs theory for Taiwanese adolescents. *CyberPsychology & Behavior, 9*(3), 317-324.
- Wan, C. S., & Chiou, W. B. (2006b). Why are adolescents addicted to online gaming? An interview study in Taiwan. *CyberPsychology & Behavior, 9*(6), 762-766.

- Wan, C., S., & Chiou, W. B. (2007). The motivations of adolescents who are addicted to online games: A cognitive perspective. *Adolescence*, 42(165), 179-197.
- Wang, H., Zhou, X., Lu, C., Wu, J., Deng, X., & Hong, L. (2011). Problematic Internet use in high school students in Guangdong Province, China. *Plos One*, 6(5).
- Wang, L., Luo, J., Bai, Y., Kong, J., Gao, W., & Sun, X. (2013). Internet addiction of adolescents in China: Prevalence, predictors, and association with well-being. *Addiction Research & Theory*, 21(1), 62-69.
- Watson, D. (2005). Rethinking the mood and anxiety disorders: A quantitative hierarchical model for DSM-V. *Journal of Abnormal Psychology*, 114(4), 522-536.
- Weaver, J. B., Mays, D., Sargent Weaver, S., Kannenberg, W., Hopkins, G. L., Eroğlu, D., et al. (2009). Health-risk correlates of video-game playing among adults. *American Journal of Preventive Medicine*, 37(4), 299-305.
- Wellman, B. (1996). An electronic group is virtually a social network. In S. Kiesler (Ed.), *Research milestones on the information highway*. Hillsdale, NJ: Lawrence Erlbaum.
- Wellman, B., & Gulia, M. (1999). Net suffers don't ride alone: Virtual communities as communities. In P. Kollock & M. Smith (Eds.), *Communities and cyberspace*. New York: Routledge.
- Welz, T., Lynch, S., Nathan, B., Lockyer, S., Adegbite, K., Clift, P., et al. (2011). Ch@t-space - A novel patient internet forum for users of a large, multi-ethnic HIV clinic. *HIV Medicine*, 12, 58-58.
- Whang, L. S. M., Lee, S., & Chang, G. (2003). Internet over-users' psychological profiles: A behavior sampling analysis on Internet addiction. *Cyberpsychology & Behavior*, 6(2), 143-150.
- Whitty, M. T. (2002). Liar, liar! An examination of how open, supportive and honest people are in chat rooms. *Computers in Human Behavior*, 18(4), 343-352.
- Widiger, T. A., & Samuel, D. B. (2005). Diagnostic categories or dimensions? A question for the Diagnostic and Statistical Manual of Mental Disorders - Fifth edition. *Journal of Abnormal Psychology*, 114(4), 494-504.
- Widyanto, L., & Griffiths, M. (2006). "Internet addiction": A critical review. *International Journal of Mental Health and Addiction*, 4, 31-51.
- Widyanto, L., & McMurrin, M. (2004). The psychometric properties of the Internet Addiction Test. *CyberPsychology & Behavior*, 7(4), 443-450.
- Williams, D., Yee, N., & Caplan, S. E. (2008). Who plays, how much, and why? Debunking the stereotypical gamer profile. *Journal of Computer-Mediated Communication*, 13, 993-1018.
- Willig, C. (2001). *Introducing qualitative research in psychology*. Buckingham: Open University.
- Winkler, A., Dörsing, B., Rief, W., Shen, Y., & Glombiewski, J. A. (2013). Treatment of Internet addiction: A meta-analysis. 33, 317-329.
- Wölfling, K., Grüsser, S. M., & Thalemann, R. (2008). Video and computer game addiction. *International Journal of Psychology*, 43(3-4), 769-769.
- Wölfling, K., Müller, K., & Beutel, M. (2010). Diagnostic measures: Scale for the Assessment of Internet and Computer Game Addiction (AICA-S). In D. Mücken, A. Teske, F. Rehbein & B. te Wildt (Eds.), *Prevention, diagnostics, and therapy of computer game addiction* (pp. 212-215). Lengerich: Pabst Science.
- Wölfling, K., & Müller, K. W. (2009). Computerspielsucht. In D. Batthyány & A. Pritz (Eds.), *Rausch ohne Drogen. Substanzgebundene Süchte* (pp. 291-308). New York: Springer.
- Wölfling, K., Müller, K. W., & Beutel, M. E. (2011). Reliability and validity of the Scale for the Assessment of Pathological Computer Gaming (CSV-S). *Psychotherapie, Psychosomatik, Medizinische Psychologie*, 61, 216-224.
- Wölfling, K., Thalemann, C., & Grüsser, S. M. (2008). Computerspielsucht: Ein psychopathologischer Symptomkomplex im Jugendalter. *Psychiatrische Praxis*, 35(5), 226-232.



- Woo, B., S. C., Chang, W. C., Fung, D. S. S., Koh, J. B. K., Leong, J. S. F., Kee, C. H. Y., et al. (2004). Development and validation of a depression scale for Asian adolescents. *Journal of Adolescence*, 27(6), 677-689.
- Wood, R. T. A., & Griffiths, M. D. (2007). Time loss whilst playing video games: Is there a relationship to addictive behaviors? *International Journal of Mental Health and Addiction*, 5, 141-149.
- World Health Organization. (1992). *ICD 10: The ICD-10 classification of mental and behavioral disorders: Clinical descriptions and diagnostic guidelines*. Geneva, Switzerland: World Health Organization.
- Xiuqin, H., Huimin, Z., Mengchen, L., Jinan, W., Ying, Z., & Ran, T. (2010). Mental health, personality, and parental rearing styles of adolescents with Internet addiction disorder. *CyberPsychology, Behavior and Social Networking*, 13(4), 401-406.
- Xu, J., Shen, L.-x., Yan, C.-h., Hu, H., Yang, F., Wang, L., et al. (2012). Personal characteristics related to the risk of adolescent internet addiction: A survey in Shanghai, China. *BMC Public Health*, 12, 1106.
- Xu, Z., & Yuan, Y. (2008). *The impact of motivation and prevention factors on game addiction*. Paper presented at the Special Interest Group on Human-Computer Interaction 2008.
- Yardley, L. (2000). Dilemmas in qualitative health research. *Psychology & Health*, 15, 215-228.
- Yates, T. M., Gregor, M. A., & Haviland, M. G. (2012). Child maltreatment, alexithymia, and problematic Internet use in young adulthood. *Cyberpsychology, Behavior and Social Networking*, 15(4), 219-225.
- Yee, N. (2006a). The psychology of MMORPGs: Emotional investment, motivations, relationship formation, and problematic usage. In R. Schroeder & A. Axelsson (Eds.), *Avatars at work and play: Collaboration and interaction in shared virtual environments* (pp. 187-207). London: Springer-Verlag.
- Yee, N. (2006b). The demographics, motivations and derived experiences of users of massively-multiuser online graphical environments. *PRESENCE: Teleoperators and Virtual Environments*, 15, 309-329.
- Yeh, Y.-C., Ko, H.-C., Wu, J. Y.-W., & Cheng, C.-P. (2008). Gender differences in relationships of actual and virtual social support to Internet addiction mediated through depressive symptoms among college students in Taiwan. *Cyberpsychology & Behavior*, 11(4), 485-487.
- Yellowlees, P. M., & Marks, S. (2007). Problematic Internet use or Internet addiction? *Computers in Human Behavior*, 23(3), 1447-1453.
- Yen, C. F., Ko, C. H., Yen, J. Y., Chang, Y. P., & Cheng, C. P. (2009). Multi-dimensional discriminative factors for Internet addiction among adolescents regarding gender and age. *Psychiatry and Clinical Neurosciences*, 63(3), 357-364.
- Yen, J.-Y., Ko, C.-H., Yen, C.-F., Chen, S.-H., Chung, W.-L., & Chen, C.-C. (2008). Psychiatric symptoms in adolescents with Internet addiction: Comparison with substance use. *Psychiatry and Clinical Neurosciences*, 62(1), 9-16.
- Yen, J.-Y., Yen, C.-F., Chen, C.-S., Tang, T.-C., & Ko, C.-H. (2009). The association between adult ADHD symptoms and Internet addiction among college students: The gender difference. *Cyberpsychology & Behavior*, 12(2), 187-191.
- Yen, J. Y., Ko, C. H., Yen, C. F., Chen, C. S., & Chen, C. C. (2009). The association between harmful alcohol use and Internet addiction among college students: Comparison of personality. *Psychiatry and Clinical Neurosciences*, 63(2), 218-224.
- Yen, J. Y., Ko, C. H., Yen, C. F., Wu, H. Y., & Yang, M. J. (2007). The comorbid psychiatric symptoms of Internet addiction: Attention deficit and hyperactivity disorder (ADHD), depression, social phobia, and hostility. *Journal of Adolescent Health*, 41(1), 93-98.

- Yen, J. Y., Yen, C. F., Chen, C. C., Chen, S. H., & Ko, C. H. (2007). Family factors of Internet addiction and substance use experience in Taiwanese adolescents. *CyberPsychology & Behavior, 10*(3), 323-329.
- Yen, J. Y., Yen, C. F., Wu, H. Y., Huang, C. J., & Ko, C. H. (2011). Hostility in the real world and online: The effect of Internet addiction, depression, and online activity. *Cyberpsychology, Behavior & Social Networking*.
- Young, K. (1998a). Internet addiction: The emergence of a new clinical disorder. *Cyberpsychology & Behavior, 3*, 237-244.
- Young, K. (1998b). *Caught in the net*. New York: Wiley.
- Young, K. (1999). Internet addiction: Symptoms, evaluation, and treatment. In L. V. T. L. Jackson (Ed.), *Innovations in clinical practice*. Sarasota, FL: Professional Resource Press.
- Young, K. (2009). Understanding online gaming addiction and treatment issues for adolescents. *American Journal of Family Therapy, 37*(5), 355-372.
- Young, K. (2010). Internet addiction over the decade: A personal look back. *World Psychiatry, 9*(2), 91-91.
- Young, K., Pistner, M., O'Mara, J., & Buchanan, J. (1999). Cyber-disorders: The mental health concern for the new millennium. *CyberPsychology & Behavior, 3*(5), 475-479.
- Young, K. S. (1996). Psychology of computer use: XL. Addictive use of the Internet: A case that breaks the stereotype. *Psychological Reports, 79*(3), 899-902.
- Young, K. S. (2004). Internet addiction - A new clinical phenomenon and its consequences. *American Behavioral Scientist, 48*(4), 402-415.
- Yu, C. F. (2002). *Evaluating cutoff criteria of model fit indices for latent variable models with binary and continuous outcomes*. Dissertation. University of California. Los Angeles. Retrieved from <http://statmodel2.com/download/Yudissertation.pdf>
- Yuan, K., Qin, W., Wang, G., Zeng, F., Zhao, L., Yang, X., et al. (2011). Microstructure abnormalities in adolescents with Internet Addiction Disorder. *Plos One, 6*(6), e20708.
- Yuen, C. N., & Lavin, M. J. (2004). Internet dependence in the collegiate population: The role of shyness. *CyberPsychology & Behavior, 7*(4), 379-383.
- Zimbardo, P. G. (1969). The human choice: Individuation, reason, and order vs. deindividuation, impulse, and chaos. In W. J. Arnold & D. Levine (Eds.), *Nebraska Symposium on Motivation*. Lincoln, NE: University of Nebraska.
- Zuckerman, M. (2002). Zuckerman-Kuhlman Personality Questionnaire (ZKPQ): An alternative five-factorial model. In B. De Raad & M. Perugini (Eds.), *Big Five Assessment* (pp. 377-396). Seattle, WA: Hogrefe and Huber.
- Zywica, J., & Danowski, J. (2008). The faces of Facebookers: Investigating social enhancement and social compensation hypotheses: Predicting Facebook and offline popularity from sociability and self-esteem, and mapping the meanings of popularity with semantic networks. *Journal of Computer-Mediated Communication, 14*(1), 1-34.

## Appendix I

### *Declaration of Collaborative Work*

#### **Literature reviews**

Kuss, D. J., Griffiths, M. D., Karila, L., & Billieux, J. (2013). Internet addiction: A systematic review of epidemiological research for the last decade. Submitted. (Chapter 1).

Kuss, D. J., & Griffiths, M. D. (2012). Online gaming addiction in children and adolescents: A review of empirical research. *Journal of Behavioral Addictions*, 1(1), 3-22. (Chapter 2).

Kuss, D. J., & Griffiths, M. D. (2012). Internet gaming addiction: A systematic review of empirical research. *International Journal of Mental Health and Addiction*, 10(2), 278-296. (Chapter 3).

Contribution of first author (DJ Kuss) to each of these literature reviews:

- Initiation of review
- Development of key ideas
- Literature collection
- Literature organisation
- Literature analysis
- Write-up
- Implementation of co-authors' feedback

#### **Empirical chapters:**

Kuss, D. J., van Rooij, A., Shorter, G. W., Griffiths, M. D., & van de Mheen, D. (2013). Internet addiction in adolescents: Prevalence and risk factors. *Computers in Human Behavior*, 29(5), 1987-1996. (Chapter 4).

Contribution of first author (DJ Kuss):

- Initiation of research
- Development of key ideas
- Data cleaning
- Data analysis

- Write-up
- Implementation of co-authors' feedback

Kuss, D. J., Griffiths, M. D., & Binder, J. F. (2013). Internet addiction in students: Prevalence and risk factors. *Computers in Human Behavior*, 29(3), 959–966. (Chapter 5).

Contribution of first author (DJ Kuss):

- Initiation of research
- Development of key ideas
- Development of online survey
- Participant recruitment
- Data collection
- Data cleaning
- Data analysis
- Write-up
- Implementation of co-authors' feedback

Kuss, D. J., Shorter, G. W., van Rooij, A. J., Griffiths, M. D., & Schoenmakers, T. (2013). Assessing Internet addiction using the parsimonious Internet addiction components model. Under revision. (Chapter 6).

Contribution of first author (DJ Kuss):

- Initiation of research
- Development of key ideas
- Development of online survey (for sample 2)
- Participant recruitment (for sample 2)
- Data collection (for sample 2)
- Data cleaning
- Data analysis
- Write-up
- Implementation of co-authors' feedback

In addition to the published work, Chapter 7 uses secondary data. All research stages other than data collection have been carried out by DJ Kuss.



## Appendix II

### *Published Chapters*

- Kuss, D. J., & Griffiths, M. D. (2012). Online gaming addiction in children and adolescents: A review of empirical research. *Journal of Behavioral Addictions, 1*(1), 3-22. (Chapter 2).
- Kuss, D. J., & Griffiths, M. D. (2012). Internet gaming addiction: A systematic review of empirical research. *International Journal of Mental Health and Addiction, 10*(2), 278- 296. (Chapter 3).
- Kuss, D. J., van Rooij, A., Shorter, G. W., Griffiths, M. D., & van de Mheen, D. (2013). Internet addiction in adolescents: Prevalence and risk factors. *Computers in Human Behavior, 29*(5), 1987–1996. (Chapter 4).
- Kuss, D. J., Griffiths, M. D., & Binder, J. F. (2013). Internet addiction in students: Prevalence and risk factors. *Computers in Human Behavior, 29*(3), 959–966. (Chapter 5).

# Online gaming addiction in children and adolescents: A review of empirical research

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**Background and aims:** Research suggests that excessive online gaming may lead to symptoms commonly experienced by substance addicts. Since games are particularly appealing to children and adolescents, these individuals may be more at risk than other groups of developing gaming addiction. **Methods:** Given these potential concerns, a literature review was undertaken in order (i) to present the classification basis of online gaming addiction using official mental disorder frameworks, (ii) to identify empirical studies that assess online gaming addiction in children and adolescents, and (iii) to present and evaluate the findings against the background of related and established mental disorder criteria. **Results:** Empirical evidence comprising 30 studies indicates that for some adolescents, gaming addiction exists and that as the addiction develops, online gaming addicts spend increasing amounts of time preparing for, organizing, and actually gaming. **Conclusions:** Evidence suggests that problematic online gaming can be conceptualized as a behavioral addiction rather than a disorder of impulse control.

**Keywords:** internet gaming addiction, online games, adolescents, children, literature review, classification

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## INTRODUCTION

Play is an innate human drive that begins in very early childhood (Caillois, 1961). Today, much game play has been transferred from the real (i.e., the embodied world) to the online world and is verified by software sales. In 2010, both video and PC game software retail sales amounted to approximately \$15.5 (US) billion (Johnson, 2011). The most popular online game is *The Sims 3* followed by *World of Warcraft's Wrath of the Lich King*. This suggests that 'Simulation Games' and 'Massively-Multiplayer Online Role-Playing Games' (MMORPGs) are favored by gaming communities (The NPD Group, 2010). These games allow players to (i) inhabit massive game worlds concurrently, (ii) develop virtual alter egos, namely avatars, and (iii) play with others all over the world anytime and anywhere. Furthermore, they enable immersion in a reality that is both simultaneously fantastic and poignantly real. Therefore, these games can be seen as "systems[s] in which reality itself [...] is entirely captured, fully immersed in a virtual image setting, in the world of make believe, in which appearances are not just on the screen through which experience is communicated, but they become the experience" (Castells, 1996, p. 404).

The manifold possibilities that online games offer for aficionados and novices alike clearly highlight the wide appeal of these games. Moreover, according to the latest report of the Entertainment Software Association (ESA), 25% of the computer and video game players are under the age of 18 years and 60% are male. The ESA also reported that 25% of parents do not impose time limits on their children's Internet use in general and 17% of parents do not impose time limits on video and computer game playing (ESA, 2010). From

these statistics, it appears that gaming, and particularly online gaming, is an integral element of children and adolescents' leisure time activities.

Whilst gaming is a pleasurable pastime activity, research suggests that excessive online gaming may in extreme cases lead to symptoms commonly experienced by substance addicts, namely salience, mood modification, craving, and tolerance (Hsu, Wen & Wu, 2009; Ko et al., 2009; Mehroof & Griffiths, 2010; Wölfling, Grüsser & Thalemann, 2008; Young, 2009). A recent systematic literature review suggests that it is particularly excessive engagement with MMORPGs that can lead to addiction in a small minority of players (Kuss & Griffiths, 2011). Since online and offline video and computer games are particularly appealing to children and adolescents (ESA, 2010), it appears reasonable to suggest that these groups may be particularly at risk (i.e., more vulnerable and susceptible) of developing gaming addiction. Furthermore, it has been argued that because of the 24/7 nature and almost mandatory excessive play required in playing MMORPGs (such as *World of Warcraft* and *Everquest*), online gaming may be more problematic for 'at risk' individuals than offline gaming (Griffiths & Meredith, 2009).

Assessing online gaming addiction in children and adolescents is relevant for several reasons. With regards to developmental psychopathological findings, it appears that addictions tend to have precursors during adolescence (Hawkins & Fitzgibbon, 1993). Also, it is relatively common that substance dependencies develop in early adulthood (APA, 2000). Therefore, prevention efforts must be established that target adolescents who have their first experiences with addictive substances and behaviors during their pubescence. During this period of time, adolescents are confronted with a variety of cumulated stressors, such as physi-

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cal and hormonal changes, as well as shifts in personal value and belief systems. Parental influence is diminished whereas the peer group gains more importance. Peer pressure may lead to a variety of problems (Silbereisen & Kastner, 1998) that may eventuate in the development of pathological behaviors, such as chemical and behavioral addictions (Wölfling & Müller, 2009).

Adolescents may use online games as a way of coping with stressors and gaming can become a dysfunctional media-focused coping strategy (Thalemann, 2009). Similarly, relationships between problematic gaming and the ways in which adolescents cope with stressors and frustrations have been reported (Wölfling, Thalemann & Grüsser, 2008). For instance, problematic gamers play games significantly more frequently than non-problematic gamers as a reaction to anger and frustration. Thus, they appear to use gaming as a strategy for emotion regulation in order to decrease negative feelings. This seems particularly problematic because those adolescents who play online games excessively are likely to get little chance to actually develop healthy ways of coping with stressors because they are constantly occupied with playing online games instead. Therefore, their psychosocial development may be significantly impaired. The consistent blocking out of and passive coping with stressful experiences is a strategy that may be successful in the short-term. However, viewed from a long-term perspective, it may limit the potential to have fundamental experiences that are necessary for developing a protective way to cope. In this case, it appears more likely that once new stressors appear, some adolescents continue to use escapist and media-focused coping mechanisms. This results in a vicious circle (Wölfling & Müller, 2009).

A wide variety of empirical and prospective studies have investigated the negative consequences of stressors upon psychological and physiological parameters when the former are inadequately dealt with. Accordingly, a repertoire of coping strategies that is underdeveloped may be seen as a risk factor for the development of a variety of negative psychological and psychosomatic problems. These entail direct effects on the immune system (Charlton, 2002) as well as negative affectivity (Kim et al., 2006) and psychosomatic problems (Batthyány, Müller, Benker & Wölfling, 2009). Moreover, adolescents aged 17–19 years treated for their pathological gambling and online gaming addiction at the Outpatient Clinic for Gaming Addictions in Mainz, Ger-

many, have been found to suffer from depressive symptoms, anxiety, and somatization (Wölfling & Müller, 2009). Such clinical observations hint at the importance of assessing excessive and potentially pathological online gaming behavior.

#### Clinical diagnosis

Behavioral addictions, such as online gaming addiction, have typically been categorized either within the frameworks of impulse control disorders or substance dependencies (Grüsser & Thalemann, 2006). To date, criteria developed for the diagnosis of online gaming addiction in empirical studies have been based on either the criteria for pathological gambling or the criteria for substance dependence. According to the American Psychiatric Association's (2000) official diagnosis, pathological gambling is an impulse control disorder not otherwise specified (see Table 1). The main characteristic of impulse control disorders is the "failure to resist an impulse, drive, or temptation to perform an act that is harmful to the person or to others" (APA, 2000, p. 663).

An alternative approach to assessing online gaming addiction is the reliance on the official criteria for substance dependence or the dependence syndrome (APA, 2000; WHO, 1992). The discriminative features of substance dependence include "a cluster of cognitive, behavioral, and physiological symptoms indicating that the individual continues use of the substance despite significant substance-related problems" (APA, 2000, p. 192). The relevant diagnostic items for substance dependence are presented below in Table 2.

Unlike pathological gambling, a diagnosis for substance dependence requires the presence of the respective criteria within a period of 12 months. Thus, it adds a time criterion to diagnosis that is relevant for the identification of genuine pathology. Moreover, another main distinguishing feature is the absence of a withdrawal criterion in the case of pathological gambling relative to substance dependence. Therefore, for pathological gambling, the actual activity of engaging in the potentially maladaptive behavior takes a prime role over any other possible negative consequences the engagement may result in. Typically, the reliance on substance dependence criteria is used for the classification of behavioral addictions (Batthyány & Pritz, 2009; Grüsser & Thalemann, 2006). With behavioral addictions such as online gaming ad-

Table 1. Diagnostic criteria for 312.31 pathological gambling

- 
- A. Persistent and recurrent maladaptive gambling behavior as indicated by five (or more) of the following:
- (1) is preoccupied with gambling (e.g., preoccupied with reliving past gambling experiences, handicapping or planning the next venture, or thinking of ways to get money with which to gamble)
  - (2) needs to gamble with increasing amounts of money in order to achieve the desired excitement
  - (3) has repeated unsuccessful efforts to control, cut back, or stop gambling
  - (4) is restless or irritable when attempting to cut down or stop gambling
  - (5) gambles as a way of escaping from problems or of relieving a dysphoric mood (e.g., feelings of helplessness, guilt, anxiety, depression)
  - (6) after losing money gambling, often returns another day to get even ("chasing" one's losses)
  - (7) lies to family members, therapist, or others to conceal the extent of involvement with gambling
  - (8) has committed illegal acts such as forgery, fraud, theft, or embezzlement to finance gambling
  - (9) has jeopardized or lost a significant relationship, job, or educational or career opportunity because of gambling
  - (10) relies on others to provide money to relieve a desperate financial situation caused by gambling
- B. The gambling behavior is not better accounted for by a Manic Episode.
- 

Note: The criteria presented originate from the American Psychiatric Association's taxonomy (2000, p. 674), which is similar to the World Health



Table 2. Criteria for substance dependence

A maladaptive pattern of substance use, leading to clinically significant impairment or distress, as manifested by three (or more) of the following, occurring at any time in the same 12-month period:

- (1) tolerance, as defined by either of the following:
  - (a) a need for markedly increased amounts of the substance to achieve intoxication or desired effect
  - (b) markedly diminished effect with continued use of the same amount of the substance
- (2) withdrawal, as manifested by either of the following:
  - (a) the characteristic withdrawal syndrome for the (respective) substance
  - (b) the same (or a closely related) substance is taken to relieve or avoid withdrawal symptoms
- (3) the substance is often taken in larger amounts or over a longer period than was intended
- (4) there is a persistent desire or unsuccessful efforts to cut down or control substance use
- (5) a great deal of time is spent in activities necessary to obtain the substance (e.g., visiting multiple doctors or driving long distances), use the substance (e.g., chain-smoking), or recover from its effects
- (6) important social, occupational, or recreational activities are given up or reduced because of substance use
- (7) the substance use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance (e.g., current cocaine use despite recognition of cocaine-induced depression, or continued drinking despite recognition that an ulcer was made worse by alcohol consumption)

Note: The criteria presented originate from the American Psychiatric Association's classification of "substance dependence" (2000, p. 197), which is similar to the World Health Organization's classification of the "dependence syndrome" (1992).

diction, no psychotropic substances are ingested. Instead, the psychotropic effect results from biochemical changes in the body. These are triggered by rewarding activities that are then engaged in excessively (Holden, 2001).

Given the variety of potential classification frameworks for online gaming addiction, it appears to be crucial to evaluate each one individually. For this purpose, a literature review was undertaken. The specific aims of this review were to (i) present the classification basis of online gaming addiction using frameworks of officially recognized mental disorders as outlined in the current versions of the Diagnostic and Statistical Manual for Mental Disorders DSM-IV-TR (APA, 2000) and the International Classification of Mental and Behavioral Disorders ICD-10 (WHO, 1992), (ii) identify contemporary empirical studies that assess online gaming addiction in children and adolescents, and (iii) present and evaluate their findings against the background of the established official criteria. For this purpose, the empirical studies identified from the current scientific knowledge base will be delineated and evaluated.

## METHOD

The database Web of Knowledge was used to identify all empirical studies published through October 31, 2011. Web of Knowledge not only contains peer-reviewed articles and conference proceedings from various social sciences (e.g., medicine and psychology), but it also makes use of papers in the natural sciences and arts and humanities. Therefore, it can be considered to be considerably more comprehensive than other commonly used databases, such as Psycinfo or PubMed. For the purpose of broad coverage, further studies were accessed via Google Scholar. The search terms utilized to detect the relevant studies were "online gam\*", "Internet gam\*", "computer gam\*", "video gam\*", "addict\*", "dependen\*", "excess\*", and "patholog\*". The inclusion criteria upon which the studies were selected were: (i) the inclusion of empirically collected data, (ii) an assessment of online gaming addiction in some form, (iii) the inclusion of children and adolescents (aged 8–18 years) in the sample, (iv) publication in peer-reviewed journals, (v) full text availability, (vi) publication after the year 2000, and (vii) written in either English or German language since these are the authors' main languages. This timeframe was applied because

studies that were published earlier than 2000 were assumed to have a focus different from online games (i.e., they specifically assessed console or arcade video games without an equivalent on the Internet). Following the comprehensive literature search, 30 empirical studies were identified as meeting the inclusion criteria.

## RESULTS

Following a thorough review of the current empirical studies, the latter were classified in accordance with the diagnostic framework that the authors' utilized to identify potentially pathological online game use. Online gaming addiction in these 30 studies was assessed using different classification schemes. These included those based on the criteria for pathological gambling ( $n = 18$ ), those based on the criteria for substance dependence ( $n = 3$ ), those based on a combination of both pathological gambling and substance dependence ( $n = 3$ ), those based on parental referral ( $n = 2$ ), and those based on other miscellaneous classification criteria ( $n = 4$ ). Each of these will be described and subsequently evaluated. An overview is presented in Table 3.

### Online gaming addiction based on the criteria for pathological gambling

Based on the database literature search, 18 studies were identified that assessed online gaming addiction by means of using adapted diagnostic criteria for pathological gambling and impulse control disorders not otherwise specified (Chan & Rabinowitz, 2006; Dongdong, Liao & Khoo, 2011; Gentile, 2009; Gentile et al., 2011; Han et al., 2007, 2009; Kwon, Chung & Lee, 2011; Lemmens, Valkenburg & Peter, 2009, 2011a, 2011b; Rau, Peng & Yang, 2006; Thomas & Martin, 2010; van Rooij, Schoenmakers, van de Eijnden & van de Mheen, 2010; van Rooij, Schoenmakers, Vermulst, van de Eijnden & van de Mheen, 2011; Wan & Chiou, 2006a, 2006b, 2007).

In order to assess online gaming addiction, six studies (Chan & Rabinowitz, 2006; Han et al., 2007, 2009; Kwon et al., 2011; Rau et al., 2006; Thomas & Martin, 2010) used an adapted version of Young's (1998) Internet Addiction Scale (Widyanto & McMurran, 2004; Young, 1996a, 1996b,



Table 3. Overview of included empirical studies

Study	Sample and design	Instruments	Addiction criteria, symptoms and prevalence
Allison, von Wahldt, Shockley and Gabbard (2006)	<ul style="list-style-type: none"> <li>– N = 1 male adolescent playing computer games excessively (age = 18)</li> <li>– Participant underwent multidisciplinary assessment for 3 days at a psychiatric clinic</li> </ul>	<ul style="list-style-type: none"> <li>Variety of psychological tests incl. WAIS, MMPI, psychiatric interviews, and social work evaluation of his family</li> </ul>	<ul style="list-style-type: none"> <li>– “Game addiction”</li> <li>– No specific diagnostic tool used</li> <li>– 12–16 h gameplay/day</li> <li>– No sleep, limited real-life social contacts</li> <li>– Escapism motivation, obsession with gaming</li> <li>– Symptoms: gaming “overshadowed” participant’s life, continuously missed classes at school, diminished energy, poor concentration, fatigue, muscle tension</li> </ul>
Batthyány, Müller, Benker and Wölfling (2009)	<ul style="list-style-type: none"> <li>– N = 1,231 students (grades 3–5) in Vienna (46% female)</li> <li>– Survey</li> </ul>	<ul style="list-style-type: none"> <li>– Assessment of Computer Game Addiction in Children – Revised (CSVK-R) (Thalemann, Albrecht &amp; Grüsser, 2004)</li> </ul>	<ul style="list-style-type: none"> <li>– “Excessive computer game play” found in 12% (n = 1,068; 10% abusive, 3% dependent behavior)</li> <li>– Based on criteria of substance dependence (DSM IV-TR and ICD-10)</li> <li>– Distinction between normal, salient, abusive and addicted</li> </ul>
Bear, Bogusz and Green (2011)	<ul style="list-style-type: none"> <li>– N = 102 adolescents (age range = 11–17 years) from out-patient psychiatric clinics in Canada</li> <li>– Surveys completed by children and their parents</li> </ul>	<ul style="list-style-type: none"> <li>– Self-devised Computer/Gaming-station Addiction Scale (CGAS) assessing criteria derived from impulse-control and substance-abuse disorder (based on Ko, Yen, Chen, Chen &amp; Yen, 2005b) on a continuum</li> <li>– Strength and Difficulties Questionnaire (Goodman, Ford, Simmons, Gatward &amp; Meltzer, 2000)</li> <li>– Weiss Functional Impairment Rating Scale-parent (WFIRS-P) (Weiss, 2008)</li> </ul>	<ul style="list-style-type: none"> <li>– Addiction score significantly correlated with higher difficulties, less prosocial behavior in both child and parent reports (i.e., positive correlations with emotional, conduct, and peer problems, and hyperactivity, and negative correlation with prosocial behavior), and functional impairment (i.e., family, learning, life skills, self-concept, and social activity)</li> <li>– Clear distinction between increased gaming time and addiction (gaming time did not correlate with any of the measures)</li> </ul>
Chan and Rabinowitz (2006)	<ul style="list-style-type: none"> <li>– N = 72 adolescents (8<sup>th</sup> and 9<sup>th</sup> grades) recruited from high school and N = 72 parents</li> <li>– Survey with sections for adolescents and their parents</li> </ul>	<ul style="list-style-type: none"> <li>– Young’s Internet Addiction Scale, modified for VGs (YIAS-VG) (Widyanto &amp; McMurrin, 2004) with good internal consistency, reliability and validity</li> <li>– Time spent playing VGs, watching TV, using the Internet</li> <li>– Conners’ Parent Rating Scale (CPRS; Conners, Sitareinos, Parker &amp; Epstein, 1998) incl. sections on oppositional, hyperactivity, inattention, and ADHD categories</li> </ul>	<ul style="list-style-type: none"> <li>– “Excessive console and Internet video game use”</li> <li>– 6 components of addiction: salience, excessive use, neglecting work, anticipation, lack of control, neglecting social life</li> </ul>
Chiu, Lee and Huang (2004)	<ul style="list-style-type: none"> <li>– N = 1,228 students in grades 5–8, sampled from 20 primary and junior high schools in Northern Taiwan</li> <li>– Survey</li> </ul>	<ul style="list-style-type: none"> <li>– Game Addiction Scale (based on Buchman &amp; Funk, 1996; Clymo, 1996)</li> <li>– Demographics including academic achievement</li> <li>– Sensation seeking (including being assertive, bold, and ambitious)</li> <li>– Boredom Inclination Scale (based on Farrell, 1990)</li> </ul>	<ul style="list-style-type: none"> <li>– “Video game addiction”, unspecified</li> <li>– 9-item self-devised scale that assesses 2 factors: game addiction and game concern; <math>\alpha = 0.86</math></li> <li>– Female gender, lower functioning, higher sensation seeking, and higher boredom inclination predict game addiction</li> </ul>
Choo, Gentile, Sim, Li, Khoo and Liau (2010)	<ul style="list-style-type: none"> <li>– N = 2,998 primary and secondary school children in Singapore (73% males; mean age = 11 years, SD = 2 years)</li> <li>– Survey questionnaire</li> </ul>	<ul style="list-style-type: none"> <li>– Pathological Video-Gaming Scale (Gentile, 2009) based on DSM-IV criteria for pathological gambling (min. 5/10 criteria had to be fulfilled for diagnosis)</li> <li>– General Media Habits Questionnaire (GMHQ) (Anderson &amp; Dill, 2000)</li> <li>– Adult Involvement in Media Scale (Anderson, Gentile &amp; Buckley, 2007; Gentile, Lynch, Linder &amp; Walsh, 2004)</li> </ul>	<ul style="list-style-type: none"> <li>– Prevalence of pathological gaming: 8.7% (12.6% boys, 4.7% girls)</li> <li>– Compared to non-pathological gamers, pathological gamers play 2× more, significantly more likely to have video-game system in bedroom, visit LAN centres, receive poorer grades, more impulse control problems, poorer social competence, greater hostile cognitions, more video-gaming related problems</li> </ul>

Table 3 (cont.)

Study	Sample and design	Instruments	Addiction criteria, symptoms and prevalence
Choo, Gentile, Sim, Li, Khoo and Liao (2010) (cont.)		<ul style="list-style-type: none"> <li>– Barratt Impulsiveness Scale (Patton, Stanford &amp; Barratt, 1995)</li> <li>– Personal Strengths Inventory – II (Liao, Chow, Tan &amp; Senf, 2011)</li> <li>– Hostile cognition (Huesmann &amp; Guerra, 1997)</li> <li>– General Mental Health Survey (Crystal et al., 1994)</li> <li>– Functional impairment (adapted from Charlton, 2002)</li> <li>– Raven’s Standard Progressive Matrices Plus (SPM Plus) (Raven, Styles &amp; Raven, 1998)</li> </ul>	<ul style="list-style-type: none"> <li>(incl. health problems), fights with parents over video games, getting little sleep, being late for school, decrease in social contacts, neglect of self-care, relying on friends for homework</li> <li>– Amount of gaming itself insufficient to define pathological gaming</li> </ul>
Cultrara and Har-El (2002)	<ul style="list-style-type: none"> <li>– N = 1 17-year-old boy with suprahyoid muscular hypertrophy caused by video game play</li> <li>– Case report</li> </ul>	<ul style="list-style-type: none"> <li>– Medical examinations</li> <li>– Patient’s history, physical, radiologic, intraoperative, and pathologic finding</li> </ul>	<ul style="list-style-type: none"> <li>– “Excessive video game play”</li> <li>– No specific diagnostic tool used</li> <li>– Muscle hypertrophy secondary to increased activity</li> <li>– Patient stopped video game play and within 4 months, submental mass decreased in size</li> </ul>
Dongdong, Liao and Khoo (2011)	<ul style="list-style-type: none"> <li>– N = 161 secondary school students in Singapore with MMO gaming experience (age range = 13–15 years; mean age = 14 years, SD = 0.7 years; 49% boys)</li> <li>– Questionnaire</li> </ul>	<ul style="list-style-type: none"> <li>– Pathological Gaming Scale (Choo et al., 2010): 10-item scale based on pathological gambling criteria with acceptable reliability (Cronbach’s <math>\alpha = 0.75</math>)</li> <li>– Self Attribute Statement Scale (based on Dittmar, 2005)</li> <li>– MMO Player Motivation Scale (modified from Yee, 2007)</li> <li>– Asian Adolescent Depression Scale (Woo et al., 2004)</li> </ul>	<ul style="list-style-type: none"> <li>– Pathological gaming explained as a function of actual-ideal self-discrepancy, depression, and escapism</li> <li>– Escapism found to have strongest direct influence on pathological gaming</li> <li>– No gender difference in pathological gaming found</li> </ul>
Gentile, Choo, Liao, Sim, Li, Fung and Khoo (2011)	<ul style="list-style-type: none"> <li>– N = 3,034 children in grades 3 (n = 743), 4 (n = 711), 7 (n = 916), 8 (n = 664) from 6 secondary schools (5 boyschools)</li> <li>– 2-year longitudinal study</li> </ul>	<ul style="list-style-type: none"> <li>– Pathological video game use (Gentile, 2009)</li> <li>– Problematic gaming (Charlton, 2002)</li> <li>– General Media Habits Questionnaire (Gentile et al., 2004; Anderson et al., 2007)</li> <li>– Barratt Impulsiveness Scale (Patton et al., 1995)</li> <li>– Personal Strengths Inventory II (Liao et al., 2011)</li> <li>– Children’s Empathic Attitudes Questionnaire (Funk, Fox, Chan &amp; Curtiss, 2008)</li> <li>– Normative beliefs about aggression (Huesmann &amp; Guerra, 1997)</li> <li>– Hostile attribution bias (Crick, 1995)</li> <li>– Aggressive fantasies (Huesmann &amp; Eron, 1986; Nadel, Spellmann, Alvarez-Canino, Lausell-Bryant &amp; Landsberg, 1996)</li> <li>– Self-report of aggression (Linder, Crick &amp; Collins, 2002)</li> <li>– Parent–family connectedness (Resnick et al., 1997)</li> <li>– ADHD screen (University of Massachusetts Medical School, 2007)</li> <li>– Asian adolescent depression scale (Woo et al., 2004)</li> <li>– Anxiety (Birmaher et al., 1997)</li> <li>– Social phobia (Connor, Davidson, Churchill, Sherwood &amp; Weisler, 2000)</li> <li>– School performance</li> </ul>	<ul style="list-style-type: none"> <li>– “Pathological gaming”</li> <li>– Definition based on APA criteria: min. 5/10 items endorsed for pathology classification</li> <li>– Pathological gaming prevalence: 9%</li> <li>– Risk factors for pathological gaming: much gaming, low social competence, greater impulsivity</li> <li>– Outcomes of pathological gaming: depression, anxiety, social phobias, lower school performance</li> </ul>

Table 3 (cont.)

Study	Sample and design	Instruments	Addiction criteria, symptoms and prevalence
Gentile (2009)	<ul style="list-style-type: none"> <li>– Stratified sample of N = 1,178 US residents (8–18 years) with equal gender and age distribution</li> <li>– 20 min omnibus online survey</li> </ul>	<ul style="list-style-type: none"> <li>– Pathological Gaming Scale (pathological = satisfies min. 6/11 criteria)</li> <li>– Several items for children’s video-game habits (adapted from Anderson et al., 2007; Gentile et al., 2004)</li> </ul>	<ul style="list-style-type: none"> <li>– 8.5% of gamers (88% gamers in total sample) classified as pathological</li> <li>– Compared to non-pathological gamers, pathological gamers were significantly more likely to play for more years, play more frequently and for more time, be more familiar with video-game rating symbols, have worse grades ins school, have difficulties with attention and ADHD, have more health problems, feel addicted to games and have friends that were addicted to games</li> </ul>
Grüsser, Thalemann, Albrecht and Thalemann (2005)	<ul style="list-style-type: none"> <li>– N = 323 children, age range = 11–14 years, M = 12 years, SD = 1; 54% males</li> <li>– Questionnaire distributed in school</li> </ul>	<ul style="list-style-type: none"> <li>– Assessment of Computer Game Addiction in Children – Revised (CSVK-R) (Thalemann et al., 2004)</li> </ul>	<ul style="list-style-type: none"> <li>– “Excessive computer/video game play” present in 9% of sample</li> <li>– Based on criteria of substance dependence (DSM IV-TR and ICD-10)</li> <li>– Distinction between normal, salient, abusive and addicted</li> </ul>
Han, Lee, Na, Ahn, Chung, Daniels, Haws and Renshaw (2009)	<ul style="list-style-type: none"> <li>– N = 62 children with ADHD (52 males; mean age = 9 years, SD = 2)</li> <li>– Questionnaire and visual continuous performance test</li> </ul>	<ul style="list-style-type: none"> <li>– Internet Addiction Scale (Young, 1996b; Korean version) with good internal consistency</li> <li>– ADHD rating scale (So, Noh, Kim, Ko &amp; Koh, 2002)</li> <li>– Computerized Neurocognitive Function Test (Kim et al., 2006)</li> </ul>	<ul style="list-style-type: none"> <li>– 52% comorbidity between “Internet video game addiction” and ADHD</li> </ul>
Han, Lee, Yang, Kim, Lyoo and Renshaw (2007)	<ul style="list-style-type: none"> <li>– N = 79 male excessive Internet game players and 75 healthy controls recruited from high schools in South Korea (mean age = 16 years, SD = 1 year)</li> <li>– Self-report questionnaires and genotyping</li> </ul>	<ul style="list-style-type: none"> <li>– Internet Addiction Scale (Young, 1998) with good internal consistency</li> <li>– Reward dependence (RD) scale of Cloninger’s Temperament and Character Inventory</li> <li>– Frequencies of 3 dopamine polymorphisms</li> <li>– SCID I (First, Gibbon, Spitzer &amp; Williams, 1996)</li> </ul>	<ul style="list-style-type: none"> <li>– “Excessive Internet game players” have higher prevalence of Taq1A1 and low activity (COMTL) alleles</li> </ul>
Kim and Kim (2010)	<ul style="list-style-type: none"> <li>– Phase 1: N = 1,422 5<sup>th</sup> graders (47% females, mean age = 12 years) recruited from 7 private elementary schools in South Korea</li> <li>– Phase 2: N = 199 8<sup>th</sup> graders (mean age = 15 years) from private junior high school</li> <li>– Phase 3: N = 393 11<sup>th</sup> graders (50% females, mean age = 18 years) from 2 public high schools</li> <li>– Survey</li> </ul>	<ul style="list-style-type: none"> <li>– Problematic Online Game Use Scale (based on Armstrong, Phillips &amp; Saling, 2000; Caplan, 2002; Charlton &amp; Danforth, 2007; Lee &amp; Ahn, 2002; Young, 1999) with good reliability, convergent and discriminant validity</li> </ul>	<ul style="list-style-type: none"> <li>– “Problematic online game use”</li> <li>– Criteria assessed: euphoria, health problem, conflict, failure of self-control, preference for virtual relationship</li> </ul>
King and Delfabbro (2009)	<ul style="list-style-type: none"> <li>– N = 38 (23 adolescents (15 males, mean age = 16 years, SD = 1; video game playing = 15 hrs/week, SD = 12 hours); 15 adults (11 males, mean age = 30 years, SD = 7; video game playing = 18 hrs/week, SD = 11)</li> <li>– Pilot interview study with 7 semi-structured group interviews</li> </ul>	<ul style="list-style-type: none"> <li>– Questions on playing motivations, and psychosocial context of excessive video game playing behavior</li> </ul>	<ul style="list-style-type: none"> <li>– “Excessive video game play”</li> <li>– No specific diagnostic measure used</li> <li>– Online Role-playing Games more rewarding than casual games ♦ more addictive</li> </ul>



Table 3 (cont.)

Study	Sample and design	Instruments	Addiction criteria, symptoms and prevalence
Ko, Yen, Chen, Chen and Yen (2005a)	– N = 221 online game playing adolescents (63% males; mean age = 13.8 years, SD = 0.7 years, range = 13–15 years) recruited in junior high school – Survey	– Chinese Internet Addiction Scale (Chen, Weng, Su, Wu & Yang, 2003): continuous measure including 26 items that assess five dimensions, namely compulsive use, withdrawal, tolerance, interpersonal relationships, health and time management (Cronbach's $\alpha = 0.96$ ) – Rosenberg Self-Esteem Scale (Rosenberg, 1965) – Questionnaire for Playing Online Games to assess age of gaming begin, time and money spent playing, location of play, and motives for play; daily life satisfaction and total number of stressors encountered in daily life	– Males significantly more likely to be addicted to playing online games than females – For males, older age, lower self-esteem, and lower daily life satisfaction predicted online gaming addiction
Kwon, Chung and Lee (2011)	– N = 1,136 middle school students in Seoul, Korea (61% males; mean age = 14 years, SD = 0.5) – Questionnaire	– Internet Game Addiction (IGA) (modified from Young, 1996a) – Real-Ideal Self Discrepancy (R-I self) (Hoge & McCarthy, 1983) – The Escape from Self Scale (Shin, 1992) – Current Negative Mood Scale (Lee, 1991) – Peer Intimacy Scale (Ray & Cohen, 1997), Korean version – Perceived Parent–Child Relationship Scale – Parent (Lee, 1981) – Perceived Parental Supervision Scale (Korean Institute of Criminal Justice Policy, 1998)	– Main finding: IGA is a consequence of escape from self – IGA most strongly predicted by escape, followed by perceived parent hostility, real-ideal self discrepancy, and parental supervision – Study provides empirical evidence for Baumeister's escape from self theory (Baumeister, 1991)
Lemmens, Valkenburg and Peter (2011b)	– N = 851 Dutch adolescents (543 gamers; age range 11–17 years, M = 13.9, SD = 1.4; 51% male) – 2-wave panel study including a paper- and pencil survey distributed in schools	– Pathological gaming (Lemmens et al., 2009) with good convergent validity and criterion validity – Time spent on games – UCLA Loneliness Scale (Russell, 1996) – Satisfaction with Life Scale (Diener, Emmons, Larsen & Griffin, 1985) – Social competence (based on Buhrmester, Furman, Wittenberg & Reis, 1988; Inderbitzen & Foster, 1992) – Self-Esteem Scale (Rosenberg, Schooler & Schoenbach, 1989)	– “Pathological gaming” – Criteria: salience, tolerance, mood modification, relapse, withdrawal, conflict, problems – Social competence, self-esteem, and loneliness predicted pathological gaming six months later – Low psychosocial well-being is antecedent and loneliness is consequence of pathological gaming
Lemmens, Valkenburg and Peter (2011a)	– N = 851 Dutch adolescents (age range 11–17 years, M = 13.9, SD = 1.4; 51% male; 540 game players, 30% female) – 2-wave panel study including a paper and pencil survey that was distributed in schools	– Pathological gaming (Lemmens et al., 2009) with good convergent validity and criterion validity – Time spent on games – Violent game play (games played analyzed for violent content using Pan-European Game Information database using weighted measure of time spent on violent games) – Physical Aggression Subscale of Aggression Questionnaire (Buss & Perry, 1992)	– “Pathological gaming” – Salience, tolerance, mood modification, relapse, withdrawal, conflict, problems – More gaming predicted more time spent on gaming six months later – Pathological gaming increased physical aggression in boys
Lemmens, Valkenburg and Peter (2009)	– 2 independent samples of Dutch game-playing adolescents (N = 352 and 369) recruited from 6 schools of secondary education (32% girls; age range: 12–18 years, mean age = 15 years, SD = 1.5) – 2 surveys	– Game Addiction Scale for Adolescents with good reliabilities and concurrent validity – Time spent on games – UCLA Loneliness Scale (Russell, 1996) – Satisfaction with Life Scale (Diener et al., 1985)	– “Game addiction” – Criteria measured: salience, tolerance, mood modification, relapse, withdrawal, conflict, problems – Game addiction correlated with use, loneliness, life satisfaction, social competence, and aggression

Table 3 (cont.)

Study	Sample and design	Instruments	Addiction criteria, symptoms and prevalence
Lemmens, Valkenburg and Peter (2009) (cont.)		<ul style="list-style-type: none"> <li>– Social competence (based on Buhrmester et al., 1988; Inderbitzen &amp; Foster, 1992)</li> <li>– Physical Aggression Subscale of Aggression Questionnaire (Buss &amp; Perry, 1992)</li> </ul>	
Rau, Peng and Yang (2006)	<ul style="list-style-type: none"> <li>– N = 64, age range: 9–20; n = 26 expert players (only males), n = 38 novices (16 females); education levels: from elementary to graduate school</li> <li>– Experimental study</li> </ul>	<ul style="list-style-type: none"> <li>– Internet Addiction Self-test (IAT; based on Young, 1996a)</li> <li>– Experiment: Participants were playing Diablo in cybercafe</li> </ul>	<ul style="list-style-type: none"> <li>– “Internet addiction” found in 8%</li> <li>– Discrepancy between self-report and questionnaire scores</li> </ul>
Rehbein, Kleimann and Möble (2010)	<ul style="list-style-type: none"> <li>– N = 44,910 German 9<sup>th</sup> graders (mean age = 15 years, SD = 1; 51% male; mean VG usage/day = 2 hrs)</li> <li>– German nationwide survey, conducted by Criminological Research Institute of Lower Saxony (KFN)</li> </ul>	<ul style="list-style-type: none"> <li>– Video Game Dependency Scale based on Internet Addiction Scale (Hahn &amp; Jerusalem, 2001) adapted for video game dependency (Rehbein &amp; Borchers, 2009) with good discriminatory power</li> </ul>	<ul style="list-style-type: none"> <li>– “Video game dependency”: diagnosed in 3% of males, 0.3% of females</li> <li>– 3% classified as at risk and 2% as dependent on video games (mainly boys: 5% at risk and 3% dependent; girls: 0.5% are at risk and 0.3% are dependent)</li> <li>– 90% of youths at risk, 91% of dependents are males</li> <li>– Based on ICD-10 criteria of dependency</li> <li>– Criteria: preoccupation/salience, conflict, loss of control, withdrawal symptoms, tolerance</li> </ul>
Salguero and Moran (2002)	<ul style="list-style-type: none"> <li>– N = 223 Spanish adolescents (age range: 13–18 years, mean age = 15 years, SD = 1; 53% male)</li> <li>– Questionnaires distributed during tutorials in school</li> </ul>	<ul style="list-style-type: none"> <li>– Problem Video Game Playing Scale (PVP; self-devised scale, unidimensional, acceptable internal consistency, good construct validity)</li> <li>– Severity of Dependence Scale (Gossop et al., 1995)</li> <li>– Demographics</li> </ul>	<ul style="list-style-type: none"> <li>– “Problem video game playing”</li> <li>– Self-devised questionnaire (9 items) assessing problem video game playing based on DSM criteria for substance dependence and pathological gambling present in previous year cross-validated with results of Severity of Dependence Scale (Gossop et al., 1995)</li> </ul>
Skoric, Teo and Neo (2009)	<ul style="list-style-type: none"> <li>– N = 333 elementary school video gamers from Singapore (age range = 8–12 years, mean age = 10 years, SD = 1; 54% males, 57% Chinese, 34% Malay)</li> <li>– Two-survey studies</li> </ul>	<ul style="list-style-type: none"> <li>– Assessment of addiction tendencies (based on APA, 2000; Danforth, 2003) with good internal reliability</li> <li>– Assessment of engagement tendencies (based on Brown, 1991)</li> <li>– Demographics</li> <li>– Amount of time spent playing video games</li> <li>– School grades</li> </ul>	<ul style="list-style-type: none"> <li>– “Video game addiction”</li> <li>– Criteria: behavioral salience, conflict, withdrawal symptoms (based on Brown, 1991, 1993) and further unspecified DSM-IV items</li> </ul>
Thomas and Martin (2010)	<ul style="list-style-type: none"> <li>– N = 1,326 students (990 secondary and 335 college students, 657 females, grades 7–13) and N = 705 (509 female, mean age = 22 years, SD = 7, 84% Australian) university students</li> <li>– Questionnaire distributed in schools</li> </ul>	<ul style="list-style-type: none"> <li>– Addiction (adapted from Fisher, 1994; Young, 1998)</li> <li>– Participation habits</li> </ul>	<ul style="list-style-type: none"> <li>– “Video-arcade/computer game/Internet addiction”</li> <li>– Salience, mood modification, tolerance, withdrawal, loss of control, conflict, relapse, and escape (min. 5/8 met for addiction classification)</li> <li>– Addiction to video-arcade games (4%), computer games (5%) and the Internet (5%)</li> <li>– Prevalence of social computer game users (55%) and Internet addiction (56%)</li> </ul>
Van Rooij, Schoenmakers, Vermulst, van den Eijnden and van de Mheen (2011)	<ul style="list-style-type: none"> <li>– N = 3,048 Dutch adolescent online gamers (first four classes of Dutch secondary school, age range: 13–16)</li> <li>– Sample stratified according to region, urbanization, and education level</li> </ul>	<ul style="list-style-type: none"> <li>– Compulsive Internet Use Scale (Meerkerk, Van den Eijnden, Vermulst &amp; Garretsen, 2009) with good concurrent, construct validity, and internal consistency</li> <li>– Weekly hours online gaming</li> <li>– Rosenberg’s Self-Esteem Scale (Rosenberg et al., 1989)</li> </ul>	<ul style="list-style-type: none"> <li>– “Online video game addiction” found in 3%, representative of 1.5% of 13–16 years old Dutch children</li> <li>– Loss of control, preoccupation, conflict, withdrawal symptoms, and coping</li> </ul>

Table 3 (cont.)

Study	Sample and design	Instruments	Addiction criteria, symptoms and prevalence
Van Rooij, Schoenmakers, Vermulst, van den Eijnden and van de Mheen (2011) (cont.)	– Repeated cross-sectional survey study with a longitudinal cohort based on Dutch Monitor Study Internet and Youth including a 1 hour questionnaire completed in schools	– UCLA Loneliness Scale (Russell, Peplau & Cutrona, 1980) – Depressive Mood List (Engels, Finkenauer, Meeus & Dekovic, 2001; Kandel & Davies, 1986; Kandel & Davies, 1982) – Revised Social Anxiety Scale for Children (La Greca & Stone, 1993)	
Van Rooij, Schoenmakers, van den Eijnden and van de Mheen (2010)	– N = 4,920 (in 2007) and 4,753 (in 2008), mean age = 14, SD = 1; 78% Dutch adolescents – Survey study – Data obtained from Monitor Study Internet and Youth	– Compulsive Internet Use Scale (Meerkerk et al., 2009) with good concurrent, construct validity, and internal consistency – Online communications, games, and other Internet functions	– Loss of control, preoccupation, conflict, withdrawal symptoms, and coping – Online gaming has strongest association with “Compulsive Internet Use”
Wan and Chiou (2006a)	– Study 1: N = 177 Taiwanese adolescents (age range: 16–24) – Study 2: N = 182 frequent MMORPG players (age range: 16–22) – Survey studies	– Internet Addiction Scale for high schoolers in Taiwan with good internal consistency, construct and discriminatory validity (adapted from Lin & Tsai, 1999) – Optimal experience/flow state (Choi, Kim & Kim, 2000) – Self-developed Two-factor Evaluation on Needs for Online Games (TEN0) to measure intensity of psychological needs on satisfaction and dissatisfaction dimensions	– “Online game addiction” – Compulsive use/withdrawal, tolerance, related problems of family, school, and health, and related problems of peer interaction and finance
Wan and Chiou (2006b)	– N = 10 Taiwanese adolescents with online game addiction (6 chosen from Internet cafes, 4 were referred), 7 male, 8 students, all spent >48 hrs/week in game – In-depth interviews	– Internet Addiction Scale for high schoolers in Taiwan with good internal consistency, construct and discriminatory validity (adapted from Lin & Tsai, 1999) – Sentence completion test and semi-structured interviews, four realms: (1) surface motivations, (2) source motivations, (3) self-conception, and (4) interpersonal relationships in real life	– “Online game addiction” – Emergent themes: (1) addicts’ psychological needs and motivations; (2) online games as the everyday focus of the addicts; (3) the interplay of real self and virtual self; (4) online games as the compensatory or extensive satisfaction for addicts’ needs; and (5) addicts’ self-reflections
Wan and Chiou (2007)	– Study 1: N = 199 adolescents (age range: 16–23) – Study 2: N = 426 adolescents (age range: 17–24) – Survey studies	– Internet Addiction Scale with good internal consistency, construct and discriminatory validity (adapted from Lin & Tsai, 1999) – Online Gaming Motivation Scale (based on Choi & Kim, 2004; Chou & Hsiao, 2000; Ng & Wiemer-Hastings, 2005)	– “Online game addiction”

1998). More specifically, the IAS assesses the following addiction components: (i) salience, (ii) excessive use, (iii) neglecting work, (iv) anticipation, (v) lack of control, and (vi) neglecting social life. The scale was found to have good internal consistency, reliability and validity (Widyanto & McMurrin, 2004). In three studies, pathological gaming was measured by means of the Game Addiction Scale for Adolescents (Lemmens et al., 2009, 2011a, 2011b). The scale has good reliability and good concurrent, convergent and criterion validity, and measures the following addiction symptoms: salience, tolerance, mood modification, relapse, withdrawal, conflict, and problems (Lemmens et al., 2009).

In three other studies (Choo et al., 2010; Gentile, 2009; Gentile et al., 2011), pathological gaming was assessed using the Pathological Video Game Use Scale (Gentile, 2009).

This scale uses the DSM-IV-TR criteria for pathological gambling and diagnoses addiction when at least five (of ten) symptoms are met. Similarly, in another study (Dongdong et al., 2011), the Pathological Video Gaming Scale (Choo et al., 2010) was used. It is yet another measure utilizing the official DSM-IV criteria for pathological gambling and includes ten items. Moreover, two studies have used the Compulsive Internet Use Scale (Meerkerk et al., 2009) to assess online video game addiction (van Rooij et al., 2010, 2011). The scale measures symptoms that relate particularly to the compulsive and impulse control elements of the behavior, including loss of control, preoccupation, conflict, withdrawal symptoms and coping. It was found to have good concurrent and construct validity, as well as good internal consistency (Meerkerk et al., 2009). Finally, three studies

used the adapted version of the Internet Addiction Scale (Lin & Tsai, 1999). This scale measures compulsive use and withdrawal, tolerance, related problems of family, school, and health, and related problems of peer interaction and finance. It was found to have good internal consistency, construct and discriminatory validity (Lin & Tsai, 1999).

The samples used in these 18 studies included 72 adolescents in grades eight and nine (mean age = 15 years, SD = 1 year) as well as their parents (Chan & Rabinowitz, 2006), 62 children (mean age = 9 years, SD = 2 years) with Attention Deficit Hyperactivity Disorder (ADHD) (Han et al., 2009), 154 male adolescents (mean age = 16 years, SD = 1 year), half of which were excessive Internet game players (Han et al., 2007), 161 secondary school students in Singapore with MMO experience (mean age = 14 years, SD = 0.7 years) (Dongdong et al., 2011), large samples (the respective sample sizes ranged from more than 800 to less than 5,000 participants) of Dutch adolescents (mean age = 14 years, SD = 1 year) (Lemmens et al., 2011a, 2011b; van Rooij et al., 2010) and adolescent Dutch online game players (Ns = 721 and 3,048; age range = 13–17 years) (Lemmens et al., 2009; van Rooij et al., 2011), American youths (N = 1,178, age range = 8–18 years with equal gender and age distribution) (Gentile, 2009), Korean adolescents (N = 1,136, mean age = 14 years, SD = 0.5 years; 61% male) (Kwon et al., 2011), and Singaporean youth (N = 2,998, mean age = 11 years, SD = 2 years, 73% male), 64 children and adolescents (age range = 9–20 years) (Rau et al., 2006), 3,034 secondary school children (mean age = 11 years, SD = 2 years) (Gentile et al., 2011), 1,326 secondary school and college students (mean age = 22 years, SD = 7 years) (Thomas & Martin, 2010), 177 Taiwanese adolescents and young adults (age range = 16–24 years) (Wan & Chiou, 2006a, 2007), and 182 Taiwanese adolescent and young adult MMORPG players (age range = 16–22 years) (Wan & Chiou, 2006a), and ten Taiwanese adolescents with no explicit age specification with online game addiction (Wan & Chiou, 2006b).

With regards to classification, van Rooij et al. (2010) contend that compared to using the Internet for other applications (e.g., downloading, social networking, using messenger, chatting, blogging, etc.), online gaming has the strongest association with compulsive Internet use. This indicates that a subgroup of compulsive Internet users should be classified as compulsive online gamers. Based on these assessments, a prevalence estimate of compulsive Internet use in secondary school (age range = 9–16 years) and college students (mean age = 21 years, SD = 6 years) was provided by four studies (Choo et al., 2010; Gentile et al., 2011; Thomas & Martin, 2010; van Rooij et al., 2011). Online video game addiction was found to be present in 3% of Dutch adolescent online gamers, which is representative of 1.5% of 13–16 year old Dutch adolescents (van Rooij et al., 2011). Pathological gaming was found in 8.5% of US youth online gamers (Gentile, 2009) and in 9% of secondary school children in Singapore (Choo et al., 2010; Gentile et al., 2011). Finally, 4%, 5%, and 5% of secondary school and

college students were found to be addicted to video-arcade games, computer games, and the Internet, respectively. In addition, lifetime participation, frequency, and duration of playing games as well as the prevalence of addiction was found to be larger for Internet and computer games relative to video-arcade games (Thomas & Martin, 2010).

In terms of play patterns and motivations, in comparison to a healthy control group, adolescent excessive Internet game players in South Korea were reported to play more, play longer, and to have higher reward dependence (Han et al., 2007). Similarly, children and adolescent expert online game players were reported to have started playing online games earlier and to play longer than novice players (Gentile, 2009; Rau et al., 2006). Also, the expert players underestimated the time they spent playing online games (Rau et al., 2006). Similarly, more time spent on games predicted gaming addiction (Choo et al., 2010; Gentile, 2009; Gentile et al., 2011; Lemmens et al., 2009, 2011a). Moreover, it has been reported that ‘flow’ state<sup>2</sup> during game play was not predictive of addiction. Related to this, the absence of playing online games generated dissatisfaction (Wan & Chiou, 2006a, 2006b). Furthermore, Taiwanese adolescent online game addicts indicated that playing online games was a focus in their lives and the interplay between their real and their virtual selves was important to them (Wan & Chiou, 2006b). In addition, another study of Taiwanese adolescent and young adults reported online game addicts exhibited higher intrinsic motivation to play games rather than an extrinsic motivation compared to non-addicted adolescents (Wan & Chiou, 2007). Finally, escapism appeared as the most important factor predicting Internet gaming addiction (Kwon et al., 2011) and pathological gaming (Dongdong et al., 2011), followed by perceived parent hostility, real-ideal self-discrepancy, and parental supervision (Kwon et al., 2011), and actual-ideal self-discrepancy and depression (Dongdong et al., 2011).

With respect to psychosocial characteristics, it has been reported that low social competence was related to pathological gaming (Choo et al., 2010; Lemmens et al., 2011b), and that psychosocial well-being and self-esteem predicted pathological gaming six months later, with the same being true for high loneliness (Lemmens et al., 2011b). Moreover, low psychosocial well-being was found to be an antecedent, whereas loneliness was a consequence of pathological gaming (Lemmens et al., 2011b). Similarly, studies have shown that game addiction correlates with loneliness (Lemmens et al., 2009; van Rooij et al., 2011), low self-esteem (van Rooij et al., 2011), low life satisfaction (Lemmens et al., 2009), and low social competence (Choo et al., 2010; Gentile et al., 2011; Lemmens et al., 2009) and that pathological gamers are significantly more likely to have decreasing social contacts compared to non-pathological gamers (Choo et al., 2010). With regards to aggression, ambivalent findings were reported. In one study, no association was found between playing video games and oppositional and/or aggressive behavior (Chan & Rabinowitz, 2006). In two other studies, time spent gaming and pathological gaming increased physical aggression in boys (Lemmens et al., 2009, 2011a) and was found to be related to having more hostile cognitions (Choo et al., 2010), and greater impulsivity was reported to be a risk factor for pathological gaming (Choo et al., 2010; Gentile et al., 2011). Moreover, online gaming addiction was found to be associated with lower grade point average and school performance (Chan & Rabinowitz, 2006; Choo et al., 2010; Gentile, 2009; Gentile et al., 2011).

<sup>1</sup> Lin and Tsai’s scale (1999) is loosely based on Young’s original Internet Addiction Test (1998). The former is a self-devised scale that shares the same name with Young’s original scales since it measures a similar phenomenon.

<sup>2</sup> According to Csikszentmihalyi (1990), the flow state is characterized by an optimal experience, where the level of challenge of a task is matched with the person’s skill.



Regarding comorbidity, findings indicate a significant association between time spent playing games for more than one hour per day and Internet addiction, inattention, and number and intensity of ADHD symptoms (Chan & Rabinowitz, 2006; Gentile, 2009). Similarly, it was reported that 52% of children who had previously been diagnosed with ADHD were diagnosed with Internet video game addiction as well (Han et al., 2009). Moreover, the outcomes of pathological gaming included depression (Dongdong et al., 2011; Gentile et al., 2011; van Rooij et al., 2011), anxiety, and social phobias (Gentile et al., 2011; van Rooij et al., 2011), as well as physical health problems, such as hand and wrist pain (Choo et al., 2010; Gentile, 2009), and neglect of self-care (i.e., skipping meals, and insufficient personal hygiene) (Choo et al., 2010). With regards to pathophysiology, one study has reported that adolescent excessive Internet game players had a significantly higher number of Taq1A1 and low activity alleles (COMTL) relative to a healthy control group (Han et al., 2007). This suggests that genetic polymorphisms contribute to online gaming addiction. Overall, the presented studies suggest that online gaming addiction is reasonably similar to pathological gambling. Moreover, research indicates that children and adolescents who use online games in a way that is clinically noticeable experience symptoms that are typically experienced by those suffering from pathological gambling. Nevertheless, a number of pathological gambling symptoms are not entirely commensurate with online gaming addiction. These include the involvement of money that is increased throughout the gambling career as well as borrowed from family members and friends, the chasing of losses, and engaging in illegal acts. In light of pathological gambling, these symptoms appear to clearly demarcate excessive engagement from addiction. Since this classification does not hold true for online gaming addiction, it appears questionable in how far an exclusive reliance on pathological gambling criteria for the classification of online gaming addiction is appropriate, particularly when considering the monetary involvement.

However, some evidence suggests that rather than playing for money, gamblers play for the excitement and get aroused by taking risks (APA, 2000). Risk taking, in this regard, may include making larger bets. Similarly, gamers can take risks when they play online games, such as choosing to fight high-level opponents and working together with new group members. Similarly, they often pay monthly subscription fees to participate in the game, and often buy in-game items. Therefore, even the criterion of monetary involvement for pathological gambling appears to have a near equivalent in gaming addiction. Nevertheless, the chasing of losses appears to be unique to pathological gambling. Consequently, while gaming addiction is closely related to pathological gambling due to symptom similarity, it cannot entirely be equated with pathological gambling as gaming addiction appears to manifest itself somewhat differently. Accordingly, exclusively basing a diagnosis of gaming addiction on an adaptation of pathological gambling criteria is insufficient.

#### Online gaming addiction based on the criteria for substance dependence

Three studies were identified in the database search that adapted the official criteria for substance dependence in order to classify online gaming addiction (Batthyány et al.,

2009; Grüsser et al., 2005; Rehbein et al., 2010). The basis of assessment were the official criteria for substance dependence and the dependence syndrome as based on the international classification manuals (APA, 2000; WHO, 1992). More specifically, in two studies (Batthyány et al., 2009; Grüsser et al., 2005), excessive computer game play was diagnosed with the Assessment of Computer Game Addiction in Children – Revised (Fragebogen zum Computerspielverhalten bei Kindern, CSVK-R; Thalemann et al., 2004). Using this instrument, computer game play is classified as pathological when children and adolescents score a minimum of seven out of 27 points on the scale. The psychometric qualities of the scale have been validated (Thalemann et al., 2004). Moreover, video game dependency was diagnosed with the Video Game Dependency Scale (Rehbein & Borchers, 2009) that was adapted from the Internet Addiction Scale<sup>3</sup> (Hahn & Jerusalem, 2001). It assesses the following addiction criteria: preoccupation and salience, conflict, loss of control, withdrawal symptoms, and tolerance. Its discriminatory power was found to be good (Rehbein & Borchers, 2009).

The studies included 1,231 Austrian students in grades three to five (mean age = 14 years, SD = 1 year) (Batthyány et al., 2009), 323 children in Germany with a mean age of 12 years (SD = 1 year) (Grüsser et al., 2005), and a representative sample of 44,910 German ninth-graders with a mean age of 15 years (SD = 1 year) (Rehbein & Borchers, 2009). In terms of online gaming addiction prevalence, the German nationwide study indicated that 3% of the entire sample was classified as at-risk and 2% as being dependent on video games. Also, there appeared clear gender differences, with 91% of dependents being male. More specifically, 3% of male adolescents and 0.3% of female adolescents were diagnosed as dependent on playing video games, with 5% of males and 0.5% of females at-risk of developing dependence (Rehbein et al., 2010). Furthermore, using the cut-off point of 7, which includes both computer game abuse and addiction (i.e., dependence), it was reported that 9% of German children (Grüsser et al., 2005) and 12% of Austrian children (Batthyány et al., 2009) played computer games excessively. Of the latter, 10% were abusing computer games, whereas 3% were identified as dependent.

The primary motivation for playing video games was coping with daily stressors (Batthyány et al., 2009; Grüsser et al., 2005). Psychosocial problems that were found to be related to excessive computer game use included increased social conflict, stress (Batthyány et al., 2009), lower school achievement, increased truancy, and limited leisure time activities (Rehbein et al., 2010). Moreover, related psychopathological problems and comorbidities comprised concentration deficits, psychosomatic challenge, school phobia (Batthyány et al., 2009), reduced sleep time and increased suicidal ideations (Rehbein et al., 2010).

Analyzing these studies, it appears that the symptoms of online gaming addiction in children and adolescents are commensurate with the official symptoms for substance dependence. The only distinguishing feature is the lack of the ingestion of a psychoactive substance for people suffering from online gaming addiction. Moreover, the only nation-

<sup>3</sup> Similar to Lin and Tsai's scale (1999) Hahn and Jerusalem's Internet Addiction Scale (2001) is a self-devised measurement instrument that is not identical to Young's Internet Addiction Test (1998).

wide prevalence study conducted in Germany (Rehbein & Borchers, 2009) suggests that 2% of adolescents are addicted to online games. This is an important finding as it appears to show that online gaming addiction appears to be a genuine health problem for youth. Furthermore, this is emphasized by the deleterious effect that online gaming addiction has on adolescent health, including anxiety, psychosomatic, psychosocial and academic problems, and suicidal ideation.

#### Online gaming addiction based on the criteria for both pathological gambling and substance dependence

Three studies have made use of a classification framework based on self-devised scales combining both pathological gambling and substance dependence adapted criteria in order to diagnose potentially addictive online gaming behaviors (Bear et al., 2011; Salguero & Moran, 2002; Skoric et al., 2009). Salguero and Moran (2002) designed a 9-item scale that they cross-validated with results from the Severity of Dependence Scale (Gossop et al., 1995) in a sample of 223 Spanish adolescents aged 13–18 years. They reported that their Problematic Video Game Playing Scale measured a unidimensional construct, and had an acceptable internal consistency and good construct validity. Moreover, the authors concluded that problem video game play is similar to the dependence syndrome (Salguero & Moran, 2002).

Similarly, Skoric et al. (2009) developed a scale based on the American Psychiatric Association's criteria for pathological gambling and substance dependence (2000) as well as Danforth's classification of online game addiction (2003). The specific criteria included were behavioral salience, conflict, and withdrawal symptoms (based on Brown, 1991, 1993), as well as further unspecified DSM-IV symptoms (Skoric et al., 2009). They used a sample of 333 elementary school video gamers from Singapore aged 8–12 years. The findings indicated that online game addiction correlated negatively with performance in school. However, neither time spent playing games nor the engagement in games correlated with poor school performance (Skoric et al., 2009).

Bear et al. (2011) also created a scale that investigates both adolescents' as well as their parents' reports. It is based on criteria for Internet addiction for adolescents as proposed by Ko et al. (2005) and it includes the criteria for impulse control and substance abuse disorders. The items specifically assessing addiction criteria include (i) a preoccupation with computer/gaming-station activities, (ii) a failure to resist the impulse to use, (iii) tolerance, (iv) withdrawal, (v) longer than intended use, (vi) unsuccessful efforts to cut down, (vii) excessive efforts put into gaining access, and (viii) continued use despite the knowledge that it causes problems. Bear et al.'s Computer/Gaming-station Addiction Scale (CGAS) (2011) investigates these criteria on a continuum with addiction scores ranging from 8 to 40 points. In order to assess the patterns of computer and gaming station use in youth, they surveyed 102 adolescents aged between 11 and 17 years as well as their parents. The results indicate that the addiction score significantly correlated with experiencing more difficulties in life as well as less prosocial behavior as reported by both adolescents and their parents. Furthermore, the addiction score significantly correlated with functional impairments across multiple life domains, namely

family, learning, life skills, self-concept, and social activity (Bear et al., 2011).

These studies highlight two important facts. First, although in all three cases the authors relied on both substance dependence and pathological gambling criteria in order to assess online gaming addiction, from the information provided it appears that their focus was weighted on diagnostic criteria for substance dependence. To be more precise, Salguero and Moran (2002) specifically point out that online gaming addiction in adolescents is similar to the dependence syndrome, which indicates that the former is a genuine addiction worthy of clinical management. Second, the studies were conducted in Singapore, Spain and Canada and therefore the results may have varied because of the sociocultural embedding of the participants in their respective home country. Consequently, it would appear highly important to assess culturally-relevant factors in online gaming addiction in children and adolescents. Depending on the sociocultural context in which gaming occurs, in addition to the connotations online gaming has, gaming practices, the prevalence of online gaming addiction, and online gaming addiction symptoms may differ. Future researchers should therefore be encouraged to assess online gaming addiction in children and adolescents cross-culturally, using assessment instruments that are commensurate with an official clinical diagnosis of the disorder, and that pay respect to the cultures they are used in.

#### Online gaming addiction based on parental reports

In two studies (Allison et al., 2006; Cultrara & Har-El, 2002), the psychopathological status of two male adolescents addicted to online gaming was based on their parents' reports. Allison et al. (2006) reported the case of an 18-year-old male adolescent whose life, according to his parents, had been taken over by playing online role-playing games for up to 16 hours daily. The adolescent was admitted into a psychiatric hospital by his parents where he underwent a variety of psychological and psychiatric assessments for three days, including an intelligence test, a personality test, and diagnostic and psychosocially based interviews. His primary motivation was reported to be to escape from real life problems. His gaming resulted in a variety of psychosocial (limited real life social contacts, missing classes at school), psychosomatic (poor concentration, muscle tension), and psychopathological problems (diminished energy, fatigue) (Allison et al., 2006). Similar results have been noted in case studies of adult excessive gamers (Griffiths, 2010).

In a more unusual case, Cultrara and Har-El (2002) reported the account of a 17-year-old male adolescent who, during video game play, continuously moved his lower jaw up and down, repeatedly grimaced and swallowed, and protruded and retruded his tongue. This resulted in muscle hypertrophy that was found to be secondary to the actual activity of his excessive video game playing. Once he stopped playing video games, the submental mass that he had developed decreased in size (Cultrara & Har-El, 2002).

The above studies are significant for general reasons. First, they provide a qualitative account of how adolescents experience online gaming addiction as well as the symptoms associated with it. These in-depth insights not only provide a more elaborate description of individual experience, but they aid researchers in discerning what consequences online

gaming addiction can have for individual adolescents. Second, the studies highlight the fact that for many children and adolescents, it is their parents who initially realize that their children's online gaming extends beyond pure enjoyment of playing and can in fact be problematic.

In fact, a recent study suggests that contact with the Out-patient Clinic for Gaming Addictions in Mainz (Germany) was initiated by mothers of potentially addicted adolescents in 86% of the cases (Beutel, Hoch, Wöfling & Müller, 2011), suggesting that parental referral is important for some adolescents who have not yet discerned that their behavior may indeed be problematic. It also hints at the significance of social support particularly for adolescents because (i) they find themselves in critical periods of cognitive, behavioral, and social development during their adolescence, and (ii) they cannot overcome their problems by themselves and are thus in need of both social and professional assistance. Notwithstanding this, a professional evaluation of the situation and the adolescents' addiction status is an essential second step that may potentially lead to clinical treatment of online gaming addiction.

#### Online gaming addiction based on other miscellaneous classification criteria

Four studies (Chiu et al., 2004; Kim & Kim, 2010; King & Delfabbro, 2009; Ko et al., 2005a) could not be categorized in any of the aforementioned frameworks. Each of these is addressed in turn. Chiu et al. (2004) aimed to assess video game addiction in 1,228 children and adolescents in grades 5–8 in Taiwan. They used the self-devised Game Addiction Scale (based on Buchman & Funk, 1996; Clymo, 1996) comprising a 9-item scale that assesses two factors, namely game addiction and game concern. The reported internal consistency has a Cronbach's  $\alpha$  of 0.86. Unfortunately, from the information the authors provide in their paper, it is unclear how their term "video game addiction" was defined and what kinds of symptoms it included. Moreover, none of the referenced articles specifically addresses addiction and pathology. Nevertheless, they found that video game addiction correlated negatively with academic achievement and positively with hostility. Furthermore, lower function, higher sensation seeking, and higher boredom inclination predicted game addiction. Counter-intuitively, female gender predicted game addiction (Chiu et al., 2004).

Kim and Kim (2010) aimed to develop a measure of problematic online game use by identifying factors that underlie problematic online game use and to test the external validity of their scale by having three independent samples of 5<sup>th</sup>, 8<sup>th</sup> and 11<sup>th</sup>-graders in South Korea ( $n = 2,014$ ) participating in their study. They devised the Problematic Online Game Use Scale (based on Armstrong et al., 2000; Caplan, 2002; Charlton & Danforth, 2007; Lee & Ahn, 2002; Young, 1999) that assessed the following criteria: euphoria, health problem, conflict, failure of self-control, and preference for virtual relationships. They reported that their scale had good reliability, as well as convergent and discriminatory validity. Moreover, problematic online game use was found to be negatively correlated with academic self-efficacy and satisfaction with daily life and positively correlated with anxiety and loneliness (Kim & Kim, 2010).

King and Delfabbro (2009) investigated the psychological and social context of video game playing in order to understand excessive video game play using pilot group inter-

views with a sample of 23 adolescents (mean age = 16 years,  $SD = 1$  year) and 15 adults. Their findings indicated that online role-playing games were more rewarding and hence more addictive than casual games. Video game playing was defined as excessive when it "create[d] adverse personal and social consequences in a person's life" (p. 62). As hypothesized, they found that excessive video game players experienced a variety of problems, such as conflicts with important life responsibilities, they neglected their social relationships, scholastic and professional productivity suffered, they ignored their household duties, and they had irregular sleeping patterns (King & Delfabbro, 2009).

Finally, Ko et al. (2005a) assessed gender differences and related factors affecting online gaming addiction among 221 Taiwanese adolescents aged 13 to 15 years (mean age = 13.8 years,  $SD = 0.7$  years). They used the Chinese Internet Addiction Scale (Chen et al., 2003), a continuous measure that includes 26 items to assess five dimensions of problems related to Internet use, adapted to measure online gaming experiences exclusively. Investigated Internet-related problems include compulsive use, withdrawal, tolerance, interpersonal relationships, health, and time management. Originally, the scale was found to have a good internal consistency with a Cronbach's  $\alpha$  of 0.96 (Chen et al., 2003). The findings indicate that males are significantly more likely to be addicted to playing online games. Moreover, for males, several factors predicted online gaming addiction, namely older age, lower self-esteem, and lower daily life satisfaction (Ko et al., 2005a).

As the aforementioned studies used miscellaneous classification frameworks, they will be evaluated in turn. As mentioned previously, Chiu et al.'s (2004) study suffered from a variety of methodological and conceptual problems, such as the omission of defining video game addiction. Moreover, the finding that females were more likely to have a video game addiction appears questionable since numerous studies indicate the opposite (e.g. Rehbein & Borchers, 2009). This suggests that the measure used lacked sensitivity and specificity. Alternatively, one could argue that being a female is likely to be a better predictor of certain aspects of addiction because it is less commonly associated with addiction. In either case, these findings require further investigation.

The particularly insightful aspect of Kim and Kim's study (2010) was their reliance on game-immanent factors. They designed a scale that specifically assessed online gaming addiction, such as a preference for virtual relationships. Although their scale has been validated in different samples, its utility as a clinical assessment tool to clearly demarcate online gaming addiction from mere engagement (Charlton, 2002) has not been established. With regards to the symptoms it assesses, it also appears questionable in how far euphoria can be used as an addiction symptom from a conceptual point of view. Specifically, it has been asserted that healthy enthusiasm adds to life whereas addiction takes away from it (Griffiths, 2002). This suggests that euphoria does not necessarily have to feature within an addiction framework, as suggested by Charlton and Danforth (2007). In sum, although Kim and Kim's study (2010) assumes online game addiction as being entirely based on the virtual world, the respective criteria used for classifying online gaming addiction may prove less useful in a clinical context.

King and Delfabbro's study (2009) indicated that adolescents that play online games excessively experience a variety of problems because of their game play. Nevertheless, no



validated measurement tool was utilized to actually validate the participants' addiction status. Therefore, it appears relatively problematic to deduce implications for online gaming addiction and mental health status in adolescents from their study.

Finally, Ko et al.'s survey study (2005) did not use an assessment instrument that was based on established diagnostic criteria. Only very loosely are the criteria their measurement instrument uses commensurate to substance dependence because criteria such as tolerance and withdrawal were included. Thus, it is unclear on what basis the other criteria have been chosen and how online gaming addiction has been defined. No cut-off values were provided, and as such, clinical diagnosis is not possible. The authors however contend that "[b]efore constructing specific diagnostic criteria, it would be practical to measure levels of addiction to Internet use with a multidimensional and continuous questionnaire such as the CIAS" (Ko et al., 2005a, p. 277). However, they do not offer a reasonable explanation for why utilizing a continuous measure would make sense in the first place. Therefore, their logic seems flawed and puts the use of the CIAS into question. Ultimately, assessments of online gaming addiction must go beyond the purpose of furthering research endeavors in the area by specifically targeting potential clinical practices. Only then are the individuals who suffer from a potentially debilitating mental disorder heard and helped.

## DISCUSSION

This systematic literature review provides important insights into the state of current knowledge of online gaming addiction in children and adolescents. From the identified empirical studies, it appears that different classification schemes have been adopted, typically based on the official criteria for pathological gambling, substance dependence, or a combination of the two. Additionally, parental reports and other miscellaneous criteria and assessment instruments have been used to determine gaming addiction. From the identified studies, it appears that the large majority of studies adapted pathological gambling criteria in order to assess the extent to which online gaming addiction is present in samples of children and adolescents. This appears acceptable since online gaming and online gambling share a variety of similar characteristics that have been extensively discussed in the psychological literature for over 20 years (Griffiths, 2005; Johansson & Götestam, 2004). It suggests that monetary reward is not necessary in order to classify an excessive engagement with games as potential addiction and could potentially be substituted by a higher likelihood for risk-taking. Similarly, traditionally land-based gambling is gradually moving towards Internet portals (Kuss & Griffiths, 2012) and there are now a number of overviews highlighting the convergence between Internet, gaming and gambling (e.g., Griffiths, 2002; King, Delfabbro & Griffiths, 2010; ). This suggests that the (potentially pathogenetic) gaming and gambling activities are progressively converging. Nevertheless, although gaming and gambling share a variety of similarities, they cannot be necessarily equated with one another.

On the other hand, some researchers claim that the classification of behavioral addictions within the framework of

pathological gambling appears relatively insufficient and it can have negative consequences for actual treatment when no use is made of therapeutic elements for patients suffering from substance dependence (Poppelreuter & Gross, 2000). Moreover, in light of the diagnostic criteria for pathological gambling, impulsivity remains the main distinguishing characteristic. However, this explanation seems relatively inadequate given a deficiency in impulse control is also considered to be one of the main features of substance dependence (Volkow & Fowler, 2000). Applying knowledge from substance dependence treatments to those for a behavioral addiction may actually be beneficial over and above typical treatment for pathological gamblers. Similarly, the framework of behavioral addictions as based on its similarities with substance dependence seems particularly appealing as it incorporates the craving of behavioral addicts for engaging in their behavior and it also includes the physical and psychological discomfort and irritability they experience when they cannot engage in the behavior, both mirroring the symptoms of craving as well as withdrawal (Holden, 2001; Orford, 2001).

Furthermore, with non-chemical addictions, it appears that tolerance is another criterion that is not accounted for by a classification that is based on pathological gambling. However, tolerance appears to play an important role in behavioral addictions because addicts need to increase their engagement (i.e., the time and effort they invest in engaging in the activity) over the course of time in order to experience pleasurable effects, which may be seen as a homeostatic restoration of balance within the body (Grüsser & Thalemann, 2006). Thus, online gaming is used as a form of self-medication (Han et al., 2009). With regards to excessive online gamers, both individual accounts of behaviors as well as empirical quantitative findings show that as their addiction develops, online gaming addicts spend increasing amounts of time preparing for, organizing, and actually gaming (Chan & Rabinowitz, 2006; Kim & Kim, 2010; King & Delfabbro, 2009; Lemmens et al., 2011a). This is common among substance abusers, and it is one of the DSM criteria for substance dependence.

There is further evidence to suggest that problematic online gaming be conceptualized as a behavioral addiction rather than a disorder of impulse control. From a clinical perspective, patients suffering from behavioral addictions present with problems that are similar to those experienced by people suffering from substance dependencies (Poppelreuter & Gross, 2000; Shaffer & Kidman, 2003). In comparison to the phaseology model of alcoholism (Jellinek, 1946), it appears that those addicted to certain behaviors progress through different phases in their addiction as well, which was found to be true for pathological gamblers (Custer, 1987). This does not mean that a behavioral addiction, such as online gaming addiction, should be classified in the same way as pathological gambling, namely within the spectrum of impulse control disorders. Instead, both online gaming addiction and pathological gambling appear to fit better within the classification akin to substance dependencies, namely behavioral addictions. This is furthermore supported by the efforts of the American Psychiatric Association to include 'Gambling Disorder' in the category of substance-related and addictive disorders rather than impulse control disorders in the proposed new fifth edition of



the Diagnostic and Statistical Manual for Mental Disorders. Viewing pathological gambling as an addictive disorder (i.e., a behavioral addiction) can therefore be seen as the first step towards a reconceptualization of both substance-related and non-chemical addictions as spectrum disorders (Shaffer et al., 2004).

Another argument in favor of this conjecture relates to the high comorbidity rates of behavioral addictions with substance dependencies and vice versa (Poppelreuter & Gross, 2000). Similarly, comorbidities frequently experienced by substance users, such as affective and anxiety disorders as well as attention-deficit hyperactivity disorder, are experienced by pathological online gamers (Kuss & Griffiths, 2011). These comorbidities do not occur with persons who suffer from obsessive-compulsive disorders (Blanco, Moreyra, Nunes, Saiz-Ruiz & Ibanez, 2001). Also, there are further similarities between substance dependence and several behavioral addictions, namely with regards to the gender distribution as well as neuropsychology and neurocognition (Bechara, 2003; Ruge & Melamed, 1993). In terms of psychophysiology, it furthermore appears that there are additional analogies between substance dependence and pathological gambling (Reuter et al., 2005) and online gambling addiction (Han, Hwang & Renshaw, 2010; Hoeft, Watson, Kesler, Bettinger & Reiss, 2008; Ko et al., 2009). With regards to molecular genetics, polymorphisms in the D2 dopamine receptor genes and the Val158Met in the Catecholamine-O-Methyltransferase (COMT) genes have been found in pathological gamblers (Blum, Wood, Sheridan, Chen & Comings, 1995) and those addicted to online gaming (Han et al., 2007). These findings clearly substantiate the contention that online gaming addiction may indeed be viewed as behavioral addiction.

Additionally, it has been reported that pathological gamblers and alcoholics share an "excessive attachment" to their addiction of choice (Orford, Morison & Somers, 1996). Furthermore, Shaffer et al. (2004) contend that both behavioral and substance-related addictions share the same etiology. That is, antecedents for addiction include neurobiological (i.e., genetic risk) and psychosocial elements (i.e., psychological and sociological risk factors) that all contribute to the vulnerability for developing addiction. In addition to this, exposure and interaction with the substance/behavior of choice as well as a desirable shift in subjective state (i.e., the mood-modifying properties of the substance/behavior) serve as further antecedents. Once biopsychosocial events occur and the substance/behavior is paired with a desirable shift repeatedly, addiction may be developed (Shaffer et al., 2004).

The manifestations and sequelae shared between different addictions are related to the biological cluster (i.e., tolerance, withdrawal, neuroanatomical changes, and genetic expression), the psychological cluster (i.e., psychopathology and comorbidity), the social cluster (i.e., deviant behaviors, social drift), natural history (i.e., exposure, relapse, sequencing of recovery), treatment non-specificity (i.e., psychopharmacological or cognitive-behavioral therapy), and object substitution (i.e., replacing the addiction of choice with another addiction). On the other hand, addictions differ in their expression (i.e., substance-related versus behavioral) and their unique manifestations and sequelae. For instance, drinking alcohol can lead to liver cirrhosis, whereas pathological gambling can lead to financial debt and mental health disorders. In sum, the similar etiology of addictions indicates that instead of viewing respective addictions as sepa-

rate pathological entities, they are better viewed as a syndrome (Shaffer et al., 2004). This gives strong support to the conjecture that pathological online gaming should be understood as a behavioral addiction rather than an impulse-control disorder.

With regards to children and adolescents who are potentially vulnerable to becoming addicted to playing online games, classification is essential because it will help to develop and initiate prevention efforts. Only when online gaming addiction is more clearly and comprehensively understood, can risk variables be targeted and protective factors fostered from a mental health point of view and on a large scale. Among groups of young people, prevention efforts may include both psycho-education as well as provision of information and tools that focus on developing healthy ways of coping with daily stressors. The earlier preventive efforts are initiated, the greater the chance that children and adolescents are protected from the dangers and ramifications of online gaming addiction.

The empirical studies examining online gaming addiction in children and adolescents in this review suffer from a variety of limitations. A major limitation is the frequent lack of sensitivity and specificity of measures used. On the one hand, it appears difficult to judge the extent to which the assessment tools utilized are sensitive enough to actually determine online gaming addiction status within children and adolescents. Thus, the question of sensitivity remains. On the other hand, it is unclear in how far the measurement instruments used are able to specifically identify adolescents who are not addicted to online gaming. Therefore, problems in the instruments' specificity may arise because the latter appears to be rather limited. In addition, the almost exclusive utilization of self-report measures calls into question the accuracy of diagnosis. Psychological and psychiatric assessments as well as parental reports appear to be indispensable complements for judging whether and to what extent a child or adolescent is actually addicted to online gaming particularly in light of a variety of symptoms that are commonly experienced comorbidly.

Another problem that materialized with the large majority of identified studies was the utilization of small, specified, self-selected, and/or mixed samples. Small samples are not representative of whole populations and therefore establishing representative prevalence estimates is obstructed. Furthermore, if samples are particularly specified (i.e., using a limited age group in a particular country, etc.), the participants' responses cannot be generalized to larger populations either. The opposite problem occurs if samples are mixed. It is unclear to what extent the findings can be generalized to specified populations. Self-selected samples comprise only those people who were enthused enough to participate and therefore these samples are somewhat unrepresentative of most target populations. Each of these problems calls for improvements in future research in order to increase the external validity of the studies' results. In addition, research in the field calls for studies that assess online gaming addiction cross-culturally because by comparing and contrasting the disorder within diverse sociocultural contexts, the differences and similarities can be discerned and treatment approaches can be tailored to the respective needs of particular cultural groups.

Conclusively, establishing a nosology of online gaming addiction satisfies two crucial aims. First, it enables the actual classification of the disorder within the classification systems. Second, it allows for the appropriate choice of re-

levant psychotherapeutic and/or psychopharmacological treatments (Du, Jiang & Vance, 2010; Griffiths & Meredith, 2009; Lee & Mysyk, 2004). As long as there is no coherent diagnostic framework upon which to base online gaming addiction diagnosis, not only does conceptual confusion ensue, but both further research endeavors as well as potential treatment plans are seriously complicated. Correspondingly, once this framework is established and accepted, the efforts of including online gaming addiction in the official diagnostic manuals (APA, 2007; Block, 2008; O'Brien, 2008) will finally come to fruition. Prevention efforts may be developed that specifically target children and adolescents who appear to be particularly at risk to developing online gaming addiction as well as associated developmental problems and disorders. Moreover, awarding online gaming addiction with an official status as mental disorder will enable diagnosis, communication about, study, treatment and prognosis of this psychopathology (Kemper, 2008; Springer, 2009; te Wildt, 2009).

## REFERENCES

- Allison, S. E., von Wahlde, L., Shockley, T. & Gabbard, G. O. (2006). The development of the self in the era of the Internet and role-playing fantasy games. *American Journal of Psychiatry*, 163(3), 381–385.
- Anderson, C. A. & Dill, K. E. (2000). Video games and aggressive thoughts, feelings, and behavior in the laboratory and in life. *Journal of Personality and Social Psychology*, 78, 772–790.
- Anderson, C. A., Gentile, D. A. & Buckley, K. (2007). *Violent Video Game Effects on Children and Adolescents: Theory, Research, and Public Policy*. New York: Oxford University Press.
- APA (2000). *Diagnostic and Statistical Manual of Mental Disorders – Text Revision (Vol. IV)*. Washington, D.C.: American Psychiatric Association.
- APA (2007). American Psychiatric Association considers 'Video Game Addiction'. *Science Daily*. Retrieved March 8, 2011, from <http://www.sciencedaily.com/releases/2007/06/070625133354.htm>
- Armstrong, L., Phillips, J. G. & Saling, L. L. (2000). Potential determinants of heavier internet usage. *International Journal of Human-Computer Studies*, 53(4), 537–550.
- Batthyány, D., Müller, K. W., Benker, F. & Wölfling, K. (2009). Computer game playing: Clinical characteristics of dependence and abuse among adolescents. *Wiener Klinische Wochenschrift*, 121(15–16), 502–509.
- Batthyány, D. & Pritz, A. (Eds.). (2009). *Rausch ohne Drogen. Substanzungebundene Süchte*. Wien: Springer.
- Baumeister, R. F. (1991). *Escaping the Self: Alcoholism, Spirituality, Masochism, and Other Flights from the Burden of Selfhood*. New York, NY: Harper Collins.
- Bear, S., Bogusz, E. & Green, D. A. (2011). Stuck on screens: Patterns of computer and gaming station use in youth seen in a psychiatric clinic. *Journal of the Canadian Academy of Child and Adolescent Psychiatry*, 20(2), 86–95.
- Bechara, A. (2003). Risky business: Emotion, decision-making and addiction. *Journal of Gambling Studies*, 19, 23–51.
- Beutel, M. E., Hoch, C., Wölfling, K. & Müller, K. W. (2011). Klinische Merkmale der Computerspiel- und Internetsucht am Beispiel der Inanspruchnehmer einer Spielsuchtambulanz. *Zeitschrift für Psychosomatische Medizin und Psychotherapie*, 57, 77–90.
- Birmaher, B., Khetarpal, S., Brent, D., Cully, M., Balach, L., Kaufman, J. & Neer, S. M. (1997). The Screen for Child Anxiety-Related Emotional Disorders (SCARED): Scale construction and psychometric characteristics. *Journal of the American Academy of Child and Adolescent Psychiatry*, 36(4), 545–553.
- Blanco, C., Moreyra, P., Nunes, E. V., Saiz-Ruiz, J. & Ibanez, A. (2001). Pathological gambling: Addiction or compulsion? *Seminars in Clinical Neuropsychiatry*, 6, 167–176.
- Block, J. J. (2008). Issues for DSM-V: Internet addiction. *American Journal of Psychiatry*, 165(3), 306–307.
- Blum, K., Wood, R., Sheridan, P., Chen, T. & Comings, D. (1995). Dopamine D2 receptor gene variants: Association and linkage studies in impulsive, addictive and compulsive disorders. *Pharmacogenetics*, 5, 121–141.
- Brown, R. I. F. (1991). Gaming, gambling and other addictive play. In J. H. Kerr & M. J. Apter (Eds.), *Adult Play: A Reversal Theory Approach*. Amsterdam: Swets and Zeitlinger, pp. 101–118.
- Brown, R. I. F. (1993). Some contributions of the study of gambling to the study of other addictions. In W. R. Eadington & J. A. Cornelius (Eds.), *Gambling Behavior and Problem Gambling*. Reno: University of Nevada, pp. 241–272.
- Buchman, D. D. & Funk, J. B. (1996). Video and computer games in the 90s: Children's time commitment and game preference. *Children Today*, 24, 12–15.
- Buhrmester, D., Furman, W., Wittenberg, M. T. & Reis, H. T. (1988). Five domains of interpersonal competence in peer relationships. *Journal of Personality and Social Psychology*, 55, 991–1008.
- Buss, A. H. & Perry, M. (1992). The Aggression Questionnaire. *Journal of Personality and Social Psychology*, 63, 452–459.
- Caillois, R. (1961). *Man, Play and Games*. Paris: Simon and Schuster.
- Caplan, S. E. (2002). Problematic Internet use and psychosocial well-being: Development of a theory-based cognitive-behavioral measurement instrument. *Computers in Human Behavior*, 18(5), 553–575.
- Castells, M. (1996). *The Rise of the Network Society*. Oxford: Blackwell.
- Chan, P. A. & Rabinowitz, T. (2006). A cross-sectional analysis of video games and attention deficit hyperactivity disorder symptoms in adolescents. *Annals of General Psychiatry*, 5(1), 16–26.
- Charlton, J. P. (2002). A factor-analytic investigation of computer 'addiction' and engagement. *British Journal of Psychology*, 93, 329–344.
- Charlton, J. P. & Danforth, I. D. W. (2007). Distinguishing addiction and high engagement in the context of online game playing. *Computers in Human Behavior*, 23(3), 1531–1548.
- Chen, S. H., Weng, L. C., Su, Y. J., Wu, H. M. & Yang, P. F. (2003). Development of Chinese Internet Addiction Scale and its psychometric study. *Chinese Journal of Psychology*, 45, 279–294.
- Chiu, S. I., Lee, J. Z. & Huang, D. H. (2004). Video game addiction in children and teenagers in Taiwan. *CyberPsychology and Behavior*, 7(5), 571–581.
- Choi, D., Kim, H. & Kim, J. (2000). A cognitive and emotional strategy for computer game design. *Journal of MIS Research*, 10, 165–187.
- Choi, D. S. & Kim, J. (2004). Why people continue to play online games: In search of critical design factors to increase customer loyalty to online contents. *Cyberpsychology and Behavior*, 7(1), 11–24.
- Choo, H., Gentile, D. A., Sim, T., Li, D., Khoo, A. & Liau, A. K. (2010). Pathological video-gaming among Singaporean youth. *Annals Academy of Medicine Singapore*, 39, 822–829.
- Chou, C. & Hsiao, M. C. (2000). Internet addiction, usage, and gratifications: The Taiwan college students' case. *Computers and Education*, 35, 65–80.

- Clymo, P. (1996). Home video game playing in schoolchildren: A study of incidence and patterns of play. *Youth Studies Australia*, 15, 59.
- Conners, C. K., Sitarenios, G., Parker, J. D. & Epstein, J. N. (1998). The revised Conners' Parent Rating Scale (CPR-R): Factor structure, reliability, and criterion validity. *Journal of Abnormal Child Psychology*, 26(4), 257–268.
- Connor, K. M., Davidson, J. R. T., Churchill, L. E., Sherwood, A. & Weisler, R. H. (2000). Psychometric properties of the Social Phobia Inventory (SPIN): New self-rating scale. *The British Journal of Psychiatry*, 176(4), 379–386.
- Crick, N. R. (1995). Relational aggression: The role of intent attributions, feelings of distress, and provocation type. *Development and Psychopathology*, 7(2), 313–322.
- Crystal, D. S., Chen, C. S., Fuligni, A. J., Stevenson, H. W., Hsu, C. C., Ko, H. J. & Kimura, S. (1994). Psychological maladjustment and academic achievement – A cross-cultural study of Japanese, Chinese, and American high-school students. *Child Development*, 65(3), 738–753.
- Csikszentmihalyi, M. (1990). *Flow: The Psychology of Optimal Experience*. New York: HarperCollins.
- Cultrara, A. & Har-El, G. (2002). Hyperactivity-induced suprahyoid muscular hypertrophy secondary to excessive video game play: A case report. *Journal of Oral and Maxillofacial Surgery*, 60(3), 326–327.
- Custer, R. (1987). The diagnosis and scope of pathological gambling. In T. Galski (Ed.), *The Handbook of Pathological Gambling*. Springfield: Thomas, pp. 3–7.
- Danforth, I. D. W. (2003). *Addiction to Online Games: Classification and Personality Correlates*. Doctoral dissertation. Whitman College. Washington.
- Diener, E., Emmons, R. A., Larsen, R. J. & Griffin, S. (1985). The Satisfaction with Life Scale. *Journal of Personality Assessment*, 49, 71–75.
- Dittmar, H. (2005). Compulsive buying a growing concern? An examination of gender, age, and endorsement of materialistic values as predictors. *British Journal of Psychology*, 96, 467–491.
- Dongdong, L., Liao, A. & Khoo, A. (2011). Examining the influence of actual-ideal self-discrepancies, depression, and escapism, on pathological gaming among massively multiplayer online adolescent gamers. *Cyberpsychology, Behavior and Social Networking*, in press. doi: 10.1089/cyber.2010.0463
- Du, Y. S., Jiang, W. Q. & Vance, A. (2010). Longer term effect of randomized, controlled group cognitive behavioural therapy for Internet addiction in adolescent students in Shanghai. *Australian and New Zealand Journal of Psychiatry*, 44(2), 129–134.
- Engels, R. C. M. E., Finkenauer, C., Meeus, W. & Dekovic, M. (2001). Parental attachment and adolescents' emotional adjustment: The associations with social skills and relational competence. *Journal of Counseling Psychology*, 48, 428–439.
- ESA (2010). *Essential facts about the computer and video game industry*. Retrieved April 21, 2011, from [http://www.theesa.com/facts/pdfs/ESA\\_Essential\\_Facts\\_2010.PDF](http://www.theesa.com/facts/pdfs/ESA_Essential_Facts_2010.PDF)
- Farrell, E. (1990). *Hanging in and Dropping out: Voices of At-risk High School Students*. New York: Teachers College Press.
- First, M. B., Gibbon, M., Spitzer, R. L. & Williams, J. B. W. (1996). *Structured Clinical Interview for DSM-IV Axis I Disorders: Clinician Version (SCID-CV): Administration booklet*. Washington, D. C.: American Psychiatric Press.
- Fisher, S. (1994). Identifying video game addiction in children and adolescents. *Addictive Behaviors*, 19, 545–553.
- Funk, J., Fox, C., Chan, M. & Curtiss, K. (2008). The development of the Children's Empathic Attitudes Questionnaire using classical and Rasch analyses. *Journal of Applied Developmental Psychology*, 29(3), 187–196.
- Gentile, D. A. (2009). Pathological video-game use among youth ages 8 to 18: A national study. *Psychological Science*, 20(5), 594–602.
- Gentile, D. A., Choo, H., Liau, A., Sim, T., Li, D. D., Fung, D. & Khoo, A. (2011). Pathological video game use among youths: A two-year longitudinal study. *Pediatrics*, 127(2), E319–E329.
- Gentile, D. A., Lynch, P. J., Linder, J. R. & Walsh, D. A. (2004). The effects of violent video game habits on adolescent hostility, aggressive behaviours, and school performance. *Journal of Adolescence*, 27(1), 5–22.
- Goodman, R., Ford, T., Simmons, H., Gatward, R. & Meltzer, H. (2000). Using the Strength and Difficulties Questionnaire to screen for child psychiatric disorders in a community sample. *British Journal of Psychiatry*, 177, 534–539.
- Gossop, M., Darke, S., Griffiths, P., Hando, J., Powis, B., Hall, W. & Strang, J. (1995). The Severity of Dependence Scale (SDS): Psychometric properties of the SDS in English and Australian samples of heroin, cocaine and amphetamine users. *Addiction*, 90, 607–614.
- Griffiths, M. (2005). Relationship between gambling and video-game playing: A response to Johansson and Götestam. *Psychological Reports*, 96, 644–664.
- Griffiths, M. D. (2002). *Gambling and Gaming Addictions in Adolescence*. Oxford: BPS Blackwell.
- Griffiths, M. D. & Meredith, A. (2009). Videogame addiction and its treatment. *Journal of Contemporary Psychotherapy*, 39(4), 247–253.
- Grüsser, S. M. & Thalemann, C. N. (2006). *Verhaltenssucht – Diagnostik, Therapie, Forschung*. Bern: Hans Huber.
- Grüsser, S. M., Thalemann, R., Albrecht, U. & Thalemann, C. N. (2005). Exzessive Computernutzung im Kindesalter – Ergebnisse einer psychometrischen Erhebung. *Wiener Klinische Wochenschrift*, 117(5–6), 188–195.
- Hahn, A. & Jerusalem, M. (2001). Internetsucht: Validierung eines Instruments und explorative Hinweise auf personale Bedingungen (Internet addiction: Validation of an instrument and explorative evidence on personal causes). In A. Theobald, M. Dreyer & T. Starsetzki (Eds.), *Handbuch zur Online-Marktforschung. Beiträge aus Wissenschaft und Praxis*. Wiesbaden: Gabler, pp. 213–233.
- Han, D. H., Hwang, J. W. & Renshaw, P. F. (2010). Bupropion sustained release treatment decreases craving for video games and cue-induced brain activity in patients with Internet video game addiction. *Experimental and Clinical Psychopharmacology*, 18(4), 297–304.
- Han, D. H., Lee, Y. S., Na, C., Ahn, J. Y., Chung, U. S., Daniels, M. A., Haws, C. A. & Renshaw, P. F. (2009). The effect of methylphenidate on Internet video game play in children with attention-deficit/hyperactivity disorder. *Comprehensive Psychiatry*, 50(3), 251–256.
- Han, D. H., Lee, Y. S., Yang, K. C., Kim, E. Y., Lyoo, I. K. & Renshaw, P. F. (2007). Dopamine genes and reward dependence in adolescents with excessive internet video game play. *Journal of Addiction Medicine*, 1(3), 133–138.
- Hawkins, J. D. & Fitzgibbon, J. J. (1993). Risk factors and risk behaviors in prevention of adolescent substance abuse. *Adolescent Medicine State of the Art Reviews: Adolescent Substance Abuse and Addictions*, 4, 249–262.
- Hoefl, F., Watson, C. L., Kesler, S. R., Bettinger, K. E. & Reiss, A. L. (2008). Gender differences in the mesocorticolimbic system during computer game-play. *Journal of Psychiatric Research*, 42(4), 253–258.
- Hoge, D. R. & McCarthy, J. D. (1983). Issues of validity and reliability in the use of real-ideal discrepancy scores to measure



- self-regard. *Journal of Personality and Social Psychology*, 44, 1048–1055.
- Holden, C. (2001). Compulsive behaviors: “Behavioral” addictions: Do they exist? *Science*, 294(5544), 980–982.
- Hsu, S. H., Wen, M. H. & Wu, M. C. (2009). Exploring user experiences as predictors of MMORPG addiction. *Computers and Education*, 53(2), 990–999.
- Huesmann, L. R. & Eron, L. D. (1986). *Television and the Aggressive Child: A Cross-national Comparison*. Hillsdale, NJ: Erlbaum.
- Huesmann, L. R. & Guerra, N. G. (1997). Children’s normative beliefs about aggression and aggressive behavior. *Journal of Personality and Social Psychology*, 72(2), 408–419.
- Inderbitzen, H. M. & Foster, S. L. (1992). The teenage inventory of social skills: Development, reliability, and validity. *Psychological Assessment*, 4, 451–459.
- Jellinek, E. M. (1946). Phases in the drinking history of alcoholics: Analysis of a survey conducted by the official organ of the Alcoholics Anonymous. *Quarterly Journal of Studies on Alcohol*, 7, 1–88.
- Johansson, A. & Götestam, K. G. (2004). Problems with computer games without monetary reward: Similarity to pathological gambling. *Psychological Reports*, 95(2), 641–650.
- Johnson, S. (2011). NPDP Group: Total 2010 game software sales flat compared to 2009. Retrieved from <http://www.g4tv.com/thefeed/blog/post/709764/npdp-group-total-2010-game-software-sales-flat-compared-to-2009/>
- Kandel, D. B. & Davies, M. (1986). Adult sequelae of adolescent depressive symptoms. *Archives of General Psychiatry*, 43, 255–262.
- Kandel, D. B. & Davies, M. N. O. (1982). Epidemiology of depressive mood in adolescents: An empirical study. *Archives of General Psychiatry*, 39, 1205–1212.
- Kemper, U. (2008). *Annäherung an den Suchtbegriff*. Geesthacht: Neuland.
- Kim, K., Ryu, E., Chon, M. Y., Yeun, E. J., Choi, S. Y., Seo, J. S. & Nam, B. W. (2006). Internet addiction in Korean adolescents and its relation to depression and suicidal ideation: A questionnaire survey. *International Journal of Nursing Studies*, 43(2), 185–192.
- Kim, M. G. & Kim, J. (2010). Cross-validation of reliability, convergent and discriminant validity for the problematic online game use scale. *Computers in Human Behavior*, 26(3), 389–398.
- Kim, S. W., Shin, I. S., Kim, J. M., Yang, S. J., Shin, H. Y. & Yoon, J. S. (2006). Association between attitude toward medication and neurocognitive function in schizophrenia. *Clinical Neuropharmacology*, 29, 197–205.
- King, D., Delfabbro, P. & Griffiths, M. (2010). The convergence of gambling and digital media: Implications for gambling in young people. *Journal of Gambling Studies*, 26, 175–187.
- King, D. L. & Delfabbro, P. (2009). Understanding and assisting excessive players of video games: A community psychology perspective. *The Australian Community Psychologist*, 21(1), 62–74.
- Ko, C. H., Liu, G. C., Hsiao, S. M., Yen, J. Y., Yang, M. J., Lin, W. C. & Chen, C. S. (2009). Brain activities associated with gaming urge of online gaming addiction. *Journal of Psychiatric Research*, 43(7), 739–747.
- Ko, C. H., Yen, J. Y., Chen, C. C., Chen, S. H. & Yen, C. F. (2005a). Gender differences and related factors affecting online gaming addiction among Taiwanese adolescents. *Journal of Nervous and Mental Disease*, 193(4), 273–277.
- Ko, C. H., Yen, J. Y., Chen, C. C., Chen, S. H. & Yen, C. F. (2005b). Proposed diagnostic criteria of Internet addiction for adolescents. *Journal of Nervous and Mental Disease*, 193(11), 728–733.
- Korean Institute of Criminal Justice Policy (1998). *Parental Supervision Scale*. Seoul, South Korea: Korean Institute of Criminal Justice Policy.
- Kuss, D. J. & Griffiths, M. D. (2011). Internet gaming addiction: A systematic review of empirical research. *International Journal of Mental Health and Addiction*, in press. doi: 10.1007/s11469-011-9318-5
- Kuss, D. J. & Griffiths, M. D. (2012). Internet gambling behavior. *Encyclopedia of Cyber Behavior*. Pennsylvania: IGI Global, in press.
- Kwon, J.-H., Chung, C.-S. & Lee, J. (2011). The effects of escape from self and interpersonal relationship on the pathological use of Internet games. *Community Mental Health Journal*, 47(1), 113–121.
- La Greca, A. M. & Stone, W. L. (1993). Social anxiety scale for children-revised: Factor structure and concurrent validity. *Journal of Clinical Child Psychology*, 22, 17–27.
- Lee, E. Y. (1991). Self-discrepancy mechanism in co-existence of depression and anxiety. Doctoral dissertation. Korea University. Seoul, South Korea.
- Lee, H. C. & Ahn, C. Y. (2002). Development of the Internet game addiction diagnostic scale. *The Korean Journal of Health Psychology*, 7, 211–239.
- Lee, J. C. (1981). *Comprehensive diagnosis and research on adolescent problems*. Seoul, South Korea: Korean Educational Development Institute.
- Lee, S. & Mysyk, A. (2004). The medicalization of compulsive buying. *Social Science and Medicine*, 58, 1709–1718.
- Lemmens, J. S., Valkenburg, P. M. & Peter, J. (2009). Development and validation of a game addiction scale for adolescents. *Media Psychology*, 12(1), 77–95.
- Lemmens, J. S., Valkenburg, P. M. & Peter, J. (2011a). The effects of pathological gaming on aggressive behavior. *Journal of Youth and Adolescence*, 40(1), 38–47.
- Lemmens, J. S., Valkenburg, P. M. & Peter, J. (2011b). Psychosocial causes and consequences of pathological gaming. *Computers in Human Behavior*, 27(1), 144–152.
- Liau, A. K., Chow, D., Tan, T. K. & Senf, K. (2011). Development and validation of the Personal Strengths Inventory using exploratory and confirmatory factor analysis. *Journal of Psychoeducational Assessment*, 29(1), 14–26.
- Lin, S. S. J. & Tsai, C.-C. (1999). Internet addiction among high schoolers in Taiwan. Paper presented at the American Psychological Association Annual Meeting, Boston.
- Linder, J. R., Crick, N. R. & Collins, W. A. (2002). Relational aggression and victimization in young adults’ romantic relationships: Associations with perceptions of parent, peer, and romantic relationship quality. *Social Development*, 11(1), 69–86.
- Meerkerk, G. J., Van Den Eijnden, R., Vermulst, A. A. & Garretsen, H. F. L. (2009). The Compulsive Internet Use Scale (CIUS): Some psychometric properties. *CyberPsychology and Behavior*, 12(1), 1–6.
- Mehroof, M. & Griffiths, M. D. (2010). Online gaming addiction: The role of sensation seeking, self-control, neuroticism, aggression, state anxiety, and trait anxiety. *CyberPsychology and Behavior*, 13(3), 313–316.
- Nadel, H., Spellmann, M., Alvarez-Canino, T., Lausell-Bryant, L. L. & Landsberg, G. (1996). The cycle of violence and victimization: A study of the school-based intervention of a multidisciplinary youth violence-prevention program. *American Journal of Preventive Medicine*, 12(5), 109–119.
- Ng, B. D. & Wiemer-Hastings, P. (2005). Addiction to the Internet and online gaming. *CyberPsychology and Behavior*, 8(2), 110–113.
- O’Brien, C. (2008). Report of the DSM-5 Substance-Related Disorders Work Group. American Psychiatric Association DSM-5

- development. Retrieved March 7, 2011, from <http://www.dsm5.org/ProposedRevisions/Pages/Substance-RelatedDisorders.aspx>
- Orford, J. (2001). Addiction as excessive appetite. *Addiction*, 96(1), 15–31.
- Orford, J., Morison, V. & Somers, M. (1996). Drinking and gambling: A comparison with implications for theories of addiction. *Drug and Alcohol Review*, 15(1), 47–56.
- Patton, J. H., Stanford, M. S. & Barratt, E. S. (1995). Factor structure of the Barratt Impulsiveness Scale. *Journal of Clinical Psychology*, 51(6), 768–774.
- Poppelreuter, S. & Gross, W. (Eds.). (2000). Nicht nur Drogen machen süchtig – Entstehung und Behandlung von stoffungebundenen Süchten. Weinheim: Beltz.
- Rau, P. L. P., Peng, S. Y. & Yang, C. C. (2006). Time distortion for expert and novice online game players. *Cyberpsychology and Behavior*, 9(4), 396–403.
- Raven, J. C., Styles, L. & Raven, M. A. (1998). Raven's Progressive Matrices: SPM Plus Test Booklet. Oxford: Oxford Psychologists Press.
- Ray, G. E. & Cohen, R. (1997). Children's evaluations of provocation between peers. *Aggressive Behavior*, 23, 417–431.
- Rehbein, F. & Borchers, M. (2009). Süchtig nach virtuellen Welten? Exzessives Computerspielen und Computerspielabhängigkeit in der Jugend (Addicted to virtual worlds? Excessive video gaming and video game addiction in adolescents). *Kinderärztliche Praxis*, 80, 42–49.
- Rehbein, F., Kleimann, M. & Mößle, T. (2010). Prevalence and risk factors of video game dependency in adolescence: Results of a German nationwide survey. *CyberPsychology, Behavior and Social Networking*, 13(3), 269–277.
- Resnick, M. D., Bearman, P. S., Blum, R. W., Bauman, K. E., Harris, K. M., Jones, J. & Udry, R. (1997). Protecting adolescents from harm: Findings from the National Longitudinal Study on Adolescent Health. *JAMA – Journal of the American Medical Association*, 278(10), 823–832.
- Reuter, J., Raedler, T., Rose, M., Hand, I., Glascher, J. & Büchel, C. (2005). Pathological gambling is linked to reduced activation of the mesolimbic reward system. *Nature Neuroscience*, 8, 147–148.
- Rosenberg, M. (1965). *Society and adolescent self-image*. New Jersey: Princeton University Press.
- Rosenberg, M., Schooler, C. & Schoenbach, C. (1989). Self-esteem and adolescent problems: Modeling reciprocal effects. *American Sociological Review*, 54, 1004–1018.
- Rugle, L. & Melamed, L. (1993). Neuropsychological assessments of attention problems in pathological gamblers. *The Journal of Nervous and Mental Disease*, 181, 107–112.
- Russell, D. (1996). The UCLA Loneliness Scale (Version 3): Reliability, validity, and factor structure. *Journal of Personality Assessment*, 66, 20–40.
- Russell, D., Peplau, L. A. & Cutrona, C. E. (1980). The revised UCLA Loneliness Scale: Concurrent and discriminant validity evidence. *Journal of Personality and Social Psychology*, 39, 472–480.
- Salguero, R. A. T. & Moran, R. M. B. (2002). Measuring problem video game playing in adolescents. *Addiction*, 97(12), 1601–1606.
- Shaffer, H. J. & Kidman, R. (2003). Shifting perspectives on gambling and addiction. *Journal of Gambling Studies*, 19(1), 1–6.
- Shaffer, H. J., LaPlante, D. A., LaBrie, R. A., Kidman, R. C., Donato, A. N. & Stanton, M. V. (2004). Toward a syndrome model of addiction: Multiple expressions, common etiology. *Harvard Review of Psychiatry*, 12(6), 367–374.
- Shin, M. S. (1992). An Empirical Study on the Mechanism of Suicide: Validity Test of the Escape from Self Scale. Doctoral dissertation. Yonsei University. Seoul, South Korea.
- Silbereisen, R. K. & Kastner, P. (1998). Jugend und Problemverhalten. *Entwicklungspsychologische Perspektiven*. In R. Oerter & L. Montada (Eds.), *Entwicklungspsychologie*. Ein Lehrbuch. München: Psychologie Verlags Union.
- Skoric, M. M., Teo, L. L. C. & Neo, R. L. (2009). Children and video games: Addiction, engagement, and scholastic achievement. *CyberPsychology and Behavior*, 12(5), 567–572.
- So, Y. K., Noh, J. N., Kim, Y. S., Ko, S. G. & Koh, Y. J. (2002). The reliability and validity of Korean parent and teacher ADHD rating scale. *Journal of the Korean Neuropsychiatric Association*, 41, 283–289.
- Springer, A. (2009). Sollen "stoffungebundene Süchte" als eigenständige Krankheitskategorie gelten? In D. Batthyány & A. Pritz (Eds.), *Rausch ohne Drogen*. New York, NY: Springer, pp. 19–44.
- te Wildt, B. T. (2009). Internetabhängigkeit – Symptomatik, Diagnostik und Therapie. In D. Batthyány & A. Pritz (Eds.), *Rausch ohne Drogen*. Substanzungebundene Süchte. New York, NY: Springer.
- Thalemann, C. (2009). Pathologische Computernutzung bei Schülern verschiedener Schultypen der 8. und 10. Klassenstufe. Doctoral dissertation, Medizinische Fakultät Charité, Berlin.
- Thalemann, R., Albrecht, U., Thalemann, C. & Grüsser, S. M. (2004). Kurzbeschreibung und psychometrische Kennwerte des "Fragebogens zum Computerspielverhalten bei Kindern" (CSVK). *Zeitschrift für Psychologie und Medizin*, 16, 226–233.
- The NPD Group (2010). 2009 US video game industry and PC game software retail sales reach \$20.2 billion. Retrieved April 21, 2011, from [http://www.npd.com/press/releases/press\\_100114.html](http://www.npd.com/press/releases/press_100114.html)
- Thomas, N. J. & Martin, F. H. (2010). Video-arcade game, computer game and Internet activities of Australian students: Participation habits and prevalence of addiction. *Australian Journal of Psychology*, 62(2), 59–66.
- University of Massachusetts Medical School, D. o. P. (2007). ADHD self-report. Retrieved March 29, 2011, from <http://healthnet.umassmed.edu/mhealth/ADHDSelfReport.pdf>
- van Rooij, A. J., Schoenmakers, T. M., van de Eijnden, R. & van de Mheen, D. (2010). Compulsive Internet use: The role of online gaming and other Internet applications. *Journal of Adolescent Health*, 47(1), 51–57.
- van Rooij, A. J., Schoenmakers, T. M., Vermulst, A. A., van den Eijnden, R. & van de Mheen, D. (2011). Online video game addiction: Identification of addicted adolescent gamers. *Addiction*, 106(1), 205–212.
- Volkow, N. D. & Fowler, J. S. (2000). Addiction: A disease of compulsion and drive: Involvement of the orbitofrontal cortex. *Cerebral Cortex*, 10, 318–325.
- Wan, C. S. & Chiou, W. B. (2006a). Psychological motives and online games addiction: A test of flow theory and humanistic needs theory for Taiwanese adolescents. *CyberPsychology and Behavior*, 9(3), 317–324.
- Wan, C. S. & Chiou, W. B. (2006b). Why are adolescents addicted to online gaming? An interview study in Taiwan. *CyberPsychology and Behavior*, 9(6), 762–766.
- Wan, C. S. & Chiou, W. B. (2007). The motivations of adolescents who are addicted to online games: A cognitive perspective. *Adolescence*, 42(165), 179–197.
- Weiss, M. (2008). Beyond core symptoms: Implications of effectiveness research for clinical practice. Paper presented at the American Academy of Child and Adolescent Psychiatry Annual Meeting.
- WHO (1992). ICD 10: The ICD-10 Classification of Mental and Behavioral Disorders: Clinical Descriptions and Diagnostic Guidelines. Geneva, Switzerland: World Health Organization.

- Widyanto, L. & McMurrin, M. (2004). The psychometric properties of the Internet Addiction Test. *CyberPsychology and Behavior*, 7(4), 443–450.
- Wölfling, K., Grüsser, S. M. & Thalemann, R. (2008). Video and computer game addiction. *International Journal of Psychology*, 43(3–4), 769.
- Wölfling, K. & Müller, K. W. (2009). Computerspielsucht. In D. Batthyány & A. Pritz (Eds.), *Rausch ohne Drogen. Substanzgebundene Süchte*. New York: Springer, pp. 291–308.
- Wölfling, K., Thalemann, C. & Grüsser, S. M. (2008). Computerspielsucht: Ein psychopathologischer Symptomkomplex im Jugendalter. *Psychiatrische Praxis*, 35(5), 226–232.
- Woo, B. S. C., Chang, W. C., Fung, D. S. S., Koh, J. B. K., Leong, J. S. F., Kee, C. H. Y. & Seah, C. K. F. (2004). Development and validation of a depression scale for Asian adolescents. *Journal of Adolescence*, 27(6), 677–689.
- Yee, N. (2007). Motivations for play in online games. *CyberPsychology and Behavior*, 9(6), 772–775.
- Young, K. (1996a). Internet addiction: The emergence of a new clinical disorder. *CyberPsychology and Behavior*, 3, 237–244.
- Young, K. (1996b). Psychology of computer use: XL. Addictive use of the Internet: A case that breaks the stereotype. *Psychological Reports*, 79(3), 899–902.
- Young, K. (1998). *Caught in the Net*. New York: Wiley.
- Young, K. (1999). Internet addiction: Symptoms, evaluation, and treatment. In L. V. T. L. Jackson (Ed.), *Innovations in Clinical Practice*. Sarasota, FL: Professional Resource Press.
- Young, K. (2009). Understanding online gaming addiction and treatment issues for adolescents. *American Journal of Family Therapy*, 37(5), 355–372.

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# Internet Gaming Addiction: A Systematic Review of Empirical Research

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**Abstract** The activity of play has been ever present in human history and the Internet has emerged as a playground increasingly populated by gamers. Research suggests that a minority of Internet game players experience symptoms traditionally associated with substance-related addictions, including mood modification, tolerance and salience. Because the current scientific knowledge of Internet gaming addiction is copious in scope and appears relatively complex, this literature review attempts to reduce this confusion by providing an innovative framework by which all the studies to date can be categorized. A total of 58 empirical studies were included in this literature review. Using the current empirical knowledge, it is argued that Internet gaming addiction follows a continuum, with antecedents in etiology and risk factors, through to the development of a “full-blown” addiction, followed by ramifications in terms of negative consequences and potential treatment. The results are evaluated in light of the emergent discrepancies in findings, and the consequent implications for future research.

**Keywords** Internet gaming addiction · Video games · Excessive play · Etiology · Pathology · Consequences

The activity of play has been ever present in human history. Playing games is pleasurable and entertaining, and it is a way of relaxation stepping out of the daily routine and enjoying something distinct from everyday life. In his cultural analysis of play, Huizinga (1938) refers to play as “a free activity (...) outside “ordinary” life as being “not serious”, but at the same time absorbing the player intensely and utterly. (...) It proceeds within its own proper boundaries of time and space according to fixed rules and in an orderly manner. It promotes the formation of social groupings which tend to surround themselves with secrecy and to stress their difference from the common world by disguise or other means” (Huizinga 1938, p. 13). Therefore, not only is play an enjoyable pastime activity, it is a

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social activity as well. It connects likeminded people, thereby fostering sociocultural protocols of behaviors associated with gameplay.

With the Internet, a new playground has emerged. In effect, the Internet offers a wide variety of games to play, which are distributed across a variety of game genres. These include (but are not restricted to) casual Browser Games (CBGs) such as DarkOrbit, First-Person or Ego-Shooters (FPSs) such as Counterstrike, Massively Multiplayer Online Role-Playing Games (MMORPGs) such as World of Warcraft (WoW), and Simulation Games (SGs) such as Second Life, to name but the most important. Furthermore, there exist hybrid forms, such as Massively Multiplayer Online Role-Playing First-Person Shooters (MMORPFPSs), such as Neocron, which combine distinct genres within one game. CBGs are played on an Internet browser and are free and easily accessible. FPSs are online tactics-shooters played from an ego-perspective in a 3D-game world. This is the game genre most frequently played in e-sports.

MMORPGs are played by hundreds of thousands of users throughout the world simultaneously. In-game, players frequently socialize in guilds<sup>1</sup> and cooperate in order to reach game-relevant goals. Moreover, they play roles by taking on virtual personae, so-called avatars, such as magicians or warriors. Finally, Simulation Games simulate real life in a metaverse where everything that can be done in actual life can be done in a virtual, second life as well. The broad appeal of these games is outlined by the NPD's 2009 software sales ranking: The Sims 3 was sold most, followed by WoW's Wrath of the Lich King (The NPD Group 2010). The next games in the ranking see an alteration between other versions of these two games, indicating that the public's current preference is for MMORPGs and real life simulations. This preference may be explained by the fact that "(p) lay enables the exploration of that tissue boundary between fantasy and reality, between the real and the imagined, between the self and the other. In play we have license to explore, both our selves and our society. In play we investigate culture, but we also create it" (Silverstone 1999, p. 64). Therefore, the blurring of the boundaries between the real and the virtual appears particularly relevant for these two most frequently played game genres.

The latest software sale rankings demonstrate that Internet games attract many gamers. This appeal is even greater for a small minority of people who play excessively. Research suggests that this minority may experience symptoms traditionally associated with substance-related addictions, such as mood modification, tolerance, and behavioral salience (Hsu et al. 2009; Ko et al. 2009; Mehroof and Griffiths 2010; Wölfling et al. 2008; Young, 2009). In order to avoid potential conceptual confusion, this review will refer to the phenomenon as Internet gaming addiction, although researchers tend to use a variety of different conceptualizations. This topic will be addressed in more detail in the section on classification and assessment. Nonetheless, in the last few years, research on Internet gaming addiction has proliferated. A relatively large number of studies were published, addressing topics as diverse as classification, etiology, and phenomenology of this behavioral addiction. There have also been recent reviews on whether the concept of Internet gaming addiction is even a valid concept (e.g., Griffiths 2010a) but such debate is not the focus of this paper. Because the current scientific knowledge of Internet gaming addiction is copious in scope and appears relatively complex, this literature review attempts to reduce this confusion by providing an innovative framework by which all the studies to date can be categorized.

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<sup>1</sup> A guild is a social grouping of people in-game, usually established around common goals, such as accessing the respective game's high-end content collectively (Ducheneaut et al. 2007).



Methodology

A comprehensive literature search was conducted using the database Web of Knowledge. The following search terms (and their derivatives) were entered in relation to online video gaming: ‘excessive’, ‘problematic’, ‘compulsive’, and ‘addictive’. In addition, further studies were identified from supplementary sources, such as Google Scholar, and these were added in order to generate a more inclusive literature review. Studies were selected in accordance with the following inclusion criteria. Studies had to (i) contain empirical data (including everything from case studies through to surveys with thousands of participants), (ii) have been published after 2000 (as there were no studies on this topic prior to that date), and (iii) contain some kind of analysis relating to Internet gaming addiction. If studies referred to gaming addicts without specifying whether these were online and/or offline gamers, due to online games’ popularity it was assumed that at least some of the participants were online gamers and therefore these studies were included in the review. It should also be noted that studies investigating the playing of gambling games for free were excluded from the analysis as these have been examined in detail elsewhere in other reviews on internet gambling (e.g., Griffiths and Parke 2010; King et al. 2010).

Results

Three main categories of studies were identified, namely those concerned with (i) etiology, (ii) pathology and (iii) ramifications of Internet gaming addiction. Each of these also contained sub-topics that are conceptualized in the schematic framework in Fig. 1. The findings within each of these categories are described. This is followed by an evaluation of these studies in the final section of the paper.

Based upon the scientific empirical literature, it is argued that Internet gaming addiction appears to follow a continuum, with antecedents in etiology and risk factors, through to the development of a “full-blown” addiction, followed by ramifications in terms of negative consequences and potential treatment. These stages are interdependent as the risk factors influence the pathogenesis of addiction and the latter may similarly reinforce the former. Likewise, addiction leads to clinically significant negative consequences for the individual, which in turn may augment the pathological status of the former, requiring the individual to seek professional treatment.

This conceptual framework is further developed by drawing upon the relevant studies identified from the empirical literature. It should also be noted that only a small number of the studies exclusively fell within only one of the main categories and the associated sub-

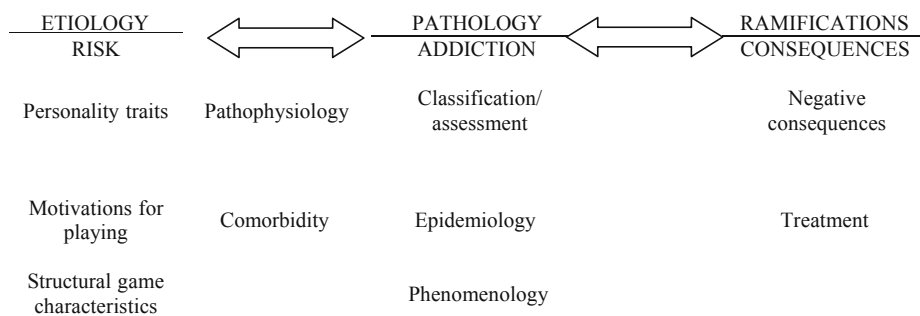


Fig. 1 The continuum of Internet gaming addiction

categories. Accordingly, many of the studies listed below are included in more than one of the sub-categories. Likewise, the sub-categories of psychophysiology and comorbidity were not placed in one of the main three categories, because they appeared to more closely resemble the intersection between the etiology and pathology of Internet gaming addiction.

### Etiology/Risk

A number of studies have focused on illuminating the etiology of, and specifying risk factors for, Internet gaming addiction. These include internal factors, namely personality traits and motivations for playing, as well as an external factor, the structural game characteristics. Each of these is dealt with below.

### Personality Traits

The first internal risk factor identified in the review was personality traits of gamers, which has been investigated in twelve studies (Allison et al. 2006; Caplan et al. 2009; Chiu et al. 2004; Chumbley and Griffiths 2006; Jeong and Kim 2010; Kim et al. 2008; Ko et al. 2005; Lemmens et al. 2010; Mehroof and Griffiths 2010; Parker et al. 2008; Peters and Malesky 2008; Porter et al. 2010). The methodologies employed ranged from a case study of an adolescent gamer (Allison et al. 2006) to a larger sample of this population (Parker et al. 2008), middle school and high school students (Chiu et al. 2004; Jeong and Kim 2010; Ko et al. 2005), undergraduate students (Chumbley and Griffiths 2006; Mehroof and Griffiths 2010), and large samples of MMORPG players (Caplan et al. 2009; Kim et al. 2008; Peters and Malesky 2008), as well as an unspecified sample of video gamers (Porter et al. 2010).

Personality traits were assessed using a variety of measures, including the Minnesota Multiphasic Personality Inventory (Butcher et al. 1989), the Eysenck Personality Questionnaire (Eysenck and Eysenck 1996), the NEO Personality Inventory (Costa and McCrae 1985), a boredom inclination scale (Farrell 1990), the Buss-Perry Aggression Questionnaire (Buss and Perry 1992), the Narcissistic Personality Disorder Scale (Hwang 1995), the Rosenberg Self-Esteem Scale (Rosenberg 1965), the Self-Control Scale (Tangney et al. 2004), emotional intelligence (Bar-On and Parker 2000), self-efficacy (based on Muris 2001; Sherer et al. 1982), and the Arnett Inventory of Sensation-Seeking (Arnett 1994).

In terms of the results, the following personality traits were found to be significantly related to Internet gaming addiction: avoidant and schizoid interpersonal tendencies (Allison et al. 2006), loneliness and introversion (Caplan et al. 2009), social inhibition (Porter et al. 2010), aggression and hostility (Caplan et al. 2009; Chiu et al. 2004; Kim et al. 2008; Mehroof and Griffiths 2010), boredom inclination (Chiu et al. 2004), sensation-seeking (Chiu et al. 2004; Mehroof and Griffiths 2010), diminished self-control and narcissistic personality traits (Kim et al. 2008), low self-esteem (Ko et al. 2005), neuroticism (Mehroof and Griffiths 2010; Peters and Malesky 2008), state and trait anxiety (Mehroof and Griffiths 2010), low emotional intelligence (Parker et al. 2008), low self-efficacy in real life as opposed to high self-efficacy in the virtual world (Jeong and Kim 2010), and diminished agreeableness (Peters and Malesky 2008). In summation, Internet gaming addiction appears to be accompanied with a variety of personality traits, which can be subsumed under the key characteristics of introversion, neuroticism and impulsivity. However, it must be noted that the personality traits that appear to have an association with Internet gaming addiction may not be unique to the disorder, and therefore until further

research has been undertaken, it is hard to assess the etiological significance of such findings.

### Motivations for Playing

A number of motivations for playing that put a player at risk for Internet gaming addiction were identified from the literature. In total, thirteen studies were identified (Beranuy et al. 2010; Caplan et al. 2009; Grüsser et al. 2005; Hsu et al. 2009; Hussain and Griffiths 2009b; King and Delfabbro 2009a, 2009b; King et al. 2011; Lu and Wang 2008; Ng and Wiemer-Hastings 2005; Wan and Chiou 2006a, 2006b, 2007). These included qualitative studies of MMORPG players (Beranuy et al. 2010), both adolescent and adult gamers (King and Delfabbro 2009b), and adolescent online game addicts (Wan and Chiou 2006b). Quantitative studies included large samples of MMORPG players (Caplan et al. 2009; Hussain and Griffiths 2009b; Ng and Wiemer-Hastings 2005), online game players (Lu and Wang 2008), video game players (King and Delfabbro 2009a; King et al. 2011), both adolescents and MMORPG players (Wan and Chiou 2006a), secondary school children (Grüsser et al. 2005), adolescents (Wan and Chiou 2007), and college students (Hsu et al. 2009). Apart from the specification of MMORPGs as game genre a number of participants were playing as mentioned above, in the other studies no explicit reference to game type was discernible.

Motivations for playing were assessed by the following means: semi-structured interviews (Beranuy et al. 2010; King and Delfabbro 2009b; Wan and Chiou 2006b) as well as theoretical frameworks (Choi et al. 2000; Myers, 1990; Williams et al. 2008). In addition to this, a number of assessment instruments were used, namely a questionnaire for assessing computer game play behavior in children (CSVK; Thalemann et al. 2004), an adapted version of the Exercise Addiction Inventory (Terry et al. 2004), the Video Game Playing Motivation Scale (PVGMT; based on Young 1998), the Two-Factor Evaluation on Needs for Online Games (TENOG; Wan and Chiou 2006a), and the Online Gaming Motivation Scale (Wan and Chiou 2007).

The results of the studies indicated that Internet gaming addiction is related to the following motivations for playing: coping with negative emotions, stress, fear and escape (Grüsser et al. 2005; Hussain and Griffiths 2009b; King and Delfabbro 2009a; Ng and Wiemer-Hastings 2005; Wan and Chiou 2006a, 2006b), dissociation (Beranuy et al. 2010), virtual friendship/relationships (Beranuy et al. 2010; Caplan et al. 2009; Hsu et al. 2009; King and Delfabbro 2009a; Ng and Wiemer-Hastings 2005), entertainment (Beranuy et al. 2010; Wan and Chiou 2006b), playfulness and loyalty (Lu and Wang 2008), empowerment, mastery, control, recognition, completion, excitement and challenge (King and Delfabbro 2009b; King et al. 2011; Wan and Chiou 2006b), curiosity and obligation (Hsu et al. 2009), reward (Hsu et al. 2009; King et al. 2010), immersion (Caplan et al. 2009), and generally high intrinsic motivation to play as opposed to extrinsic motivation (Wan and Chiou 2007). In summation, it appears that it is particularly motivations related to dysfunctional coping, socialization and personal satisfaction that serve as risk factors for developing Internet gaming addiction.

### Structural Characteristics of the Game

Certain structural characteristics of the game itself are thought to make playing online games particularly appealing to persons who play excessively. A total of four studies were

identified that have analyzed such characteristics (Chumbley and Griffiths 2006; King et al. 2010; Smahel et al. 2008; Thomas and Martin 2010). The samples included in the studies were MMORPG players (Smahel et al. 2008), video game players (King et al. 2010), and students within different stages in their education (Chumbley and Griffiths 2006; Thomas and Martin 2010). Again, for the last two participant groups, no specification with regards to game genre was referred to.

The methods employed to investigate structural characteristics of the game included: high and negative reinforcement of play via the game's structural characteristics as based on the skill for playing required and investigated via self-report, as well as affective and playability measurements scored on Likert scales (Chumbley and Griffiths 2006), the Video Game Structural Characteristics Survey (King et al. 2010), questions about the relationship of the gamers to their virtual characters (Smahel et al. 2008), and game addiction with regards to different game genres (Thomas and Martin 2010).

The results indicated that structural characteristics of games appear to be related to addiction. More specifically, Internet games and arcade games were found to be more addictive than offline video games although these three different types of games were inadequately defined by the authors particularly in relation to internet games (Thomas and Martin 2010). Moreover, it has been found that structural characteristics affect players' mood. That is, negative reinforcement led to frustration, whereas positive reinforcement resulted in game persistence, hypothetically allowing to link positive reinforcement to addiction (Chumbley and Griffiths 2006). In addition to this, particular game features were enjoyed significantly more by addicted players, namely adult content, finding rare in-game items, and watching videogame cut-scenes (King et al. 2010). Finally, addicted players appeared to be particularly proud of their avatars, i.e., they wanted to be like their virtual characters, and viewed the latter as superior compared to themselves (Smahel et al. 2008). In summation, certain structural characteristics of Internet games appear to put players at risk for developing an addiction to these games. Most notably, Internet games constructed in such a way so as to reinforce playing by various means appear to have a higher addictive potential than those that do not contain these structures, such as offline games.

#### Pathophysiology

Pathophysiology is one of the sub-categories that falls between etiology and pathology of Internet gaming addiction and thus it represents an aspect of the intersection between risk factors and the actual development of pathological behaviors and cognitions. Several studies have assessed the relationship between Internet gaming addiction and physiology. In total, seven such studies were identified (Cultrara and Har-El 2002; Dworak et al. 2007; Han et al. 2010; Hoeft et al. 2008; Ko et al. 2009; Thalemann et al. 2007). With regards to methods and participants, these studies included one case study of an adolescent role-playing gamer (Cultrara and Har-El 2002), as well as a small sample of young teenagers (Dworak et al. 2007), several studies comparing gaming addicts and healthy controls (Han et al. 2010; Han et al. 2007; Ko et al. 2009; Thalemann et al. 2007), as well as a student sample (Hoeft et al. 2008).

The associations between Internet gaming addiction and physical problems were assessed by the following means: functional Magnetic Resonance Imaging (fMRI; Han et al. 2010; Hoeft et al. 2008; Ko et al. 2009), electroencephalography (EEG; Thalemann et al. 2007), genotyping (Han et al. 2007), polysomnographic measures and visual and verbal memory tests (Dworak et al. 2007), and medical examinations including the patient's history, and physical, radiologic, intraoperative, and pathologic findings (Cultrara and Har-El 2002).

The results of the fMRI studies conducted revealed that during computer game cue presentation, gaming addicts showed similar neural processes and increased activity in brain areas associated with substance-related addictions and other behavioral addictions, such as pathological gambling. Significantly stronger activation in addicts relative to healthy controls was found in the left occipital lobe, parahippocampal gyrus, dorsolateral prefrontal cortex, nucleus accumbens, right orbitofrontal cortex, bilateral anterior cingulate, medial frontal cortex, and the caudate nucleus (Han et al. 2010; Hoefft et al. 2008; Ko et al. 2009). Moreover, the gaming addicts' emotional processing of game-relevant cues was found to be increased relative to that of casual gamers (Thalemann et al. 2007).

In a similar vein, those addicted to Internet gaming were found to have a higher prevalence of two polymorphisms of the dopaminergic system that are associated with substance-related addictions, namely the Taq1A1 allele of the dopamine D2 receptor and the Val158Met in the Catecholamine-O-Methyltransferase (COMT) genes (Han et al. 2007). Additionally, excessive online game play was associated with significantly reduced amounts of slow-wave sleep and declines in verbal memory performance and a prolonged sleep-onset latency (Dworak et al. 2007). Finally, it was reported that one patient excessively moved his jaw and tongue during online game play, to the end that he developed muscle hypertrophy and associated physical problems (Cultrara and Har-El 2002).

However, it must also be noted that although gaming addicts displayed stronger activation compared to non-addicts in these studies, the question remains as to whether this is specific to gaming addiction, or general to any activity that generates arousal (e.g., gambling), and whether these findings reflect causes or effects. Based on the studies presented here, it cannot be proved that the findings reported attest to the severity of the mental health problem if effects found are the result of exposure, anymore than differences in dopaminergic activity between drug and non-drug users attest to the severity of mental health problems for society at large. Despite such limitations, these studies appear to show that neither the causes nor the consequences of Internet gaming addiction are restricted to psychosocial factors. More specifically, the results of scientific studies demonstrate that Internet gaming addiction is associated with a wide variety of physiological, biochemical and neurological aberrations from the norm. This attests to the apparent severity of this mental health problem for society at large.

### Comorbidity

Comorbidity was found to be one of the two categories that the current scientific literature focuses on that cannot adequately be subsumed under one of the main categories presented in the framework. The occurrence of further (sub)clinical symptoms can be a risk factor for Internet gaming addiction as well as an accompanying condition in such a way that they are interdependent. Therefore, in this review no claims regarding the direction of relationship are made.

A total of five studies assessing Internet gaming addiction and its comorbidity were identified (Allison et al. 2006; Batthyány et al. 2009; Chan and Rabinowitz 2006; Batthyány et al. 2009; Peng and Liu 2010). With regards to methodology, the participant groups investigated in the studies were relatively diverse. One study included the case of an adolescent gamer (Allison et al. 2006), and quantitative studies included high school students (Chan and Rabinowitz 2006), college students (Batthyány et al. 2009), online gamers (Peng and Liu 2010), as well as children diagnosed with ADHD (Han et al. 2009).



Internet gaming addiction was found to be associated with symptoms of generalized anxiety disorder, panic disorder, depression, social phobia (Allison et al. 2006), school phobia (Batthyány et al. 2009), ADHD (Allison et al. 2006; Batthyány et al. 2009; Chan and Rabinowitz 2006; Han et al. 2009), as well as psychosomatic symptoms (Batthyány et al. 2009). These results reflect some of the findings of the section concerned with personality traits in that some of the latter may demarcate premorbid levels of diagnosed pathology.

#### Pathology/Addiction

Several studies have assessed pathological characteristics of addiction to Internet gaming. This section is subdivided into three sub-categories, namely the classification and assessment, epidemiology and phenomenology of Internet gaming addiction.

#### Classification/Assessment

A total of seven studies focusing on the classification and assessment of Internet gaming addiction were identified (Charlton and Danforth 2007; Griffiths 2010a, b; Kim and Kim 2010; King et al. 2010; Salguero and Moran 2002; Skoric et al. 2009; van Rooij et al. 2010). In terms of methodology, two case studies of male online gamers were included (Griffiths 2010a, b), large samples of adult MMORPG players (Charlton and Danforth 2007), elementary school video gamers (Skoric et al. 2009), student and non-student video game players (King et al. 2009), teenagers (Salguero and Moran 2002), elementary and high school students (Kim and Kim 2010), and secondary school adolescents (van Rooij et al. 2010).

In each of the studies, different terminologies were applied for similar phenomena, ranging from compulsive Internet use (van Rooij et al. 2010), problem video game playing (King et al. 2009; Salguero and Moran 2002) and problematic online game use (Kim and Kim 2010) to video game addiction (Skoric et al. 2009) and online gaming addiction (Charlton and Danforth 2007; Griffiths 2010a, b). Similarly, a variety of measurement instruments was used in order to assess the specified problematic/addictive behaviors, namely the Compulsive Internet Use Scale (Meerkerk et al. 2009), the Problematic Video Game Playing Test (adapted from Young 1998), the Problem Video Game Playing Scale (Salguero and Moran 2002), the Problematic Online Game Use Scale (Kim and Kim 2010), an assessment of addiction tendencies (based on American Psychiatric Association 2000), the Addiction-Engagement Questionnaire (modified from Charlton 2002), and the Game Addiction Scale (based on Lemmens et al. 2009).

The results of the studies indicate that Internet gaming addiction appears to be a viable construct worthy of individual and independent investigation (van Rooij et al. 2010). It must be noted that the researchers working on this study used the terms addiction and compulsive use interchangeably, so that it seems appropriate to refer to addictions in this case. Furthermore, it was emphasized that addiction cannot be equated with problematic use. Some of the studies suggest that problematic game playing lies on a continuum towards addiction, as it can result in addiction symptoms, namely salience, mood modification, tolerance, withdrawal, conflict, and relapse (Griffiths 2010b; King et al. 2009; Salguero and Moran 2002). Others adopt more detailed approaches to classification, claiming that problematic use is characterized by investing much time and energy in the game, euphoria, tolerance, denial, and a preference for online relationships (Kim and Kim 2010). This finding is in line with the result that addiction core criteria (conflict, withdrawal symptoms, relapse, reinstatement, and behavioral salience)

must be distinguished from peripheral criteria (cognitive salience, tolerance, and euphoria), for only the former were found to load on an addiction factor (Charlton and Danforth 2007). In a similar vein, it was found that addiction does not equal excessive engagement: Only when significant negative consequences of excessive gaming occur can one speak of an addiction (Griffiths 2010a, 2010b; Skoric et al. 2009). A more detailed evaluation of this finding will take place in the discussion.

## Epidemiology

From the literature, ten studies were identified assessing the prevalence of Internet gaming addiction (Batthyány et al. 2009; Grüsser et al. 2005; Grüsser, Thalemann, and Griffiths 2007a; Jeong and Kim 2010; Ng and Wiemer-Hastings 2005; Porter et al. 2010; Rehbein et al. 2010; Thomas and Martin 2010; Yee 2006a, 2006b). The following samples were included: 1,231 students in grades 3 to 5 (Batthyány et al. 2009), 323 children with a mean age of 12 years (Grüsser et al. 2005), 44,910 9<sup>th</sup> graders (Rehbein et al. 2010), 600 middle and high school students (Jeong and Kim 2010), 2,031 secondary, college and university students (Thomas and Martin 2010), 7,069 gamers with a mean age of 21 years (Grüsser et al. 2007a), 91 MMORPG and offline game players (Ng and Wiemer-Hastings 2005), 1,945 video gamers predominantly below 30 years (Porter et al. 2010), and 30,000 MMORPG players (Yee 2006a, 2006b). The prevalence of Internet gaming addiction was assessed with the measures referred to in the sections on motivations for playing and classification/assessment.

The results of the studies indicate that approximately 12% of students in third to fifth grades played computer games excessively (i.e., were classified as abusers and/or addicts), 10% abused these games (i.e., they scored between 7 and 13 on the Fragebogen zum Computerspielverhalten bei Kindern und Jugendlichen [CSVK-R]), and 3% could be categorized as being dependent upon engaging with them (i.e., they scored 13 and above on the CSVK-R) (Batthyány et al. 2009). Furthermore, 9% of 12-year old children fulfilled the criteria for excessive computer and video game playing (Grüsser et al. 2005). Three percent of male and 0.3% of female ninth graders could be diagnosed as being dependent on video games, while 5% of boys and 0.5% of girls were at risk for developing dependence (Rehbein et al. 2010). Four percent of students met the criteria for addiction to video arcade games, and 5% for computer games and the Internet respectively (Thomas and Martin 2010). Finally, 2.2% of middle and high school students were found to be addicted to Internet games (Jeong and Kim 2010).

The studies including gamers specifically reveal higher prevalence rates. Problematic gaming behaviors were present in 8% of video gamers (Porter et al. 2010). Other researchers claimed that 12% of online gamers met at least three criteria for addiction (Grüsser et al. 2007a). In addition to this, the findings suggest that 12% of MMORPG players preferred to talk to people in game rather than in real life and were happier in game than anywhere else (Ng and Wiemer-Hastings 2005). Furthermore, 8% of MMORPG players spent a minimum of 40 h in game per week, 61% spent a minimum of ten hours in game continuously, 30% stayed in game although they did not enjoy it, 18% experienced academic, health, financial or relationship problems, and 50% considered themselves to be addicted (Yee 2006a, 2006b). Nevertheless, although a number of studies have assessed the prevalence of Internet gaming addiction, they used dissimilar assessment instruments as well as cut-offs and included diverse participant groups. This may explain the large variability in prevalence percentages. Therefore, the quoted results do not allow for making definite overall claims with regards to epidemiology at this point in time.

## Phenomenology

Ten studies have investigated the experience of Internet gaming addiction from a phenomenological perspective (Allison et al. 2006; Chappell et al. 2006; Charlton and Danforth 2007; Chou and Ting 2003; Hussain and Griffiths 2009a; Rau et al. 2006; Seah and Cairns 2007; Wan and Chiou 2006a, 2006b; Wood and Griffiths 2007). The methodologies used were qualitative, including a case study of an adolescent excessive MMORPG player (Allison et al. 2006), ten adolescent online game addicts (Wan and Chiou 2006b), and 12 Everquest players (Chappell et al. 2006), and quantitative, including 442 adult MMORPG players (Charlton and Danforth 2007), adults (Chou and Ting 2003; Hussain and Griffiths 2009a), adult and teenage online gamers (Rau et al. 2006), students (Seah and Cairns 2007; Wood and Griffiths 2007), and 16–24-year old adolescents and MMORPG players (Wan and Chiou 2006a).

The experiences of different aspects of Internet gaming addiction were assessed using different methodologies, such as psychiatric interviews (Allison et al. 2006), in-depth interviews assessed with interpretative phenomenological frameworks (Chappell et al. 2006), and content analysis (Wan and Chiou 2006b). In addition to this, several studies have assessed flow experience (Chou and Ting 2003; Wan and Chiou 2006a), immersion (Seah and Cairns 2007) and associated time loss (Rau et al. 2006; Wood and Griffiths 2007) during game-play quantitatively, as based on Csikszentmihalyi's (1990) conceptualization of flow (i.e., the optimum experience a person achieves when performing an activity). Finally, the Addiction-Engagement Questionnaire (modified from Charlton 2002) has also been used.

The results suggest that Internet gaming addiction is associated with large amounts of time, i.e., up to 16 h per day, spent in game, lack of sleep and a shortage of social and romantic contacts (Allison et al. 2006). Moreover, it is experienced similarly to any other substance-related addiction (Hussain and Griffiths 2009a), in such a way that salience, mood modification, conflict, withdrawal symptoms, cravings and relapse occurred (Chappell et al. 2006; Charlton and Danforth 2007). Additionally, online game addicts perceived gaming as providing compensation for needs which were not met in their real lives, and that it has become the focus of their lives (Wan and Chiou 2006b).

In terms of flow and associated experiences, the studies found that the experience of flow and in-game immersion was associated with addiction (Chou and Ting 2003; Seah and Cairns 2007). Another study found that it was game novices who experienced more flow when playing for about one hour, whereas for expert players it took longer to experience flow (Rau et al. 2006). In line with this and contrary to the results of the above mentioned studies, it was also found that flow negatively correlated with addictive inclination (Wan and Chiou 2006a). Furthermore, it has also been found that the experience of time loss does not necessarily precipitate addiction (Wood and Griffiths 2007). These findings will be evaluated in the discussion.

## Ramifications

Several studies have assessed the ramifications of Internet gaming addiction. These can be summarized primarily as negative consequences that may require professional treatment. These topics are dealt with below.

### Negative Consequences

Nineteen studies have highlighted the negative consequences of Internet gaming addiction beyond the comorbidities outlined earlier (Allison et al. 2006; Batthyány et al. 2009; Chan and



Rabinowitz 2006; Chiu et al. 2004; Chuang 2006; Dworak et al. 2007; Griffiths et al. 2004; Grüsser, Thalemann and Griffiths 2007a; Hussain and Griffiths 2009a, 2009b; Jeong and Kim 2010; King and Delfabbro 2009b; Lemmens et al. 2010; Liu and Peng 2009; Peters and Malesky 2008; Rehbein et al. 2010; Skoric et al. 2009; Yee 2006a, 2006b). These have been investigated in children (Batthyány et al. 2009; Skoric et al. 2009), teenagers (Allison et al. 2006; Chan and Rabinowitz 2006; Chiu et al. 2004; Dworak et al. 2007; Jeong and Kim 2010; Lemmens et al. 2010; Rehbein et al. 2010), teenagers and adults (King and Delfabbro 2009b), MMORPG players (Griffiths et al. 2004; Grüsser, Thalemann and Griffiths 2007a; Hussain and Griffiths 2009a, 2009b; Liu and Peng 2009; Peng and Liu 2010; Peters and Malesky 2008; Yee 2006a, 2006b), and epilepsy patients (Chuang 2006).

The negative consequences were assessed via a variety of psychological tests and psychiatric interviews, academic achievement, EEG, MRI, polysomnographic measurements, visual and verbal memory tests, asking what was sacrificed for gaming, the psychosocial context of gaming behavior, social competence, preference for a virtual life, relationship formation, the Internet Addiction Scale modified for video games (Widyanto and McMurrin 2004), Conners' Parent Rating Scale (Conners et al. 1998), Questionnaire on Computer Game Behavior of Children (Thalemann et al. 2004), the Questionnaire for Differentiated Assessment of Addiction (Grüsser et al. 2007b), the Exercise Addiction Inventory (adapted from Terry et al. 2004), the Game Addiction Scale (Lemmens et al. 2009), the UCLA Loneliness Scale (Russell 1996), the Satisfaction with Life Scale (Diener et al. 1985), the Self-Esteem Scale (Rosenberg et al. 1989), the Negative Life Consequences Scale (Liu et al. 2008), the Generalized Problematic Internet Use Scale (Caplan 2002), the social control subscale of the Social Skill Inventory (Riggio 1989), the CES Depression Scale (Mirowsky and Ross 1992), and the Videogame Dependency Scale (adapted from Rehbein and Borchers 2009).

The results of these studies show that Internet gaming addiction can lead to a wide variety of negative consequences. These include psychosocial problems, namely an obsession with gaming, no real life relationships (Allison et al. 2006), inattention (Batthyány et al. 2009; Chan and Rabinowitz 2006), aggressive/oppositional behavior and hostility (Chan and Rabinowitz 2006; Chiu et al. 2004), stress (Batthyány et al. 2009), maladaptive coping (Batthyány et al. 2009; Hussain and Griffiths 2009a, 2009b), decreased academic achievement (Chiu et al. 2004; Jeong and Kim 2010; Rehbein et al. 2010; Skoric et al. 2009), declines in verbal memory performance (Dworak et al. 2007), sacrificing hobbies, sleep, work, education, socializing, time with partner/family as well as associated problems (Batthyány et al. 2009; Griffiths et al. 2004; King and Delfabbro 2009b; Liu and Peng 2009; Peng and Liu 2010; Peters and Malesky 2008; Rehbein et al. 2010; Yee 2006a, 2006b), dissociation (Hussain and Griffiths 2009a), lower psychosocial well-being and loneliness (Lemmens et al. 2010), maladaptive cognitions (Peng and Liu 2010), and increased thoughts of committing suicide (Rehbein et al. 2010). Moreover, psychosomatic problems were found to be consequences of Internet gaming addiction. These included psychosomatic challenges (Batthyány et al. 2009), seizures (Chuang 2006), and sleep abnormalities (Allison et al. 2006; Dworak et al. 2007). Altogether, the relatively long list of potential negative consequences clearly indicates that Internet gaming addiction is a phenomenon that cannot be taken lightly and deserves more extensive recognition.

## Treatment

Three studies have particularly assessed the treatment of Internet gaming addiction (Beranuy et al. 2010; Han et al. 2010; Han et al. 2009). These studies included a qualitative

analysis of nine male MMORPG addicts aged 16–26 years (Beranuy et al. 2010), a comparative study of video game addicts and healthy controls between 17 and 29 years of age (Han et al. 2010), and a sample of 62 children with Internet video game addiction and comorbid ADHD (Han et al. 2009).

With regards to methodology, one investigation (Beranuy et al. 2010) was a descriptive analytic-relational study using semi-structured interview protocols including questions on sociodemographics, family, reasons for therapy, relationships, game usage, and symptom exploration. Its aim was to explore addictive playing of MMORPGs in players undergoing treatment for their gaming addiction. Another study (Han et al. 2010) was experimental, using fMRI for assessing brain activation during game cue exposure in addicts compared to healthy controls, as well as psychometric measurements, including the Internet Addiction Test (Young 1998), Beck's Depression Inventory (Beck and Steer 1993), and the structured clinical diagnostic interview (First et al. 1996, 1997). Its aim was to investigate the effects of bupropin sustained release treatment on Internet video game addicts. The final study (Han et al. 2009) used a computerized neurocognitive function test (Kim et al. 2006), the Internet Addiction Test (Young 1998), and the ADHD Rating Scale (So et al. 2002) to assess the effects of methylphenidate on Internet video game play in children with ADHD.

The results demonstrated that Internet gaming addiction develops as playing times increase significantly, as loss of control, a narrow behavioral focus and serious life conflicts appear. Moreover, the addiction symptoms were similar to those experienced by persons addicted to substances, including salience, mood modification, loss of control, craving, and serious adverse effects, and a variety of further psychosocial problems (Beranuy et al. 2010). Furthermore, following a six-week period of psychopharmacological treatment, craving for Internet video game play as well as brain activities associated with addictions in Internet video game addicts were significantly decreased, while daily life functioning was increased (Han et al. 2010). Finally, an eight-week psychopharmacological treatment targeting ADHD symptoms resulted in a decrease in Internet gaming addiction and playing times (Han et al. 2009). The efficacy of psychopharmacological treatment for treating Internet gaming addiction once again highlights the biochemical underpinnings of this disorder. This demonstrates not only that Internet gaming addiction is a potential mental health concern worthy of treatment, but also that this treatment may alleviate a wide variety of psychosocial problems as a result of the addiction to playing these games.

## Discussion

This systematic review has demonstrated that research into Internet gaming addiction has proliferated over the last few years. From the published studies, it appears that the current scientific knowledge of Internet gaming addiction can be categorized into etiology, pathology, and associated ramifications. In terms of etiology, it would appear that personality traits, motivations for playing, and the structural characteristics of the games are of particular importance. Furthermore, pathophysiology and comorbidity appear to be intersections between risk factors and the actual development of pathological behaviors and cognitions. The analysis of pathology itself can be furthermore subclassified into its assessment and addiction classification, as well as epidemiology and phenomenology. Finally, the ramifications of Internet gaming addiction were found to be negative consequences, which allow for the behavior to be classified as pathological as based on established clinical standards (American Psychiatric Association 2000). In line with this, Internet gaming addiction may require professional treatment.

On a neuronal and biochemical level, Internet gaming addiction appears to be similar to other substance-related addictions, thus supporting the assumption that it is an addiction, albeit a behavioral one, like gambling addiction (Batthyány and Pritz 2009; Grüsser and Thalemann 2006). Firstly, the studies presented suggest that Internet gaming addicts' brains react to game-relevant cues the way that substance addicts' brains react to rewards associated with substance-related addictions (Kalivas and Volkow 2005; Knutson and Cooper 2005). Secondly, the efficacy of psychopharmacological interventions that may alleviate Internet gaming addiction symptoms, support its biochemical, cognitive, and behavioral basis. Thirdly, the genetic polymorphisms found in Internet gaming addicts are similar to those associated with reward dependence in alcohol (Blum et al. 1990), cocaine addictions (Noble et al. 1993), and pathological gambling (Comings et al. 1996). To summarize, Internet gaming addiction is a behavioral addiction that appears to be similar to substance-related addictions and thus it supports the idea of a syndrome model of addiction. Put simply, Shaffer et al. (2004) suggest that each addiction – whether it be to gambling, drugs, sex, or the Internet – might be a distinctive expression of the same underlying syndrome (i.e., addiction is a syndrome with multiple opportunistic expressions). These findings emphasize the pathological status of Internet gaming addiction and demarcate the latter as a mental health concern that is increasingly gaining recognition.

Another aspect that deserves closer scrutiny is the dissimilarity of findings with regards to whether (and in how far) flow experience is associated with addiction to Internet games. Studies are ambiguous in suggesting that flow correlates with addiction, as some seem to suggest a relationship (Chou and Ting 2003; Seah and Cairns 2007), whereas other findings imply the opposite (Wan and Chiou 2006b; Wood and Griffiths 2007). From a theoretical perspective, flow is characterized as an optimal experience (Csikszentmihalyi 1990). No one would disagree with the fact that addiction is anything but optimal. Therefore, being addicted to the flow state experienced during Internet gaming may carry with it the problems that addiction implies. The dissimilarity between the findings may be explained by different conceptualizations of addiction employed in such a way that excessive engagement is equated with pathology. However, it has been shown that a distinction between excess and addiction makes sense from a scientific point of view (Charlton and Danforth 2007; Griffiths 2010a, b).

Against this background, it seems likely that excessive players experience flow because their game playing is principally characterized by excitement and challenge (Wan and Chiou 2006b), which lies at the heart of flow experience. Flow occurs when a person is absorbed by a task in which the task's level of challenge and the individual's skill are matched (Csikszentmihalyi 1990). Contrary to this, it seems unlikely that addicted players experience flow, for they tend to continue playing although they do not enjoy it (Yee 2006a, 2006b), which attests to the compulsiveness of their behaviors. Therefore, it appears probable that addicts have already left the flow experience behind. This provides additional support to the idea that some players who engage in Internet gaming excessively can develop a full-blown addiction to it.

In relation to this, another important finding from the studies is the distinction that has been made between excessive engagement and addiction (Charlton and Danforth 2007; Griffiths 2010a, b; Skoric et al. 2009). Excessive (problematic) engagement was found in approximately 8–12% of young persons, whereas addiction seems to be present in 2–5% of children, teenagers and students. Furthermore, one study found that 12% of online game players met at least three addiction criteria (Grüsser et al. 2007a, b). This is in line with adopting either monothetic or polythetic formats for addiction diagnosis, as set forth by Lemmens et al. (2009). In the former, all addiction criteria must be met in order to diagnose

someone with gaming addiction, whereas in the latter, only half of them need to be endorsed. What follows as a consequence of the utilization of these dissimilar frameworks is the apparent discrepancy between prevalence estimates.

From the studies reviewed, it furthermore appears that MMORPG players particularly experienced symptoms associated with addiction, such as tolerance, mood modification, and negative psychosocial consequences, and half of them acknowledged that they were addicted to playing these games. In comparison to the general population of youth and young adults, it may be deduced that the prevalence of Internet gaming addiction is relatively high in the collective population of the MMORPG players that were included in the studies referenced. It has also been claimed that “MMOGs are particularly good at simultaneously tapping into what is typically formulated as game/not game, social/instrumental, real/virtual. And this mix is exactly what is evocative and hooks many people” (Taylor 2006, pp. 153–154). This emphasizes the importance of the particular game genre’s structural characteristics in the etiology of Internet gaming addiction, which may necessitate further scientific exploration.

Although this systematic literature review is specific in that it does not present Internet gaming addiction as a type of Internet addiction, it must be conceded that in the studies that were included, dissimilar foci were adopted with regards to the respective game genres analyzed. As mentioned in the introduction, a variety of games are accessible and playable via the Internet, each of which may entail dissimilar addictive potentials. For a number of studies, particularly those dealing with video games, it is unclear to what extent these games were specifically played on the Internet or offline. Furthermore, there are multiple forms of Internet gaming ranging from multi-player to single games, and complex to simple skills-based. In this review, no attempt was made to compare findings across similar types of gaming (often because the authors of the studies themselves had not made these distinctions), raising the question of the validity of combining studies reporting MMORPG, video games and other non-specified game genres. In light of this, researchers are advised to carefully describe the games their participants are playing in order to circumvent this difficulty and to increase the external validity of their findings to specific populations.

It should also be noted that there are different cultural and social factors associated with the environment that participants were recruited from in various studies that are outlined in this review. This could be highly relevant given that many studies on Internet gaming have been conducted in South East Asian countries where the social infrastructure fosters the promotion of professional competitions located in large venues that include social interactions among players, or where strong ego and image identities are derived from public recognition of gaming skills.

With regards to psychopathological status, it seems fruitful to distinguish between excessive engagement and addiction as suggested by past research (Charlton and Danforth 2007). This is a requirement particularly when taking into consideration the context of the American Psychiatric Association’s definition of what constitutes a mental disorder worthy of professional treatment. According to the APA, a mental disorder is a “clinically significant behavioral or psychological syndrome or pattern that occurs in an individual and that is associated with present distress (...) or disability (i.e., impairment in one or more important areas of functioning) or with a significantly increased risk of suffering death, pain, disability, or an important loss of freedom” (American Psychiatric Association 2000, p. xxxi). Accordingly, only when the condition is experienced as significantly impairing can one speak of an addiction, which is clearly not the case for excessive gamers who enjoy themselves while playing their games and for whom their gaming does not result in significant negative consequences. In line with this, researchers must be cautious in deploying the label

“addiction” for it does not merely denote the extreme utilization of substances or engagement in certain behaviors, but it demarcates a genuine mental health problem.

For that reason, future researchers are advised to properly investigate what they claim to be an addiction in order to make sure that their identification of pathology is commensurate with clinical parlance even within the confinements of research using surveys for diagnosis only. Related to this is the utilization of a wide variety of assessment instruments to diagnose addiction, most of which have not been validated. Likewise, many studies used non-representative self-selected samples and small sample sizes. This obstructs the comparability of results, but it also puts into question the validity of diagnosis. Clearly, future researchers are advised not to develop additional measurement instruments, but to assess the validity and reliability of those already constructed against the official criteria of substance dependence as established by the American Psychiatric Association (2000).

## References

- Allison, S. E., von Wahlde, L., Shockley, T., & Gabbard, G. O. (2006). The development of the self in the era of the Internet and role-playing fantasy games. *The American Journal of Psychiatry*, 163(3), 381–385.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders—Text revision*. Washington, D.C.: American Psychiatric Association.
- Arnett, J. (1994). Sensation seeking: a new conceptualization and a new scale. *Personality and Individual Differences*, 16, 289–296.
- Bar-On, R., & Parker, J. D. A. (2000). *The Bar-On EQ-i:YV: Technical manual*. Toronto: Multi-Health Systems.
- Batthyány, D., & Pritz, A. (Eds.). (2009). *Rausch ohne Drogen*. Wien: Springer.
- Batthyány, D., Müller, K. W., Benker, F., & Wölfling, K. (2009). Computer game playing: clinical characteristics of dependence and abuse among adolescents. *Wiener Klinische Wochenschrift*, 121(15–16), 502–509.
- Beck, A. T., & Steer, R. (1993). *Manual for the Beck depression inventory*. San Antonio: The Psychological Corporation.
- Beranuy, M., Carbonell, X., & Griffiths, M. (2010). A qualitative analysis of online gaming addicts in treatment. Submitted manuscript.
- Blum, K., Noble, E. P., Sheridan, P. J., et al. (1990). Allelic association of human dopamine D2 receptor gene in alcoholism. *Journal of the American Medical Association*, 263, 2055–2060.
- Buss, A. H., & Perry, M. (1992). The aggression questionnaire. *Journal of Personality and Social Psychology*, 63, 452–459.
- Butcher, J. N., Dahlstrom, W. G., Graham, J. R., Tellegen, A., & Kaemmer, B. (1989). *The Minnesota Multiphasic Personality Inventory-2 (MMPI-2): Manual for administration and scoring*. Minneapolis: University of Minnesota Press.
- Caplan, S. E. (2002). Problematic internet use and psychosocial well-being: development of a theory-based cognitive-behavioral measurement instrument. *Computers in Human Behavior*, 18(5), 553–575.
- Caplan, S. E., Williams, D., & Yee, N. (2009). Problematic internet use and psychosocial well-being among MMO players. *Computers in Human Behavior*, 25(6), 1312–1319.
- Chan, P. A., & Rabinowitz, T. (2006). A cross-sectional analysis of video games and attention deficit hyperactivity disorder symptoms in adolescents. *Annals of General Psychiatry*, 5(1), 16–26.
- Chappell, D., Eatough, V., Davies, M. N. O., & Griffiths, M. D. (2006). Everquest—It’s just a computer game right? An interpretative phenomenological analysis of online gaming addiction. *International Journal of Mental Health and Addiction*, 4, 205–216.
- Charlton, J. P. (2002). A factor-analytic investigation of computer ‘addiction’ and engagement. *British Journal of Psychology*, 93, 329–344.
- Charlton, J. P., & Danforth, I. D. W. (2007). Distinguishing addiction and high engagement in the context of online game playing. *Computers in Human Behavior*, 23(3), 1531–1548.
- Chiu, S. I., Lee, J. Z., & Huang, D. H. (2004). Video game addiction in children and teenagers in Taiwan. *Cyberpsychology & Behavior*, 7(5), 571–581.
- Choi, D., Kim, H., & Kim, J. (2000). A cognitive and emotional strategy for computer game design. *Journal of MIS Research*, 10, 165–187.



- Chou, T. J., & Ting, C. C. (2003). The role of flow experience in cyber-game addiction. *Cyberpsychology & Behavior*, 6(6), 663–675.
- Chuang, Y. C. (2006). Massively multiplayer online role-playing game-induced seizures: a neglected health problem in Internet addiction. *Cyberpsychology & Behavior*, 9(4), 451–456.
- Chumbley, J., & Griffiths, M. (2006). Affect and the computer game player: the effect of gender, personality, and game reinforcement structure on affective responses to computer game-play. *Cyberpsychology & Behavior*, 9(3), 308–316.
- Comings, D. E., Rosenthal, R. J., Lesieur, H. R., et al. (1996). A study of the dopamine D2 receptor gene in pathological gambling. *Pharmacogenetics*, 6, 223–234.
- Conners, C. K., Sitarenios, G., Parker, J. D., & Epstein, J. N. (1998). The revised Conners' Parent Rating Scale (CPR-R): Factor structure, reliability, and criterion validity. *Journal of Abnormal Child Psychology*, 26(4), 257–268.
- Costa, P. T., & McCrae, R. R. (1985). *The NEO personality inventory manual*. Odessa: Psychological Assessment Resources.
- Csikszentmihalyi, M. (1990). *Flow: the psychology of optimal experience*. New York: HarperCollins.
- Cultrara, A., & Har-El, G. (2002). Hyperactivity-induced suprahyoid muscular hypertrophy secondary to excessive video game play: a case report. *Journal of Oral and Maxillofacial Surgery*, 60(3), 326–327.
- Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, 49, 71–75.
- Ducheneaut, N., Yee, N., Nickell, E., & Moore, R. J. (2007). *The life and death of online gaming communities: A look at guilds in World of Warcraft*. San Jose: Paper presented at the CHI.
- Dworak, M., Schierl, T., Bruns, T., & Struder, H. K. (2007). Impact of singular excessive computer game and television exposure on sleep patterns and memory performance of school-aged children. *Pediatrics*, 120(5), 978–985.
- Eysenck, H. J., & Eysenck, S. G. B. (1996). *Manual of the Eysenck Personality Scales (EPS adult) (revised ed.)*. London: Hodder & Stoughton Educational.
- Farrell, E. (1990). *Hanging in and dropping out: Voices of at-risk high school students*. New York: Teachers College Press.
- First, M. B., Gibbon, M., Spitzer, R. L., & Williams, J. B. W. (1996). *Structured Clinical Interview for DSM-IV Axis I Disorders: Clinician Version (SCID-CV): Administration booklet*. Washington, D. C.: American Psychiatric Press.
- First, M. B., Gibbon, M., Spitzer, R. L., Williams, J. B. W., & Benjamin, L. S. (1997). *Structural Clinical Interview for DSM-IV (R) Axis II Personality Disorders (SCID-II)*. Washington, D. C.: American Psychiatric Press.
- Griffiths, M. D. (2010a). Online gaming addiction: Fact or fiction? In W. Kaminski & M. Lorber (Eds.), *Clash of realities* (pp. 191–203). Munch: Kopaed.
- Griffiths, M. D. (2010b). The role of context in online gaming excess and addiction: some case study evidence. *International Journal of Mental Health and Addiction*, 8(1), 119–125.
- Griffiths, M. D., & Parke, J. (2010). Adolescent gambling on the internet: a review. *International Journal of Adolescent Medicine and Health*, 22, 59–75.
- Griffiths, M. D., Davies, M. N. O., & Chappell, D. (2004). Demographic factors and playing variables in online computer gaming. *Cyberpsychology & Behavior*, 7(4), 479–487.
- Grüsser, S. M., & Thalemann, C. N. (Eds.). (2006). *Verhaltenssucht—Diagnostik, Therapie, Forschung*. Bern: Hans Huber.
- Grüsser, S. M., Thalemann, R., Albrecht, U., & Thalemann, C. N. (2005). Exzessive Computernutzung im Kindesalter—Ergebnisse einer psychometrischen Erhebung. *Wiener Klinische Wochenschrift*, 117(5–6), 188–195.
- Grüsser, S. M., Thalemann, R., & Griffiths, M. D. (2007a). Excessive computer game playing: evidence for addiction and aggression? *Cyberpsychology & Behavior*, 10(2), 290–292.
- Grüsser, S. M., Wölfling, K., Döffert, S., et al. (2007b). Questionnaire on differentiated assessment of addiction (QDAA). Göttingen: Hogrefe.
- Han, D. H., Lee, Y. S., Yang, K. C., Kim, E. Y., Lyoo, I. K., & Renshaw, P. F. (2007). Dopamine genes and reward dependence in adolescents with excessive internet video game play. *Journal of Addiction Medicine*, 1(3), 133–138.
- Han, D. H., Lee, Y. S., Na, C., Ahn, J. Y., Chung, U. S., Daniels, M. A., et al. (2009). The effect of methylphenidate on Internet video game play in children with attention-deficit/hyperactivity disorder. *Comprehensive Psychiatry*, 50(3), 251–256.
- Han, D. H., Hwang, J. W., & Renshaw, P. F. (2010). Bupropion sustained release treatment decreases craving for video games and cue-induced brain activity in patients with Internet video game addiction. *Experimental and Clinical Psychopharmacology*, 18(4), 297–304.

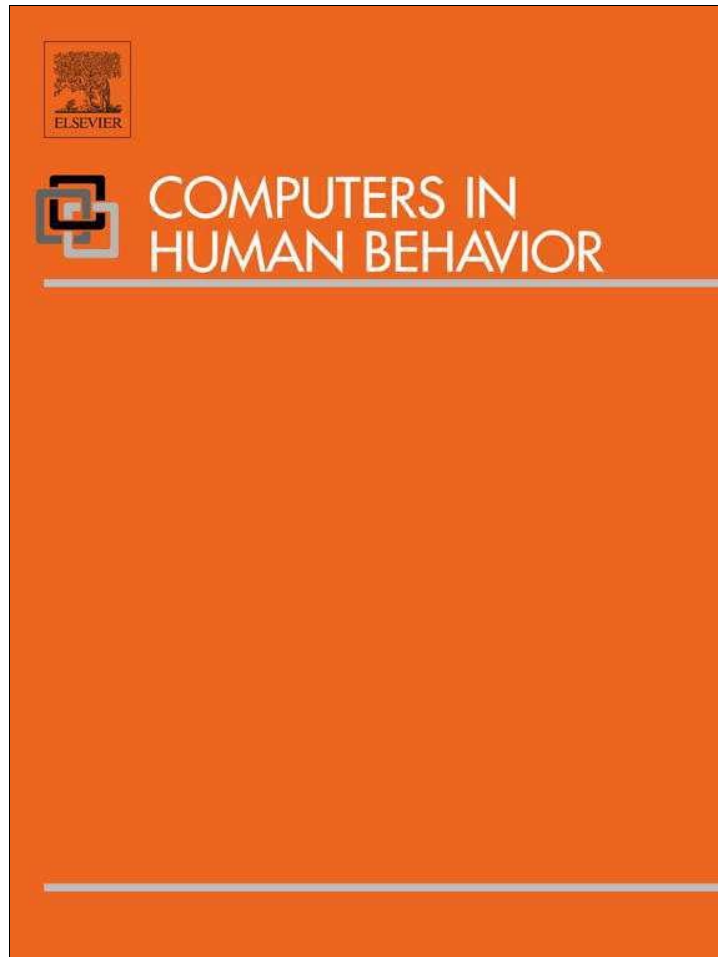
- Hoefl, F., Watson, C. L., Kesler, S. R., Bettinger, K. E., & Reiss, A. L. (2008). Gender differences in the mesocorticolimbic system during computer game-play. *Journal of Psychiatric Research*, 42(4), 253–258.
- Hsu, S. H., Wen, M. H., & Wu, M. C. (2009). Exploring user experiences as predictors of MMORPG addiction. *Computers & Education*, 53(2), 990–999.
- Huizinga, J. (1938). *Homo ludens: A study of the play-element in culture*. Boston: Beacon.
- Hussain, Z., & Griffiths, M. D. (2009a). The attitudes, feelings, and experiences of online gamers: a qualitative analysis. *Cyberpsychology & Behavior*, 12(6), 747–753.
- Hussain, Z., & Griffiths, M. D. (2009b). Excessive use of massively-multi-player online role-playing games: a pilot study. *International Journal of Mental Health and Addiction*, 7, 563–571.
- Hwang, S. T. (1995). Development of diagnostic criteria for personality disorder. Seoul: Yonsei University. Master's thesis.
- Jeong, E. J., & Kim, D. W. (2010). Social activities, self-efficacy, game attitudes, and game addiction. *Cyberpsychology, Behavior & Social Networking*, e-pub ahead of print.
- Kalivas, P. W., & Volkow, N. D. (2005). The neural basis of addiction: a pathology of motivation and choice. *The American Journal of Psychiatry*, 162, 1403–1413.
- Kim, M. G., & Kim, J. (2010). Cross-validation of reliability, convergent and discriminant validity for the problematic online game use scale. *Computers in Human Behavior*, 26(3), 389–398.
- Kim, S. W., Shin, I. S., Kim, J. M., Yang, S. J., Shin, H. Y., & Yoon, J. S. (2006). Association between attitude toward medication and neurocognitive function in schizophrenia. *Clinical Neuropharmacology*, 29, 197–205.
- Kim, E. J., Namkoong, K., Ku, T., & Kim, S. J. (2008). The relationship between online game addiction and aggression, self-control and narcissistic personality traits. *European Psychiatry*, 23(3), 212–218.
- King, D. L., & Delfabbro, P. (2009a). Motivational differences in problem video game play. *Journal of CyberTherapy & Rehabilitation*, 2(2), 139–149.
- King, D. L., & Delfabbro, P. (2009b). Understanding and assisting excessive players of video games: a community psychology perspective. *The Australian Community Psychologist*, 21(1), 62–74.
- King, D. L., Delfabbro, P. H., & Zajac, I. T. (2009). Preliminary validation of a new clinical tool for identifying problem video game playing. *International Journal of Mental Health and Addiction*, e-pub ahead of print.
- King, D. L., Delfabbro, P. H., & Griffiths, M. D. (2010). The convergence of gambling and digital media: implications for gambling in young people. *Journal of Gambling Studies*, 26, 175–187.
- King, D. L., Delfabbro, P. H., & Griffiths, M. D. (2011). The role of structural characteristics in problematic video game play: an empirical study. *International Journal of Mental Health and Addiction*. doi:10.1007/s11469-010-9289-y.
- Knutson, B., & Cooper, J. C. (2005). Functional magnetic resonance imaging of reward prediction. *Current Opinion in Neurology*, 18, 411–417.
- Ko, C. H., Yen, J. Y., Chen, C. C., Chen, S. H., & Yen, C. F. (2005). Gender differences and related factors affecting online gaming addiction among Taiwanese adolescents. *The Journal of Nervous and Mental Disease*, 193(4), 273–277.
- Ko, C. H., Liu, G. C., Hsiao, S. M., Yen, J. Y., Yang, M. J., Lin, W. C., et al. (2009). Brain activities associated with gaming urge of online gaming addiction. *Journal of Psychiatric Research*, 43(7), 739–747.
- Lemmens, J. S., Valkenburg, P. M., & Peter, J. (2009). Development and validation of a game addiction scale for adolescents. *Media Psychology*, 12(1), 77–95.
- Lemmens, J. S., Valkenburg, P. M., & Peter, J. (2010). Psychosocial causes and consequences of pathological gaming. *Computers in Human Behavior*, e-pub ahead of print.
- Liu, M., & Peng, W. (2009). Cognitive and psychological predictors of the negative outcomes associated with playing MMOGs (massively multiplayer online games). *Computers in Human Behavior*, 25, 1306–1311.
- Liu, M., Ko, H., & Wu, J. (2008). The role of positive/negative outcome expectancy and refusal self-efficacy of Internet use on Internet addiction among college students in Taiwan. *Cyberpsychology & Behavior*, 11, 451–457.
- Lu, H. P., & Wang, S. M. (2008). The role of Internet addiction in online game loyalty: an exploratory study. *Internet Research*, 18(5), 499–519.
- Meerkerk, G. J., Van Den Eijnden, R., Vermulst, A. A., & Garretsen, H. F. L. (2009). The Compulsive Internet Use Scale (CIUS): some psychometric properties. *Cyberpsychology & Behavior*, 12(1), 1–6.
- Mehroof, M., & Griffiths, M. D. (2010). Online gaming addiction: the role of sensation seeking, self-control, neuroticism, aggression, state anxiety, and trait anxiety. *Cyberpsychology & Behavior*, 13(3), 313–316.
- Mirowsky, J., & Ross, C. E. (1992). Age and depression. *Journal of Health and Social Behavior*, 33, 187–205.

- Muris, P. (2001). A brief questionnaire for measuring self-efficacy in youths. *Journal of Psychopathology and Behavioral Assessment*, 23(3), 145–149.
- Myers, D. (1990). A Q-study of game player aesthetics. *Simulation & Gaming*, 21, 375–396.
- Ng, B. D., & Wiener-Hastings, P. (2005). Addiction to the internet and online gaming. *Cyberpsychology & Behavior*, 8(2), 110–113.
- Noble, E. P., Blum, K., Khalsa, M. E., et al. (1993). Allelic association of the D2 dopamine receptor gene with cocaine dependence. *Drug and Alcohol Dependence*, 33, 271–285.
- Parker, J. D. A., Taylor, R. N., Eastabrook, J. M., Schell, S. L., & Wood, L. M. (2008). Problem gambling in adolescence: relationships with internet misuse, gaming abuse and emotional intelligence. *Personality and Individual Differences*, 45(2), 174–180.
- Peng, W., & Liu, M. (2010). Online gaming dependency: a preliminary study in China. *CyberPsychology, Behavior and Social Networking*, 13(3), 329–333.
- Peters, C. S., & Malesky, L. A. (2008). Problematic usage among highly-engaged players of massively multiplayer online role playing games. *Cyberpsychology & Behavior*, 11(4), 480–483.
- Porter, G., Starcevic, V., Berle, D., & Fenech, P. (2010). Recognizing problem video game use. *The Australian and New Zealand Journal of Psychiatry*, 44(2), 120–128.
- Rau, P. L. P., Peng, S. Y., & Yang, C. C. (2006). Time distortion for expert and novice online game players. *Cyberpsychology & Behavior*, 9(4), 396–403.
- Rehbein, F., & Borchers, M. (2009). Suechtig nach virtuellen Welten? Exzessives Computerspielen und Computerspielabhaengigkeit in der Jugend [Addicted to virtual worlds? Excessive video gaming and video game addiction in adolescents]. *Kinderaerztliche Praxis*, 80, 42–49.
- Rehbein, F., Psych, G., Kleimann, M., Mediasci, G., & Mossle, T. (2010). Prevalence and risk factors of video game dependency in adolescence: results of a German nationwide survey. *CyberPsychology, Behavior and Social Networking*, 13(3), 269–277.
- Riggio, R. (1989). *The social skill inventory manual* (Research ed.). Palo: Consulting Psychologists Press.
- Rosenberg, M. (1965). *Society and adolescent self-image*. New Jersey: Princeton University Press.
- Rosenberg, M., Schooler, C., & Schoenbach, C. (1989). Self-esteem and adolescent problems: modeling reciprocal effects. *American Sociological Review*, 54, 1004–1018.
- Russell, D. (1996). The UCLA Loneliness Scale (Version 3): reliability, validity, and factor structure. *Journal of Personality Assessment*, 66, 20–40.
- Salguero, R. A. T., & Moran, R. M. B. (2002). Measuring problem video game playing in adolescents. *Addiction*, 97(12), 1601–1606.
- Seah, M., & Cairns, P. (2007). From immersion to addiction in videogames. Paper presented at the Proceedings of the 22nd British HCI Group Annual Conference on People and Computers: Culture, Creativity, Interaction—Volume I, Liverpool, UK.
- Shaffer, H. J., LaPlante, D. A., LaBrie, R. A., Kidman, R. C., Donato, A. N., & Stanton, M. V. (2004). Toward a syndrome model of addiction: multiple expressions, common etiology. *Harvard Review of Psychiatry*, 12(6), 367–374.
- Sherer, M., Maddux, J. E., Mercandante, B., Prentice-Dunn, S., Jacobs, B., & Rogers, R. W. (1982). The Self-Efficacy Scale: construction and validation. *Psychological Reports*, 51, 663–671.
- Silverstone, R. (1999). Rhetoric, play, performance: revisiting a study of the making of a BBC documentary. In J. Gripsrud (Ed.), *Television and common knowledge* (pp. 71–90). London: Routledge.
- Skoric, M. M., Teo, L. L. C., & Neo, R. L. (2009). Children and video games: addiction, engagement, and scholastic achievement. *Cyberpsychology & Behavior*, 12(5), 567–572.
- Smahel, D., Blinka, L., & Ledabyl, O. (2008). Playing MMORPGs: connections between addiction and identifying with a character. *Cyberpsychology & Behavior*, 11(6), 715–718.
- So, Y. K., Noh, J. N., Kim, Y. S., Ko, S. G., & Koh, Y. J. (2002). The reliability and validity of Korean parent and teacher ADHD rating scale. *Journal of the Korean Neuropsychiatric Association*, 41, 283–289.
- Tangney, P. J., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grads, and interpersonal success. *Journal of Personality*, 72, 272–322.
- Taylor, T. L. (2006). *Play between worlds. Exploring online game culture*. Cambridge: MIT.
- Terry, A., Szabo, A., & Griffiths, M. (2004). The exercise addiction inventory: a new brief screening tool. *Addiction Research & Theory*, 12(5), 489–499.
- Thalemann, R., Albrecht, U., Thalemann, C., & Grüsser, S. M. (2004). Kurzbeschreibung und psychometrische Kennwerte des "Fragebogens zum Computerspielverhalten bei Kindern (CSVK). *Zeitschrift für Psychologie und Medizin*, 16, 226–233.
- Thalemann, R., Wölfling, K., & Grüsser, S. M. (2007). Specific cue reactivity on computer game-related cues in excessive gamers. *Behavioral Neuroscience*, 121(3), 614–618.
- The NPD Group. (2010). 2009 US video game industry and PC game software retail sales reach \$20.2 billion. Retrieved November 4, 2010, from [http://www.npd.com/press/releases/press\\_100114.html](http://www.npd.com/press/releases/press_100114.html).



- Thomas, N. J., & Martin, F. H. (2010). Video-arcade game, computer game and Internet activities of Australian students: participation habits and prevalence of addiction. *Australian Journal of Psychology*, 62(2), 59–66.
- van Rooij, A. J., Schoenmakers, T. M., van de Eijnden, R., & van de Mheen, D. (2010). Compulsive Internet use: the role of online gaming and other Internet applications. *The Journal of Adolescent Health*, 47(1), 51–57.
- Wan, C. S., & Chiou, W. B. (2006a). Psychological motives and online games addiction: a test of flow theory and humanistic needs theory for Taiwanese adolescents. *Cyberpsychology & Behavior*, 9(3), 317–324.
- Wan, C. S., & Chiou, W. B. (2006b). Why are adolescents addicted to online gaming? An interview study in Taiwan. *Cyberpsychology & Behavior*, 9(6), 762–766.
- Wan, C. S., & Chiou, W. B. (2007). The motivations of adolescents who are addicted to online games: a cognitive perspective. *Adolescence*, 42(165), 179–197.
- Widyanto, L., & McMurrin, M. (2004). The psychometric properties of the Internet Addiction Test. *Cyberpsychology & Behavior*, 7(4), 443–450.
- Williams, D., Yee, N., & Caplan, S. E. (2008). Who plays, how much, and why? Debunking the stereotypical gamer profile. *Journal of Computer-Mediated Communication*, 13, 993–1018.
- Wölfling, K., Thalemann, R., & Grusser-Sinopoli, S. M. (2008). Computer game addiction: A psychopathological symptom complex in adolescence. *Psychiatrische Praxis*, 35(5), 226–232.
- Wood, R. T. A., & Griffiths, M. D. (2007). Time loss whilst playing video games: is there a relationship to addictive behaviors? *International Journal of Mental Health and Addiction*, 5, 141–149.
- Yee, N. (2006a). The demographics, motivations and derived experiences of users of massively-multiuser online graphical environments. *PRESENCE: Teleoperators and Virtual Environments*, 15, 309–329.
- Yee, N. (2006b). The psychology of MMORPGs: emotional investment, motivations, relationship formation, and problematic usage. In R. Schroeder & A. Axelsson (Eds.), *Avatars at work and play: Collaboration and interaction in shared virtual environments* (pp. 187–207). London: Springer.
- Young, K. (1998). *Caught in the net*. New York: Wiley.
- Young, K. (2009). Understanding online gaming addiction and treatment issues for adolescents. *American Journal of Family Therapy*, 37(5), 355–372.

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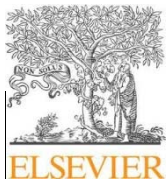


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## Internet addiction in adolescents: Prevalence and risk factors

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## a b s t r a c t

As new media are becoming daily fare, Internet addiction appears as a potential problem in adolescents. From the reported negative consequences, it appears that Internet addiction can have a variety of detrimental outcomes for young people that may require professional intervention. Researchers have now identified a number of activities and personality traits associated with Internet addiction. This study aimed to synthesise previous findings by (i) assessing the prevalence of potential Internet addiction in a large sample of adolescents, and (ii) investigating the interactions between personality traits and the usage of particular Internet applications as risk factors for Internet addiction. A total of 3105 adolescents in the Netherlands filled out a self-report questionnaire including the Compulsive Internet Use Scale and the Quick Big Five Scale. Results indicate that 3.7% of the sample were classified as potentially being addicted to the Internet. The use of online gaming and social applications (online social networking sites and Twitter) increased the risk for Internet addiction, whereas extraversion and conscientiousness appeared as protective factors in high frequency online gamers. The findings support the inclusion of 'Internet addiction' in the DSM-V. Vulnerability and resilience appear as significant aspects that require consideration in further studies.

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## 1. Introduction

With the availability and mobility of new media, Internet addiction has emerged as a potential problem in young people. Based on a growing research base (Young, 2010), the American Psychiatric Association aims to include Internet Use Disorder in the appendix of the upcoming fifth edition of the Diagnostic and Statistical Manual for Mental Disorders (2012) for the first time, acknowledging the problems arising from this type of addictive disorder. Adolescents appear to be a population at risk for developing Internet addiction (Leung, 2007) due to variability in developing their cognitive control (Casey, Tottenham, Liston, & Durston, 2005) and boundary setting skills (Liu & Potenza, 2007).

With regards to prevalence of Internet addiction in adolescents, estimates vary widely across countries. Using Young's Internet Addiction Test (1999), 1.5% of Greek (Kormas, Critselis, Janikian, Kafetzis, & Tsitsika, 2011) and 1.6% of Finnish adolescents (Kaltiala-Heino, Lintonen, & Rimpela, 2004) were found to be addicted to using the Internet. Using a modified version of the Minnesota Impulsive Disorders Inventory, 4% of US high school were identified as addicted to using the Internet (Liu, Desai, Krishnan-Sarin,

Cavallo, & Potenza, 2011). Higher prevalence rates have been reported in South East Asian countries (e.g., Taiwan, Singapore, South Korea and China). For example, using Young's Internet Addiction Test (1998a) 8% of adolescents in China (Cao, Sun, Wan, Hao, & Tao, 2011) and 10.7% of adolescents in South Korea (Park, Kim, & Cho, 2008) were found to be addicted to using the Internet. In comparison and unsurprisingly, prevalence estimates in youth psychiatric settings are reported to be considerably higher. For instance, the prevalence of Internet addiction among minors using the Assessment of Internet and Computer Game Addiction Scale (Wölfling, Müller, & Beutel, 2010) was found to be 11.3% in Germany (Müller, Ammerschläger, Freisleder, Beutel, & Wölfling, 2012), and assessed via the Internet Addiction Test (Young, 1998b), 11.6% of adolescent outpatients in Latin America were classed as being Internet addicts (Liberatore, Rosario, Colon-De Marti, & Martinez, 2011). A detailed outline of the reported studies can be found in Table 1.

Overall, in the reported studies to date, a variety of measurement instruments have been used that do not allow for a clear-cut and comparable estimation of Internet addiction prevalence in both adolescent and adult populations. Therefore, there is a need for utilising actual clinical criteria in order to demarcate potentially pathological (i.e., addictive) behaviours from high-engagement behaviours that appear to be linked to a number of

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Table 1  
Overview of prevalence studies of internet addiction in adolescents.

Study	Aim	Sample and country	Design	Internet addiction measures	Prevalence
Kormas et al. (2011)	To assess the determinants and psychosocial implications associated with potential problematic Internet use (PIU) and PIU among adolescents	N = 866 randomly selected adolescents in Greece (mean age = 14.7 years)	Cross-sectional pen-and-paper questionnaire study	Young's Internet Addiction Test (Young, 1999), scoring >50/100 indicates addiction	1.5% with problematic Internet use
Kaltiala-Heino et al. (2004)	To assess the prevalence of features suggesting a harmful Internet use among 12–18 year-olds in Finland	N = 7292 representative of adolescents in Finland (4 age groups, mean ages = 12.6, 14.6, 16.6 and 18.6 years)	Cross-sectional postal survey	Pathological gambling criteria (addicted when 4/7 criteria met)	1.6% addicted
Liu et al. (2011)	To explore the prevalence and health correlates of problematic Internet use among high school students in the United States	N = 3,560 high school students in USA (age range = 14–18 years)	Cross-sectional pen-and-paper survey	Modified Minnesota Impulsive Disorder Inventory (Grant et al., 2005), endorsing craving, withdrawal, and abstinence attempts simultaneously indicates problematic Internet use	4% With problematic Internet use
Cao et al. (2011)	To investigate the prevalence of problematic Internet use (PIU) and its relationships with psychosomatic symptoms and life satisfaction among adolescents in mainland China	N = 17,599 adolescents in China sampled via stratified cluster sampling in schools (mean age = 16.1 years)	School-based cross-sectional survey	Young's Internet Addiction Test (Young, 1999), scoring >50/100 indicates addiction	8.1% With problematic Internet use
Park et al. (2008)	To explore relations between risk and protective factors and Internet addiction adolescents in South Korea	N = 903 middle and high school students in South Korea (60.5% middle school seniors, 39.5% high school students (12.4% freshmen, 27.1% juniors)) randomly selected from schools in Seoul	Cross-sectional pen-and-paper survey	Modified Young's Internet Addiction Scale (IAS) (1998a), scoring $\geq 70$ indicates addiction	10.7% Addicted
Müller et al. (2012)	To explore Internet addiction prevalence in a clinical context in Germany	N = 81 child and adolescent psychiatric patients in Germany (mean age = 13.6 years)	Cross-sectional pen-and-paper questionnaire	Assessment of Internet and computer game addiction scale (Wöfling et al., 2010), scoring >7/15.5 indicates addiction	11.3% Addicted
Liberatore et al. (2011)	To study the prevalence of Internet addiction in adolescents receiving treatment for a diagnosed psychiatric illness	N = 71 adolescent outpatients in Puerto Rico, Latin America (age range = 13–17 years)	Cross-sectional pen-and-paper questionnaire	Internet Addiction Test (Young, 1998a), scores $\geq 80/100$ indicate addiction	11.6% Addicted

personality traits in addicted Internet users (Charlton & Danforth, 2010). In this study, clinical criteria for Internet addiction will be adopted, which will provide an indication of potential Internet addiction assessed via self-report (Meerkerk, Van Den Eijnden, Vermulst, & Garretsen, 2009). The criteria are based on the official diagnoses of substance dependence and pathological gambling (American Psychiatric Association, 2000) and are planned to be integrated in the proposed addition to the updated DSM, Internet Use Disorder (American Psychiatric Association., 2012). Accordingly, Internet addiction as adopted in this paper does not refer to a clinical diagnosis, but to a potentially pathological behavioural pattern. It is denoted by the presence of the following symptoms: (i) a loss of control over the behaviour, (ii) conflict (internal and interpersonal), (iii) preoccupation with the Internet, (iv) using the Internet to modify mood, and (v) withdrawal symptoms (Meerkerk et al., 2009).

From the perspective of the engagement in specific online activities, rather than focusing on Internet addiction per sé, researchers have now identified a number of activities that can be engaged in excessively online that may lead to symptoms similar to substance-related addictions (Yellowlees & Marks, 2007). Among these, excessive online gaming (Kuss & Griffiths, 2012a), excessive online gambling (Griffiths & Parke, 2010), and the use of social media (van den Eijnden, Meerkerk, Vermulst, Spijkerman, & Engels, 2008), such as online social networks (SNSs) (Kuss & Griffiths, 2011) appear to stand out. Their increasing diversity and usage growth among young populations (Entertainment Software Association., 2012; Lenhart, Purcell, Smith, & Zickuhr, 2012) is mirrored by the rising number of treatment studies (King, Delfabbro, Griffiths, & Gradisar, 2011; Liu, Liao, & Smith, 2012).

Research and clinical practice suggest that the concept of Internet addiction is not to be taken lightly as a number of negative

consequences of excessive Internet use in adolescents have been identified in the literature. For instance, a recent review of the neuroscientific evidence (Kuss and Griffiths, 2012c) indicates that Internet addiction in adolescence can have a negative impact on identity formation (Kim et al., 2012) and change the structure of the developing brain (Lin et al., 2012; Yuan et al., 2011). In addition to this, it may negatively affect cognitive functioning (Park et al., 2011), lead to poor academic performance and engagement in risky activities (Tsitsika et al., 2011), poor dietary habits (Kim et al., 2010), low quality of interpersonal relations (Milani, Osualdella, & Di Blasio, 2009), and self-injurious behaviour (Lam, Peng, Mai, & Jing, 2009) in adolescents. From the reported negative consequences, it appears that Internet addiction can have a variety of detrimental psychosocial and physical outcomes for adolescents that may require professional intervention (King, Delfabbro, & Griffiths, 2012).

In addition to this, Internet addiction appears to be comorbid with clinical disorders and premorbid symptoms. In adolescents, Internet addiction has been reported to be comorbid with depression and insomnia (Cheung & Wong, 2011), suicidal ideation (Fu, Chan, Wong, & Yip, 2010), attention-deficit hyperactivity disorder, social phobia, and hostility (Ko, Yen, Chen, Yeh, & Yen, 2009), schizophrenia, obsessive-compulsive disorder (Ha et al., 2006), aggression (Ko, Yen, Liu, Huang, & Yen, 2009), drug use (Gong et al., 2009), and problematic alcohol use (Ko et al., 2008a). These comorbidities may be suggestive of a bidirectional causality relationship and similar etiology (Ko, Yen, Chen, Chen, & Yen, 2008b; Mueser, Drake, & Wallach, 1998), and increased severity of psychopathology relative to a single presenting mental health problem (de Graaf, Bijl, Spijker, Beekman, & Vollebergh, 2003). In light of this, Internet addiction in adolescents cannot be dismissed as a transitory phenomenon that will take care of itself.

Instead, it appears important to establish and explore a diagnosis that may prove beneficial for young populations who experience similar and related problems (King, Delfabbro, Griffiths, & Gradisar, 2012).

The personality traits that distinguish addicted gamers from high engagement gamers are reported to be negative extraversion (i.e., introversion), emotional stability, agreeableness, negative valence (indicated by being demanding, needy, and eager to impress), and attractiveness (characterised by care about appearance, being well groomed, neat and efficient, and highly motivated) (Charlton & Danforth, 2010). Other research has indicated that online gaming addiction may be related to neuroticism, anxiety, and sensation seeking (Mehroof & Griffiths, 2010). Apart from online gaming, research indicates that adolescent Internet addicts score significantly lower on extraversion compared to non-addicted adolescents (Huang et al., 2010), have low emotional stability, low extraversion, and low agreeableness (van der Aa et al., 2009). In summary, low emotional stability, low agreeableness, and low extraversion seem convincing candidates for increasing the risk of Internet addiction as these associations are found in multiple studies. However, to date, no study has investigated the interactions between personality and different types of potentially problematic Internet usage in increasing the risk for being addicted to using the Internet. Assessing the interactions between these variables may allow discerning both risk as well as protective factors for Internet addiction in adolescents who use the Internet frequently. Specifically, the identification of characteristics that demarcate frequent users who develop addiction symptoms from frequent users who do not may prove beneficial with regards to prevention and treatment. Behaviours and cognitions associated with the preventive character traits in the risk groups (i.e., high frequency users of specific Internet applications) can be established and maintained.

With this study, it is aimed to fill the gap in knowledge in current research by (i) assessing the prevalence of Internet addiction in a large sample of adolescents, and (ii) for the first time exploring the interactions between personality traits and the usage of particular Internet applications as risk factors for Internet addiction. Based on previous research, the hypotheses are that (i) using online applications that enable social functions (i.e., SNSs, chatting, instant messaging, and Twitter) and online gaming, and (ii) specific personality traits (i.e., low emotional stability, low agreeableness, and low extraversion) increase the risk for being addicted to the Internet, and (iii) there exist interaction effects between the usage of specific Internet applications and personality traits in elevating or decreasing the chances of Internet addiction, the precise nature of which still needs to be determined.

## 2. Materials and methods

### 2.1. Design

In this study, the 2011 subsample of the annual Monitor study “Internet and Youth” (Eijnden, Spijkerman, Vermulst, van Rooij, & Engels, 2010) which specifically assesses Internet usage behaviours among adolescents was utilised, including 3173 adolescents from 13 schools in the Netherlands. The Monitor study uses school sampling stratified according to region of the school, urbanisation, and education level. A total of 3756 questionnaires were distributed in participating classes with an overall response rate of 84%. Response rate varied mainly due to logistics, such as entire classes dropping out due to teacher absence or delay within school logistics. Of the questionnaires distributed, 3105 were valid (i.e., students provided answers for most questions) and were used in the present study.

### 2.2. Sample

The data of a total of 3105 Dutch adolescents (aged 11–19 years,  $M = 14.2$ ,  $SD = 1.1$  years) were used in this study. The sample characteristics are presented in Table 2.

In terms of gender distribution, 51.7% of the adolescents were females and an overwhelming majority of the participants were born in the Netherlands (96.5%). In terms of school level, 45.8% of adolescents participated in VMBO (“voorbereidend middelbaar beroepsonderwijs”, i.e., pre-professional education that incorporates ages 12–16), and 54.2% were in HAVO/VWO (“hoger algemeen voortgezet onderwijs”/ “voorbereidend wetenschappelijk onderwijs”, i.e., higher general and pre-university education including ages 12–18).

### 2.3. Materials

A paper-and-pencil survey was used that included sections on (i) sociodemographic information, (ii) Internet use, (iii) Internet addiction, and (iv) personality traits.

#### 2.3.1. Sociodemographics

In this section, general sociodemographic information was inquired about, including questions about gender, date and country of birth, weight and height, and level of schooling.

#### 2.3.2. Internet use

In the section on Internet use, adolescents were asked to state how frequently and where they used the Internet and whether they are supervised when using it. In addition to this, the following Internet application uses were inquired about in terms of days per week and hours per day: instant messenger (e.g., MSN), e-mail, surfing, Twitter, chat, social networking sites, forums, Habbo Hotel, weblogs, YouTube, online poker, downloading, television and radio live streaming, as well as online, offline, and browser games. For these variables, usage hours per week were calculated in order to provide a more detailed and elaborated picture of overall usage.

#### 2.3.3. Internet addiction

In order to assess Internet addiction, the Compulsive Internet Use Scale (CIUS) (Meerkerk et al., 2009) was employed. It is a 14-item unidimensional self-report questionnaire rated on a 5-point ordinal scale (ranging from 0 = ‘never’ to 4 = ‘very often’) that enquires into the following addiction symptoms: loss of control, pre-occupation (cognitive and behavioural), withdrawal symptoms, coping/mood modification, and conflict (inter- and intrapersonal). Total scores were calculated by summing up scores for each question. These criteria are based on the DSM-IV TR diagnoses for substance dependence and pathological gambling (American Psychiatric Association, 2000). The CIUS was marginally adjusted for the usage in the present Dutch adolescent population, as previously used in other studies (van Rooij, Schoenmakers, van de Eijnden, & van de Mheen, 2010).

At present, no definitive cut-off value for the CIUS has been established. However, using the CIUS in two adolescent samples, van Rooij, Schoenmakers, Vermulst, van den Eijnden, and van de Mheen (2011) located a group addicted to playing online games. A latent class analysis of CIUS scoring patterns found a mean score on each indicator in the highest group of 2.8 in one sample and 2.9 in the second sample (van Rooij et al., 2011). This translated to a total score of around 28, given these item scores. Based on van Rooij et al.’s study, Rumpf and colleagues adopted a minimum score of 28 out of a possible total of 56 that may be indicative of psychopathology and thus demarcates potential addiction from high engagement, and this cut off point will be used here (Rumpf, Meyer, Kreuzer, & John, 2011). In terms of the psychometric



Table 2  
Sociodemographics of total sample and subsamples of not addicted and addicted adolescents.

Adolescents (N = 3,105)	N	Percent of total	Not addicted (n)	Percent of total	Addicted (n)	Percent of total	Overall test
Age (years)							
Mean (SD)	14.23 (1.07)		14.24 (1.08)		14.02 (1.00)		
11 years	2	0.1	2	0.1	0	0	
12 years	40	1.4	37	1.3	3	0.1	
13 years	725	25.2	696	24.2	29	1.0	
14 years	1061	36.9	1011	35.2	50	1.7	
15 years	721	25.1	700	24.4	21	0.7	
16 years	244	8.5	241	8.4	3	0.1	
17 years	65	2.3	63	2.2	2	0.1	
18 years	14	0.5	13	0.5	1	0	
19 years	2	0.1	2	0.1	0	0	FET = 13.76
Sex							
Male	1501	48.3	1431	46.5	51	1.7	
Female	1604	51.7	1534	49.8	62	2.0	$\chi^2 = 0.43$
School level <sup>a</sup>							
VMBO	1410	45.8	1340	43.5	70	2.3	
HAVO/VWO	1668	54.2	1625	52.8	43	1.4	$\chi^2 = 12.31^*$
Country of birth							
Netherlands	2951	96.5	2843	93.0	108	3.5	
Suriname	5	0.2	5	0.2	0	0	
Netherlands Antilles	6	0.2	6	0.2	0	0	
Aruba	1	0	1	0	0	0	
Turkey	3	0.1	3	0.1	0	0	
Marokko	5	0.2	5	0.2	0	0	
Indonesia	2	0.1	2	0.1	0	0	
Other	85	2.8	80	2.6	5	0.2	FET = 16.22

Note 1: Abbreviations. FET = Fisher's exact test.

Note 2: A respondent is classified as "addicted user" when they scored >27 on the CIUS.

Note 3: Due to missing values, the sum total of participants may not equal 2257 for each variable analysed.

\*  $p < .01$ .

<sup>a</sup> VMBO and HAVO/VWO refer to pre-professional education (ages 12–16), higher general and pre-university education (ages 12–18), respectively.

qualities of the CIUS, its construct and concurrent validity, temporal and factorial stability/invariance, and internal consistency have been proven to be good (Meerkerk et al., 2009). In the present analysis, the internal consistency of the CIUS was found to be excellent with Cronbach's alpha = .88 (Cronbach, 1951).

2.3.3.1. Risk. In this context, the definition for Internet addiction risk was defined as the probability of addiction for a person possessing a particular personality trait and/or using a specific application of the Internet relative to a person who does not have the trait and/or does not use the specific application. In contrast to that, a risk ratio refers to the event of addiction relative to the risk of addiction, and can therefore reach a maximum of 1 (Sistrom and Garvan, 2004).

#### 2.3.4. Personality measure

Personality was assessed using the short self-report measure Quick Big Five (QBF) (Vermulst & Gerris, 2009) that was based on Goldberg's personality markers (1992). It measures the big five personality traits extraversion, agreeableness, conscientiousness, emotional stability, and resourcefulness via 30 questions (six per trait) scored on a 7-point ordinal scale (ranging from 1 = 'is not completely correct' to 7 = 'is exactly correct'). Total scores were calculated by summing up the relevant response scores per personality trait. Overall, the internal consistency of the respective subscales was good, with a Cronbach's alpha of .86 for extraversion, .84 for conscientiousness, .81 for agreeableness, .82 for emotional stability, and .75 for resourcefulness.

#### 2.4. Statistical analyses

For the analyses, adolescents classed as addicted to using the Internet and those who were not were compared with regards to

(i) the frequency of their Internet usage, (ii) the location of usage, and (iii) their CIUS scores using independent samples t-tests, assuming unequal variances when group sizes were unequal as indicated by significant Levene's tests, and chi-squared ( $\chi^2$ ) tests in the case of categorical outcomes. For the main analyses, the assumptions of linearity, independence of errors, and multicollinearity of the relevant variables were checked. Response patterns for the CIUS were checked in order to ensure adequate variability of responses were found. In addition to this, continuous predictors were centred at their mean by subtracting mean scores from the observed values to eliminate potential collinearity problems (Aiken & West, 1991). Next, a logistic regression analysis using the backward LR method was used including all personality traits and the following Internet applications: MSN, Twitter, chat, SNS, and online games, with Internet addiction status as binary outcome variable (i.e., the dependent variable was addicted versus non-addicted). The significant predictors were then entered into a model containing interaction effects. The final model presents all significant interactions and relevant main effects. In order to follow-up the interactions in more detail, linear regression analyses per group (addicted and non-addicted) and simple effects analyses were performed. For all analyses, only significant results are reported.

#### 3. Results

Response pattern analysis revealed a total of 2457 different response patterns in the data for the CIUS, indicating a good variability in CIUS scores. When analysing the response pattern in more detail, 191 participants answered "never" to all items, and "seldom", "sometimes", "often" and "very often" were endorsed on all items by one participant each. In terms of Internet use, results indicated that nearly all adolescents (99.8%) used the Internet at

home or in school. In 44.9% of cases, Internet activities were not generally supervised at home, compared to a 10.2% lack of Internet supervision at school. Furthermore, 3.7% (95% CI [3.0, 4.4]) of the adolescents in this sample were classified as potentially addicted to using the Internet. In terms of sociodemographic variables, Internet addicts differed significantly from non-addicts with regards to their school level, with adolescents at VMBO being significantly more likely to be in the addicted group relative to the HAVO/VWO students ( $X^2(1) = 12.31, p < .01$ ). More specifically, 5% of VMBO students were identified as potentially addicted to using the Internet, in comparison to only 2.6% of the HAVO/VWO students.

As presented in Table 3, compared to non-addicted adolescents, addicted adolescents used the Internet for significantly more days per week ( $M = 6.67, SD = 0.74$  vs.  $M = 5.83, SD = 1.55$ ;  $t(149.97) = -10.95, p < .01$ ), and significantly more hours per day ( $M = 4.33, SD = 1.34$  vs.  $M = 2.96, SD = 1.38$ ;  $t(2782) = -8.86, p < .01$ ). In addition to this, the groups differed significantly with regards to where they used the Internet, with addicted adolescents using it more often in the kitchen ( $X^2(1) = 4.47, p < .05, 25.7%$  vs.  $17.9%$ ), via WiFi ( $X^2(1) = 6.20, p < .01, 65.5%$  vs.  $53.6%$ ) and via their mobile phones ( $X^2(1) = 16.50, p < .01, 44.2%$  vs.  $26.9%$ ). Finally, the addicted adolescents scored significantly higher on the CIUS ( $M = 33.37, SD = 5.66$ ) than non-addicted adolescents ( $M = 8.82, SD = 6.65$ ;  $t(124.10) = 44.97, p < .01$ ).

The final model including the significant interactions and relevant main effects of Internet application usage and personality traits as presented in Table 4 predicted Internet addiction status significantly ( $X^2(10) = 148.16, p < .001$ ) and explained 23% of the variance in Internet addiction (Nagelkerke's  $R^2 = .23$ ). In terms of personality traits, agreeableness was the strongest predictor of Internet addiction ( $b = -.109, Wald X^2(1) = 13.00, p < .001$ ). Moreover, every unit increase in agreeableness decreased the odds of being addicted to using the Internet by 10.3%. Addicted adolescents scored significantly lower on agreeableness ( $M = 30.53, SD = 4.80$ ) than non-addicted adolescents ( $M = 33.12, SD = 4.85$ ;  $t(2823) = 5.45, p < .001$ ).

The next personality trait predictive of Internet addiction was emotional stability ( $b = -.089, Wald X^2(1) = 17.12, p < .001$ ). Every unit increase in emotional stability decreased the odds of being addicted to the Internet by 8.5%. Addicted adolescents scored significantly lower on emotional stability ( $M = 24.48, SD = 7.23$ ) than non-addicted adolescents ( $M = 29.49, SD = 6.58$ ;  $t(2876) = 7.66, p < .001$ ). The third personality trait to predict Internet addiction significantly was resourcefulness ( $b = .062, Wald X^2(1) = 6.34, p < .05$ ). Every unit increase in resourcefulness score increased the odds of being addicted to the Internet by 6.4%. Finally, consci-

ness score decreased the odds of being addicted to the Internet by 4.1%. Addicted adolescents scored significantly lower on conscientiousness ( $M = 23.64, SD = 6.21$ ) than non-addicted adolescents ( $M = 25.91, SD = 7.04$ ;  $t(114.46) = 3.65, p < .001$ ).

In terms of the respective online applications, the use of the social applications Twitter ( $b = .026, Wald X^2(1) = 16.16, p < .001$ ) and social networking sites ( $b = .031, Wald X^2(1) = 18.06, p < .001$ ) significantly predicted Internet addiction. Every additional hour of weekly Twitter and SNS use increased the odds of being addicted to the Internet by 2.6% and 3.2%, respectively. Compared to non-addicted adolescents, addicted adolescents spent significantly more hours per week on Twitter ( $M = 15.32, SD = 22.12$  vs.  $M = 4.95, SD = 12.67$ ;  $t(111.71) = -4.89, p < .01$ ), and SNS ( $M = 22.10, SD = 20.34$  vs.  $M = 9.12, SD = 11.65$ ;  $t(111.70) = -6.65, p < .01$ ).

Furthermore, the use of online games significantly predicted Internet addiction ( $b = .022, Wald X^2(1) = 6.47, p < .05$ ). Every additional weekly hour playing online games increased the odds of being addicted to the Internet by 2.3%. Addicted adolescents played online games for significantly more hours per week ( $M = 11.31, SD = 17.72$ ) than non-addicted adolescents ( $M = 3.68, SD = 9.38$ ;  $t(114.43) = -4.55, p < .01$ ).

In addition to the predictive main effects, two interactions appeared significant. First, the interaction between weekly online gaming hours and extraversion predicted Internet addiction ( $b = -.003, Wald X^2(1) = 6.82, p < .01$ ), and decreased the odds of being addicted to the Internet by 0.3%. Following up the significant interactions with linear regression analyses in the different groups indicated that in the addicted group, extraversion did predict the extent of online gaming ( $b = -.436, F(1) = 5.12, p < .05$ ), whereas in the non-addicted group it did not ( $b = -.003; F(1) = 0.01, ns$ ).

Secondly, the interaction between weekly online gaming hours and conscientiousness predicted Internet addiction ( $b = .003, Wald X^2(1) = 6.14, p < .05$ ), and increased the odds of being addicted to the Internet by 0.3%. Following up the significant interactions with linear regression analyses in the different groups indicated that in the addicted group, conscientiousness did not predict the extent of online gaming ( $b = .198; F(1) = .51, ns$ ), whereas in the non-addicted group, it did ( $b = -.140; F(1) = 31.76, p < .001$ ).

#### 4. Discussion

In the present research, the risk for Internet addiction in a large sample of Dutch adolescents was investigated by looking at the interplay between personality traits and the usage of different Internet applications. Using a validated self-report measure (Meerkerk et al., 2009), it was found that 3.7% of the adolescents included were classified as addicted to using the Internet. This appears to be at the more conservative end of estimates that range from 1.5% in Greece (Kormas et al., 2011) to 10.7% in South Korea (Park et al., 2008). Using a conservative threshold with the CIUS, it was possible to establish a cut-off indicative of Internet addiction as based on this validated and frequently used self-report measure. Nevertheless, it needs to be noted that in the reported studies, different measurement tools have been used which makes it difficult to compare prevalence rates across questionnaires.

In this study, the expected relationship between social application and online gaming use as predictors of Internet addiction was established. The use of both Twitter and SNSs increased the risk of being addicted to using the Internet by 2.6% and 3.2%, respectively. The primary motivation for using social Internet applications relates to the maintenance of established offline networks (Donath

Table 3  
Internet use among not addicted and addicted adolescents.

	Not addicted (n = 2965)	Addicted (n = 113)	
Frequency	M (SD)	M (SD)	T
Days/week	5.83 (1.55)	6.67 (0.74)	10.95**
Hours per day	2.96 (1.38)	4.33 (1.34)	9.16**
Location	%	%	$X^2$
Living room	55.4	58.4	0.40
Own room	42.2	50.4	3.02
Kitchen	17.9	25.7	4.47*
Other room	33.8	39.8	1.78
Wi-Fi	53.6	65.5	6.20**
Mobile phone	26.9	44.2	16.50**
No Internet	0.1	0.0	0.12
Internet addiction	M (SD)	M (SD)	T
CIUS score	8.82 (6.65)	33.37 (5.66)	44.97**

\*  $p < .05$ .

\*\*  $p < .01$ .

entiousness significantly predicted Internet addiction ( $b = -.042, Wald X^2(1) = 4.45, p < .05$ ). Every unit increase in conscientious-

Table 4  
Logistic regression of Internet application use and personality traits on Internet addiction risk.

	95% CI for exp b			
	b (SE)	Lower	Exp b	Upper
Constant	-4.029 (0.173)			
Online games* extraversion	-0.003** (0.001)	0.995	0.997	0.999
Online games* conscientiousness	0.003* (0.001)	1.001	1.003	1.006
Twitter	0.026** (0.006)	1.013	1.026	1.039
SNS	0.031** (0.007)	1.017	1.032	1.047
Online games	0.022* (0.009)	1.005	1.023	1.040
Emotional stability	-0.089** (0.021)	0.877	0.915	0.954
Resourcefulness	0.062* (0.025)	1.014	1.064	1.117
Agreeableness	-0.109** (0.030)	0.845	0.897	0.952
Conscientiousness	-0.042* (0.020)	0.922	0.959	0.997
Extraversion	-0.008 (0.22)	0.950	0.992	1.036

Note 1:  $R^2 = .06$  (Cox and Snell), .23 (Nagelkerke). Model  $\chi^2(9) = 148.16$ ,  $p < .001$ .

\*  $p < .05$ .

\*\*  $p < .01$ .

indicates that these motivations differ between age groups, with young adolescents expressing their identities by means of a self-display of personal information and older adolescents expressing it through connections (Lee, Lee, & Kwon, 2010). However, unlike the hypothesised relationship, the use of social applications other than SNSs and Twitter did not contribute to predicting Internet addiction. A variety of studies have indicated that the excessive use of online social networking sites may be problematic (e.g., Kuss & Griffiths, 2011; Leung & Lee, 2012) as it tends to reinforce the establishment and maintenance of online, rather than offline, social networks. In a similar vein, excessive use of Twitter may have detrimental consequences for real life communication and is believed to activate the hedonistic dopamine system (Hofmann, Vohs, & Baumeister, 2012), that offers instantaneous gratification when using applications such as Twitter.

Additionally, playing online games increased the risk of being addicted to the Internet by 2.3%. Overall, previous research indicates that unlike other game forms, such as browser and offline games, online games appear to have a high addictive potential, so that vulnerable people may develop addiction as a consequence of frequent engagement (Kuss & Griffiths, 2012b). In this study, only the frequent use of online games, and neither browser nor offline games, increased the risk of being addicted to the Internet. Online games require a large amount of commitment and time investment on behalf of the player in order for him to be able to achieve game imminent goals which may in turn contribute to the development of maladaptive behaviours and coping strategies that reinforce gaming (Kuss, Louws, & Wiers, 2012). Taken together, and viewed from the frequency of usage and potential problems, the desire to use online media appears to be very strong. In line with this, a recent study indicates that it appears significantly stronger than the desire for tobacco, sex, coffee, alcohol, and eating, it is significantly more difficult to resist and can lead to "pathological abuse" (Hofmann et al., 2012).

In addition to the specific usage of the Internet, a number of personality traits appeared to predict Internet addiction. As hypothesized, low emotional stability increased the risk of Internet addiction. Low emotional stability is congruent with high neuroticism (Matthews, Deary, & Whiteman, 2009) and the latter has been found to be predictive of Internet addiction and Internet gaming addiction in university students (Dong, Wang, Yang, & Zhou, 2012; Mehroof & Griffiths, 2010; Tsai et al., 2009), and therefore the present study extends previous research by utilising an adolescent sample.

Moreover, low agreeableness was found to increase the risk of Internet addiction. Low agreeableness corresponds to aggression-hostility (Zuckerman, 2002). In adolescents, aggression has been

associated with Internet addiction after controlling for television watching (Ko, Yen, Liu, et al., 2009b). Online disinhibition (Joinson, 1998), as a consequence of online anonymity, may lead to deindividuation (Zimbardo, 1969) and can foster aggressive behaviours (Ko, Yen, Liu, et al., 2009b). This process may be particularly problematic for adolescents as their cognitive control capabilities may not be adequately developed (Casey et al., 2005).

In addition to the personality traits hypothesised to be linked to Internet addiction, resourcefulness was found to increase the risk of being addicted to using the Internet. Resourcefulness has been related to openness to experience (Matthews et al., 2009). Previous research indicates that increased novelty seeking, which is part of openness to experience, is linked to Internet addiction in college students (Ko et al., 2010). Similarly, openness to experience has been found to be associated with marijuana use (Terracciano, Löckenhoff, Crum, Bienvenu, & Costa, 2008). From this, it appears that characteristics indicative of resourcefulness and openness to experience, such as creativity, imagination, and innovation may lead adolescents to engage in pleasurable activities, such as using the Internet, excessively. Alternatively, these gamers are highly creative, enthusiastic users who get carried away with their hobbies with the consequence of negative side effects that may be transitory. In order to determine these relationships in more depth, in-depth qualitative studies need to be conducted in the future.

The final personality trait that was found to increase the risk of Internet addiction was negative conscientiousness. This finding is a replication of previous research using the CIUS to assess Internet addiction in a large sample of 16,925 11–80-years olds (Meerkerk, Van den Eijnden, Vermulst, & Garretsen, 2007). It indicates that the less conscientious adolescents are, the more likely they are to experience problems related to Internet addiction. From an explanatory point of view, adolescents who are less conscientious would chose using the Internet over other, less pleasurable activities, such as doing their homework, and may therefore be at increased risk of using the Internet excessively.

In addition to these main effects, it was found that the effect of online gaming frequency interacted with specific personality traits in increasing the risk for Internet addiction. First, the amount of online gaming (i.e., number of hours played) and low scores on extraversion predicted Internet addiction. More specifically, low scores on extraversion predicted the extent of online gaming in the adolescents who were addicted as indicated by their CIUS scores. In this regard, higher extraversion can be viewed as personality trait that fulfils a preventive function. Of the adolescents who frequently engage in online gaming, those who are more extraverted were less likely to become addicted to using the Internet. Introversion has been implicated in Internet and online gaming



addiction time and again (Huang et al., 2010; van der Aa et al., 2009; Young, 2009). Interestingly, in this study low extraversion (or introversion) has been found to increase the risk of Internet addiction only among online gamers. It appears that there might be a mutually reinforcing relationship between online gaming and introversion (Weaver et al., 2009) in such a way that individuals with introverted traits start playing games because they find it easier to interact virtually than in real life, which in turn exacerbates their shyness in real life and makes them turn to the game. The directionality of this relationship needs to be examined in future research.

Second, the amount of online gaming (number of hours) and low scores on conscientiousness increased the risk of being addicted to using the Internet. Viewing this effect in more detail, it appeared that in the participants who did not meet the cut-off point for Internet addiction using the CIUS, conscientiousness appeared as predictor of weekly online gaming hours. Adolescents who engaged in playing online games frequently and who had higher conscientiousness scores were less likely to be addicted to using the Internet. Frequent online gamers who score highly on conscientiousness may feel a strong commitment to their virtual personae, guilds and high-level game content as they are organised, systematic, and thorough (Vermulst & Gerris, 2009). Rather than developing problems indicative of potential Internet addiction, they immerse in the game world in a more healthy way and are able to switch off. Their loyalty to their guild and achievement striving may lead them to engaging in end-game content at higher levels which typically requires an increased investment of time (Ducheneaut, Yee, Nickell, & Moore, 2006). Potentially, frequent online gamers who also score high on conscientiousness may be characterised by high engagement, but not addiction (Charlton & Danforth, 2007) relative to those online gamers who play similarly frequently, but who score low on conscientiousness. In order to explore this topic further, qualitative research is needed. From the perspective of research design, it appears important to pay close attention to the effects of interacting variables on the development of Internet addiction because this may allow us to tackle questions of etiology and risk.

Overall, the reported hours of Internet use appear somewhat different in comparison to other studies. For instance, in a sample of 136,589 13–18 year old South Korean adolescents, Do, Shin, Bautista, and Foo (2013) reported a relatively low mean daily Internet use of 86 min for non-study related purposes, in comparison to the non-pathological group in the present study that spent an average of approximately three hours online per day and the potentially addicted group that spent an average of 4.3 h on the Internet. Online research on 216 Austrian secondary school students revealed that they spent a comparatively relatively high daily average of 4.79 h online (Appel, Holt, Stiglbauer, & Batinic, 2012). This divergence in numbers can be explained by the fact that the South Korean study only inquired into non-study related usage of the Internet, whereas another study found that nearly 90% of children and adolescents use the Internet at school (Johnson, 2010), indicating that a proportion of the online time reported in Appel et al.'s study may have been spent for educational purposes. As an alternative explanation, this study used an online collection method which may have purported technophilic adolescents to participate rather than their not so technologically inclined peers. Self-selection bias has been generally reported as a limitation in online research (Bethlehem, 2008). Consequently, it appears necessary to cross-check online usage times using similar methods while specifying usage purposes in order for comparisons across studies to be possible. Therefore, future researchers are encouraged to be precise with regards to what kinds of Internet usage they assess.

Finally, in terms of sociodemographic variables, adolescents in

one another with regards to the probability of being addicted to using the Internet, with VMBO students being more likely than HAVO/VWO students. Therefore, VMBO students should be targeted as they appear to be a population at risk for developing Internet addiction (van Rooij et al., 2010), and future research is encouraged accordingly. Widespread Internet accessibility appeared to contribute to the likelihood of being addicted to the Internet, as adolescents who used it in the kitchen, on their mobile phones, and via WiFi were more likely to be addicted to the Internet than the adolescents who did not have extensive access. In the current ubiquitous media environment, it appears that adolescents make increasing use of the Internet on the go, anytime and anywhere. The ever increasing numbers of adolescents with access to mobile Internet technology via smartphones, laptops and tablets (Lenhart et al., 2012) appears as potential explanation for the discerned problems related to Internet use. The more adolescents are able to use their favourite applications whenever and wherever they want may increase the likelihood for the development of negative consequences due to excessive use. This contention needs to be examined in future studies.

#### 4.1. Limitations

There are a number of limitations to the present study. First, self-report measures like the ones used here do not suffice for any clinical assessment of diagnosed psychopathology. Specifically, rather than offering a clear-cut diagnosis, the CIUS scores in this sample are an indicator of addictive behaviours. The conservative cut-off point for addiction adopted here may serve as a benchmark based on which populations can be identified that may be particularly at risk for developing and/or experiencing problematic behaviours that may impact their lives in a variety of negative ways, without assuming that the adolescents identified as potentially addicted require professional help. Viewed from the perspective of clinical practice, self-report measures are the most commonly used tools to provide psychiatrists and psychologists with an indication of psychopathology level prior to treatment. They are pragmatic regarding the ease of administration and scoring (Ruben, 1999). In addition to this, using a scale may not only allow for the identification of pathological online behaviours, but it may aid the recognition of adolescents who may be at risk for developing Internet addiction as indicated by the number of symptoms endorsed. Second, the study used data of a cross-sectional nature. Therefore, the results of this study provide an indication of association, not causality. In order to view Internet addiction from an etiological point of view, it is necessary to investigate the present data taking into consideration the longitudinal cohort. Third, in this study, a categorical classification of potential psychopathology has been adopted at the expense of a more extensive dimensional analysis. Participants were classed into groups depending on whether they met a sufficient number of diagnostic criteria or not. This procedure is common in everyday clinical practice as the diagnostic manuals request diagnoses being made based on cut-offs (American Psychiatric Association, 2000). The advantages of this method include ease of communication, clinical decision-making, and agreement with health care and insurance providers (Brown & Barlow, 2005). Therefore, being imminently exploratory in nature, the present study has applied a concise categorical approach. Future researchers are advised to look beyond categories and investigate the matter in a dimensional fashion. Fourth, the number of hours of Internet application use used in the present paper is a very rough estimate given it is a multiplication from days per week and hours per day. Therefore, it might be prone to a number of methodological problems, such as ceiling effects, and dividing

As such, the adopted number of hours of Internet application use provides a rough estimate.

#### 4.2. Implications

The present research has a number of implications for prevention, treatment, and research. In terms of prevention, the identification of specific variables associated with Internet addiction (i.e., the respective personality traits as well as specific usages of the Internet) allows for targeting individuals who appear to be at risk for developing Internet addiction. These adolescents and their parents may be approached by teachers and educated about the problems their Internet usage may cause. With regards to prevention, raising awareness and providing education for both adolescents and their parents appear as key themes. For instance, messages on Twitter would be a good place to start targeting both parties, as well as advertisements in the sidebars of social networking sites about where to get help in case of concern and/or need. Messages on Twitter could be re-tweeted by relevant organisations which have a readership of adolescents and/or parents, or schools with Twitter feeds could re-tweet. In this light, the online space in which problematic behaviours occur can be used as a preventive and educative tool which may prove beneficial in decreasing associated problems and concerns.

For the purpose of treatment, the present research may benefit mental health practitioners in their efforts to develop specific approaches that pay tribute to the respective individuals' personality and associated needs and requirements. Scores on personality scales tend to vary just like personality tends to be changing rather than remaining stable over the course of life (Krueger, 2005). However, the results of the current study may serve as starting point for the development of specialised treatments of Internet addiction taking into consideration the respective personality traits. For instance, an adolescent with low conscientiousness may especially benefit from a meticulously regulated day structure in the course of treatment, whereas an adolescent who is not stable emotionally is likely to be helped by continuous encouragement and positive cognitive restructuring. The same holds true for the utilisation of different Internet applications. The excessive gamer may be aided by supporting the discovery of alternative adventurous activities (such as offline and browser games) that provide the possibility of achievement and rewards. With regards to the gamer with low agreeableness, the cultivation of social contacts may serve as form of exposure therapy whereby antagonistic attitudes towards others can be gradually unlearned. The excessive gamer with low resourcefulness may be helped by exploring creative recreational activities that may open up alternative ways of thinking and being to him. Similarly, the problematic social application user may be helped by encouraging the establishment of a real life social network with peers and maintaining it in the real world, rather than online.

So far, treatment research indicates that cognitive behavioural therapy in combination with family or group therapy appears beneficial for adolescents suffering from Internet addiction (Liu et al., 2012), and may be used in multimodal school-based settings (Du, Jiang, & Vance, 2010). In such a way, the present research encourages practitioners to pay attention to the actual behaviours and Internet usages as well as the individuality of their adolescent patients with the goal of symptom relief and eventual successful therapy completion. In light of research in the area, the current study paves the way for future investigations of the interplay between different factors, such as personality and specific online application use, in increasing the risk for possible Internet addiction. The next step may be to view Internet addiction from an etiological perspective, and consider relationships between these factors in a treatment population diagnosed with Internet

addiction. Recommendations include verification of results using the longitudinal Monitor Study data and further replications, which allow for prospective assessment of causality.

#### 5. Conclusion

In conclusion, Internet addiction appears as a mental health problem for Dutch adolescents. The results support the American Psychiatric Association's efforts to include Internet addiction in the updated version of the DSM as a psychiatric condition that requires further research (2012). Although conservative relative to other estimates, the reported prevalence of addiction-related problems in 3.7% of the present Dutch adolescent sample is somewhat disconcerting. Internet addiction is associated with a variety of psychological and physical health problems and may impact the developing adolescent in a variety of domains. This study paves the way for future research into Internet addiction. It highlights the risk of high frequency usage of specific Internet applications, which, separately and in combination with particular personality traits, may foster the development of psychopathology. Similarly, it specifies personality traits which, in frequent users, may serve as protective factors. Accordingly, vulnerability on the one hand and resilience on the other are important aspects that need to be taken into consideration in further studies. From a mental health perspective, it is of utmost importance to identify the factors that contribute to the risk for Internet addiction and at the same time discern those that have a protective function. Ultimately, this will further a general understanding of why the excessive engagement in a behaviour leads to pathogenesis in one individual, but not in another.

#### References

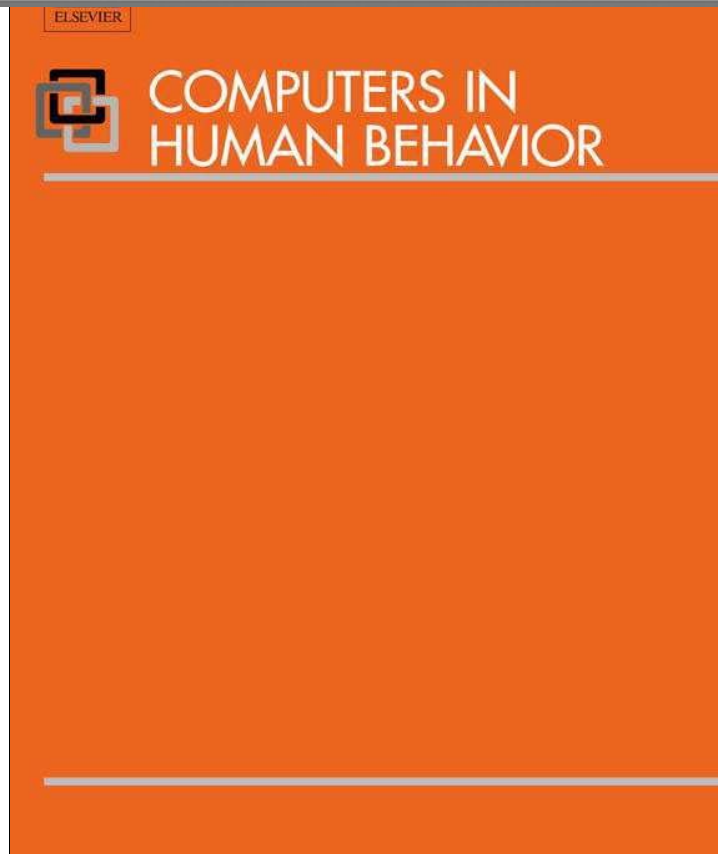
- Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park: Sage.
- American Psychiatric Association (2000). *Diagnostic and statistical manual for mental disorders IV, text-revision*. Washington, DC: American Psychiatric Association.
- American Psychiatric Association. (2012). R 40 Internet use disorder. DSM-5 development. <<http://www.dsm5.org/ProposedRevision/Pages/proposedrevision.aspx?rid=573#>>. Retrieved 07.09.12.
- Appel, M., Holt, P., Stiglbauer, B., & Batinic, B. (2012). Parents as a resource: Communication quality affects the relationship between adolescents' Internet use and loneliness. *Journal of Adolescence*, 35(6), 1641–1648.
- Bethlehem, J. (2008). *How accurate are self-selection web surveys?* The Hague, NL: Statistics Netherlands.
- Brown, T. A., & Barlow, D. H. (2005). Dimensional versus categorical classification of mental disorders in the fifth edition of the diagnostic and statistical manual of mental disorders and beyond: Comment on the special section. *Journal of Abnormal Psychology*, 114(4), 551–556.
- Cao, H., Sun, Y., Wan, Y., Hao, J., & Tao, F. (2011). Problematic Internet use in Chinese adolescents and its relation to psychosomatic symptoms and life satisfaction. *BMC Public Health*, 11, 104–110.
- Casey, B. J., Tottenham, N., Liston, C., & Durston, S. (2005). Imaging the developing brain: What have we learned about cognitive development? *Trends in Cognitive Sciences*, 9, 104–110.
- Charlton, J. P., & Danforth, I. D. W. (2007). Distinguishing addiction and high engagement in the context of online game playing. *Computers in Human Behavior*, 23(3), 1531–1548.
- Charlton, J. P., & Danforth, I. D. W. (2010). Validating the distinction between computer addiction and engagement: Online game playing and personality. *Behaviour and Information Technology*, 29(6), 601–613.
- Cheung, L. M., & Wong, W. S. (2011). The effects of insomnia and Internet addiction on depression in Hong Kong Chinese adolescents: An exploratory cross-sectional analysis. *Journal of Sleep Research*, 20(2), 311–317.
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16(3), 297–334.
- de Graaf, R., Bijl, R. V., Spijker, J., Beekman, A. T., & Vollebergh, W. A. (2003). Temporal sequencing of lifetime mood disorders in relation to comorbid anxiety and substance use disorders—Findings from the Netherlands mental health survey and incidence study. *Social Psychiatry and Psychiatric Epidemiology*, 38, 1–11.
- Do, Y. K., Shin, E., Bautista, M. A., & Foo, K. (2013). The associations between self-reported sleep duration and adolescent health outcomes: What is the role of time spent on Internet use? *Sleep Medicine*, 14(2), 195–200.
- Donath, J., & Boyd, D. (2004). Public displays of connection. *BT Technology Journal*, 22(4), 71–82.

- Dong, G., Wang, J., Yang, X., & Zhou, H. (2012). Risk personality traits of Internet addiction: A longitudinal study of Internet-addicted Chinese university students. *Asia-Pacific Psychiatry* (e-pub ahead of print).
- Du, Y. S., Jiang, W. Q., & Vance, A. (2010). Longer term effect of randomized, controlled group cognitive behavioural therapy for Internet addiction in adolescent students in Shanghai. *Australian and New Zealand Journal of Psychiatry*, 44(2), 129–134.
- Ducheneaut, N., Yee, N., Nickell, E., & Moore, R. J. (2006). Building an MMO with mass appeal – a look at gameplay in World of Warcraft. *Games and Culture*, 1(4), 218–317.
- Eijnden, R. J. J. M., Spijkerman, R., Vermulst, A. A., van Rooij, A. J., & Engels, R. J. J. M. (2010). Compulsive Internet use among adolescents: bidirectional parent–child relationships. *Journal of Abnormal Child Psychology*, 38(1), 77–89.
- Ellison, N. B., Steinfield, C., & Lampe, C. (2007). The benefits of Facebook “friends”: Social capital and college students’ use of online social network sites. *Journal of Computer-Mediated Communication*, 12(4).
- Entertainment Software Association. (2012). 2012 sales, demographic and usage data – Essential facts about the computer and video game industry. <[http://www.theesa.com/newsroom/release\\_detail.asp?releaseID=174](http://www.theesa.com/newsroom/release_detail.asp?releaseID=174)>. Retrieved 07.09.12.
- Fu, K.-W., Chan, W. S. C., Wong, P. W. C., & Yip, P. S. F. (2010). Internet addiction: Prevalence, discriminant validity and correlates among adolescents in Hong Kong. *British Journal of Psychiatry*, 196(6), 486–492.
- Goldberg, L. R. (1992). The development of markers for the Big Five factor structure. *Psychological Assessment*, 4, 26–42.
- Gong, J., Chen, X., Zeng, J., Li, F., Zhou, D., & Wang, Z. (2009). Adolescent addictive Internet use and drug abuse in Wuhan, China. *Addiction Research and Theory*, 17(3), 291–305.
- Grant, J. E., Levine, L., Kim, D., & Potenza, M. N. (2005). Impulse control disorders in adult psychiatric inpatients. *American Journal of Psychiatry*, 162(11), 2184–2186.
- Griffiths, M. D., & Parke, J. (2010). Adolescent gambling on the Internet: a review. *International Journal of Adolescent Medicine and Health*, 22(1), 58–75.
- Ha, J. H., Yoo, H. J., Cho, I. H., Chin, B., Shin, D., & Kim, J. H. (2006). Psychiatric comorbidity assessed in Korean children and adolescents who screen positive for Internet addiction. *Journal of Clinical Psychiatry*, 67(5), 821–826.
- Hofmann, W., Vohs, K. D., & Baumeister, R. F. (2012). What people desire, feel conflicted about, and try to resist in everyday life. *Psychological Science*, 23(6), 582–588.
- Huang, X., Zhang, H., Li, M., Wang, J., Zhang, Y., & Tao, R. (2010). Mental health, personality, and parental rearing styles of adolescents with Internet addiction disorder. *Cyberpsychology Behavior and Social Networking*, 13(4), 401–406.
- Johnson, G. M. (2010). Young children’s Internet use at home and school: Patterns and profiles. *Journal of Early Childhood Research*, 8(3), 282–298.
- Joinson, A. N. (1998). Causes and effects of disinhibition on the Internet. In J. Gackenback (Ed.), *The psychology of the Internet* (pp. 43–60). New York, NY: Academic Press.
- Kaltiala-Heino, R., Lintonen, T., & Rimpela, A. (2004). Internet addiction? Potentially problematic use of the Internet in a population of 12–18 year-old adolescents. *Addiction Research and Theory*, 12(1), 89–96.
- Kim, Y., Park, J. Y., Kim, S. B., Jung, I.-K., Lim, Y. S., & Kim, J.-H. (2010). The effects of Internet addiction on the lifestyle and dietary behavior of Korean adolescents. *Nutrition Research and Practice*, 4(1), 51–57.
- Kim, Y.-R., Son, J.-W., Lee, S.-I., Shin, C.-J., Kim, S.-K., Ju, G., et al. (2012). Abnormal brain activation of adolescent Internet addict in a ball-throwing animation task: Possible neural correlates of disembodiment revealed by fmri. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, 39(1), 88–95.
- King, D. L., Delfabbro, P. H., & Griffiths, M. D. (2012). Clinical interventions for technology-based problems: Excessive Internet and video game use. *Journal of Cognitive Psychotherapy: An International Quarterly*, 26, 43–56.
- King, D. L., Delfabbro, P. H., Griffiths, M. D., & Gradsar, M. (2011). Assessing clinical trials of Internet addiction treatment: A systematic review and CONSORT evaluation. *Clinical Psychology Review*, 31(7), 1110–1116.
- King, D. L., Delfabbro, P. H., Griffiths, M. D., & Gradsar, M. (2012). Cognitive-behavioural approaches to outpatient treatment of Internet addiction in children and adolescents. *Journal of Clinical Psychology: In Session*, 68, 1185–1195.
- Ko, C.-H., Hsiao, S., Liu, G.-C., Yen, J.-Y., Yang, M.-J., & Yen, C.-F. (2010). The characteristics of decision making, potential to take risks, and personality of college students with Internet addiction. *Psychiatry Research*, 175(1–2), 121–125.
- Ko, C. H., Yen, J. Y., Chen, C. S., Chen, C. C., & Yen, C. F. (2008b). Psychiatric comorbidity of Internet addiction in college students: An interview study. *CNS Spectrums*, 13(2), 147–153.
- Ko, C.-H., Yen, J.-Y., Chen, C.-S., Yeh, Y.-C., & Yen, C.-F. (2009a). Predictive values of psychiatric symptoms for Internet addiction in adolescents: A 2-year prospective study. *Archives of Pediatrics and Adolescent Medicine*, 163(10), 937–943.
- Ko, C. H., Yen, J. Y., Liu, S. C., Huang, C. F., & Yen, C. F. (2009b). The associations between aggressive behaviors and Internet addiction and online activities in adolescents. *Journal of Adolescent Health*, 44(6), 598–605.
- Ko, C.-H., Yen, J.-Y., Yen, C.-F., Chen, C.-S., Weng, C.-C., & Chen, C.-C. (2008a). The association between Internet addiction and problematic alcohol use in adolescents: The problem behavior model. *CyberPsychology and Behavior*, 11(5), 571–576.
- Kormas, G., Critselis, E., Janikian, M., Kafetzis, D., & Tsitsika, A. (2011). Risk factors and psychosocial characteristics of potential problematic and problematic Internet use among adolescents: A cross-sectional study. *BMC Public Health*, 11, Krueger, R. F. (2005). Continuity of axes I and II – Toward a unified model of personality, personality disorders, and clinical disorders. *Journal of Personality Disorders*, 19(3), 233–261.
- Kuss, D. J., & Griffiths, M. D. (2011). Online social networking and addiction – A review of the psychological literature. *International Journal of Environmental Research and Public Health*, 8(9), 3528–3552.
- Kuss, D. J., & Griffiths, M. D. (2012a). Online gaming addiction in children and adolescents: A review of empirical research. *Journal of Behavioral Addictions*, 1(1), 3–20.
- Kuss, D. J., & Griffiths, M. D. (2012b). Internet gaming addiction: A systematic review of empirical research. *International Journal of Mental Health and Addiction*, 10(2), 278–296.
- Kuss, D. J., & Griffiths, M. D. (2012c). Internet and gaming addiction: A systematic literature review of neuroimaging studies. *Brain Sciences*, 2, 347–374.
- Kuss, D. J., Louws, J., & Wiers, R. W. W. (2012). Online gaming addiction? Motives predict addictive play behavior in Massively Multiplayer Online Role-Playing Games. *Cyberpsychology, Behavior and Social Networking*, 15(9), 480–485.
- Lam, L. T., Peng, Z., Mai, J., & Jing, J. (2009). The association between Internet addiction and self-injurious behaviour among adolescents. *Injury Prevention*, 15(6), 403–408.
- Lee, G., Lee, J., & Kwon, S. (2010). Use of social-networking sites and subjective well-being: A study in South Korea. *Cyberpsychology, Behavior & Social Networking* (e-pub ahead of print).
- Lenhart, A., Purcell, K., Smith, A., & Zickuhr, K. (2012). Social media & mobile Internet use among teens and young adults. PEW Internet & American Life Project. Washington, DC: Pew Research Center.
- Leung, L. (2007). Stressful life events, motives for Internet use, and social support among digital kids. *CyberPsychology and Behavior*, 10(2), 204–214.
- Leung, L., & Lee, P. S. N. (2012). The influences of information literacy, Internet addiction and parenting styles on Internet risks. *New Media and Society*, 14(1), 117–136.
- Liberatore, K. A., Rosario, K., Colon-De Marti, L. N., & Martinez, K. G. (2011). Prevalence of Internet addiction in Latino adolescents with psychiatric diagnosis. *Cyberpsychology, Behavior and Social Networking*, 14(6), 399–402.
- Lin, F., Zhou, Y., Du, Y., Qin, L., Zhao, Z., Xu, J., et al. (2012). Abnormal white matter integrity in adolescents with Internet addiction disorder: A tract-based spatial statistics study. *PLoS ONE*, 7(1).
- Liu, T. C., Desai, R. A., Krishnan-Sarin, S., Cavallo, D. A., & Potenza, M. N. (2011). Problematic Internet use and health in adolescents: Data from a high school survey in Connecticut. *Journal of Clinical Psychiatry*, 72(6), 836–845.
- Liu, C., Liao, M., & Smith, D. C. (2012). An empirical review of Internet addiction treatment outcome studies in China. *Research on Social Work Practice*, 22(3), 282–292.
- Liu, T., & Potenza, M. N. (2007). Problematic Internet use: Clinical implications. *CNS Spectrums*, 12(6), 453–466.
- Matthews, G., Deary, I. J., & Whiteman, M. C. (2009). *Personality traits* (3rd ed.). Cambridge: Cambridge University Press.
- Meerkerk, G. J., Van den Eijnden, R. J. J. M., Vermulst, A. A., & Garretsen, H. F. L. (2007). The relationship between personality, psychosocial wellbeing and compulsive Internet use: The Internet as cyber Prozac? Pwned by the Internet – Explorative research into the causes and consequences of compulsive Internet use (pp. 86–101). Rotterdam: Erasmus Universiteit Rotterdam.
- Meerkerk, G. J., Van Den Eijnden, R., Vermulst, A. A., & Garretsen, H. F. L. (2009). The Compulsive Internet Use Scale (CIUS): Some psychometric properties. *CyberPsychology and Behavior*, 12(1), 1–6.
- Mehroof, M., & Griffiths, M. D. (2010). Online gaming addiction: The role of sensation seeking, self-control, neuroticism, aggression, state anxiety, and trait anxiety. *CyberPsychology and Behavior*, 13(3), 313–316.
- Milani, L., Osualdella, D., & Di Blasio, P. (2009). Quality of interpersonal relationships and problematic Internet use in adolescence. *CyberPsychology & Behavior*, 12(6), 681–684.
- Mueser, K. T., Drake, R. E., & Wallach, M. A. (1998). Dual diagnosis: A review of etiological theories. *Addictive Behaviors*, 23, 717–734.
- Müller, K. W., Ammerschläger, M., Freisleder, F. J., Beutel, M. E., & Wölfling, K. (2012). Addictive Internet use as a comorbid disorder among clients of an adolescent psychiatry – Prevalence and psychopathological symptoms. [Suchtartige Internetnutzung als komorbide Störung im jugendpsychiatrischen Setting.]. *Zeitschrift für Kinder- und Jugendpsychiatrie und Psychotherapie*, 40(5), 331–339.
- Park, S. K., Kim, J. Y., & Cho, C. B. (2008). Prevalence of Internet addiction and correlates with family factors among South Korean adolescents. *Adolescence*, 43(172), 895–909.
- Park, M.-H., Park, E. J., Choi, J., Chai, S., Lee, J.-H., Lee, C., et al. (2011). Preliminary study of Internet addiction and cognitive function in adolescents based on IQ tests. *Psychiatry Research*, 190(2–3), 275–281.
- Ruben, D. H. (1999). Diagnosing alcoholism and its addictive patterns using self-report rating scales. *Alcoholism Treatment Quarterly*, 17(3), 37–46.
- Rumpf, H. J., Meyer, C., Kreuzer, A., & John, U. (2011). Prävalenz der Internetabhängigkeit (PINTA). Bericht an das Bundesministerium für Gesundheit. Greifswald und Lübeck: Universität zu Lübeck, Universitätsmedizin Greifswald.
- Sistrom, C. L., & Garvan, C. V. (2004). Proportions, odds, and risk. *Radiology*, 230, 12–19.



- Terracciano, A., Löckenhoff, C. E., Crum, R. M., Bienvu, O. J., & Costa, P. T. (2008). Five-Factor Model personality profiles of drug users. *BMC Psychiatry*, 8(22). Tsai, H. F., Cheng, S. H., Yeh, T. L., Shih, C. C., Chen, K. C., & Yang, Y. C. (2009). The risk factors of Internet addiction – A survey of university freshmen. *Psychiatry Research*, 167(3), 294–299.
- Tsitsika, A., Critselis, E., Louizou, A., Janikian, M., Freskou, A., Marangou, E., et al. (2011). Determinants of Internet addiction among adolescents: A case-control study. *The Scientific World Journal*, 11, 866–874.
- van den Eijnden, R. J. J. M., Meerkerk, G.-J., Vermulst, A. A., Spijkerman, R., & Engels, R. C. M. E. (2008). Online communication, compulsive Internet use, and psychosocial well-being among adolescents: A longitudinal study. *Developmental Psychology*, 44(3), 655–665.
- van der Aa, N., Overbeek, G., Engels, R. C. M. E., Scholte, R. H. J., Meerkerk, G. J., & van den Eijnden, R. J. J. M. (2009). Daily and compulsive Internet use and well-being in adolescence: A diathesis-stress model based on Big Five personality traits. *Journal of Youth and Adolescence*, 38, 765–776.
- van Rooij, A. J., Schoenmakers, T. M., van de Eijnden, R., & van de Mheen, D. (2010). Compulsive Internet use: The role of online gaming and other Internet applications. *Journal of Adolescent Health*, 47(1), 51–57.
- van Rooij, A. J., Schoenmakers, T. M., Vermulst, A. A., van den Eijnden, R. J. J. M., & van de Mheen, D. (2011). Online video game addiction: Identification of addicted adolescent gamers. *Addiction*, 106(1), 205–212.
- Vermulst, A. A., & Gerris, J. R. M. (2009). Quick Big Five (QBF). *Persoonlijkheidstest*. Nijmegen, The Netherlands: Behavioural Science Institute, University of Nijmegen.
- Weaver, J. B., Mays, D., Sargent Weaver, S., Kannenberg, W., Hopkins, G. L., Eroğlu, D., et al. (2009). Health-risk correlates of video-game playing among adults. *American Journal of Preventive Medicine*, 37(4), 299–305.
- Wölfling, K., Müller, K., & Beutel, M. (2010). Diagnostic measures: Scale for the Assessment of Internet and Computer Game Addiction (AICA-S). In D. Mücken, A. Teske, F. Rehbein, & B. te Wildt (Eds.), *Prevention, diagnostics, and therapy of computer game addiction* (pp. 212–215). Lengerich: Pabst Science.
- Yellowlees, P. M., & Marks, S. (2007). Problematic Internet use or Internet addiction? *Computers in Human Behavior*, 23(3), 1447–1453.
- Young, K. (1998a). Internet addiction: The emergence of a new clinical disorder. *Cyberpsychology and Behavior*, 3, 237–244.
- Young, K. (1998b). *Caught in the net*. New York: Wiley.
- Young, K. (2009). Understanding online gaming addiction and treatment issues for adolescents. *American Journal of Family Therapy*, 37(5), 355–372.
- Young, K. (2010). Internet addiction over the decade: A personal look back. *World Psychiatry*, 9(2), 91.
- Young, K. (1999). Internet addiction: Symptoms, evaluation, and treatment. In L. V. T. L. Jackson (Ed.), *Innovations in clinical practice*. Sarasota, FL: Professional Resource Press.
- Yuan, K., Qin, W., Wang, G., Zeng, F., Zhao, L., Yang, X., et al. (2011). Microstructure abnormalities in adolescents with Internet addiction disorder. *PLoS ONE*, 6(6).
- Zimbardo, P. G. (1969). The human choice: Individuation, reason, and order vs. Deindividuation, impulse, and chaos. In W. J. Arnold & D. Levine (Eds.), *Nebraska Symposium on Motivation*. Lincoln, NE: University of Nebraska.
- Zuckerman, M. (2002). Zuckerman-Kuhlman Personality Questionnaire (ZKPQ): An alternative five-factorial model. In B. De Raad & M. Perugini (Eds.), *Big Five Assessment* (pp. 377–396). Seattle, WA: Hogrefe and Huber.

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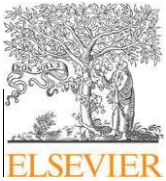
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## Internet addiction in students: Prevalence and risk factors

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## a r t i c l e i n f o

## Keywords:

Internet addiction  
 Personality  
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 Risk  
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 Students

## a b s t r a c t

The last decade has witnessed a large increase in research on the newly emerging mental health problem of Internet addiction. Rather than looking at Internet addiction per se, this study focused on particular activities on the Internet that might be potentially addictive and linked them to personality traits that might predispose individuals to Internet addiction. The aims of this study were (i) to assess the prevalence of clinically significant levels of Internet addiction, and to (ii) discern the interplay between personality traits and specific Internet uses in increasing the risk for Internet addiction. This cross-sectional online survey used data from 2257 students of an English university. Results indicated that 3.2% of the students were classified as being addicted to the Internet. The included personality traits and uses of online activities explained 21.5% of the variance in Internet addiction. A combination of online shopping and neuroticism decreased the risk for Internet addiction, whereas a combination of online gaming and openness to experience increased it. In addition to this, frequent usage of online shopping and social online activities, high neuroticism and low agreeableness significantly increased the chances of being addicted to the Internet. Findings and their implications are discussed.

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## 1. Introduction

The last decade has witnessed a large increase in research on the newly emerging mental health problem of Internet addiction (e.g. Griffiths, 2000; Young, 2010). As behavioral addiction (Holden, 2001; Kuss, 2012), Internet addiction leads to symptoms traditionally associated with substance-related addictions, namely mood modification, salience, tolerance, withdrawal, conflict, and relapse (Griffiths, 2005). The similarity with other addictions is furthermore substantiated by a multiplicity of neurobiological evidence (Kuss & Griffiths, 2012a). From a clinical perspective, Internet addiction is treated seriously and specific treatment approaches have been adopted in different countries (King, Delfabbro, Griffiths, & Gradisar, 2011), testifying to the need of professional help for those who suffer. Following the advancements in research and the increasing demand for clinical treatment, the American Psychiatric Association has decided to include “Internet use disorder” in the appendix of the upcoming fifth edition of the Diagnostic and Statistical Manual for Mental Disorders (DSM-V) (2012) (American Psychiatric Association., 2012).

Some authors (e.g., Widyanto & Griffiths, 2006) have claimed that rather than looking at Internet addiction per se, researchers should focus on particular activities on the Internet that might be potentially addictive because people do not become addicted to the medium, but to the actual behavior they engage in online.

In terms of specific applications, gaming has been extensively researched as an online application with a high addictive potential (Huang, 2006; Kuss & Griffiths, 2012b; Leung, 2004). Moreover, the use of social applications, namely online chatting (Huang, 2006; Leung, 2004), social networking sites (SNSs) (Kuss & Griffiths, 2011; Leung & Lee, 2012), such as Facebook (Kittinger, Correia, & Irons, 2012), and online instant messengers (Leung, 2004; Yuen & Lavin, 2004) have been found to be associated with Internet addiction. Furthermore, spending more time on online activities such as shopping and gaming has been linked to depressive symptoms (Morgan & Cotten, 2003). It appears that these applications may be specifically predictive of Internet addiction, however, no research has been conducted to date taking into consideration all of them in a single model.

In addition to the use of specific online activities, personality traits have been linked to Internet addiction. Higher scores on neuroticism (Dong, Wang, Yang, & Zhou, 2012; Tsai et al., 2009), and low scores on extraversion (van der Aa et al., 2009; Xiuqin et al., 2010), agreeableness and emotional stability (van der Aa et al., 2009) have been established as potentially important risk factors for Internet addiction. Internet gaming addiction specifically has been associated with neuroticism (Mehroof & Griffiths, 2010b; Peters & Malesky, 2008), aggression and hostility (Caplan, Williams, & Yee, 2009; Kim, Namkoong, Ku, & Kim, 2008; Mehroof & Griffiths, 2010a, 2010b), introversion (Caplan et al., 2009), social inhibition (Porter, Starcevic, Berle, & Fenech, 2010), sensation-seeking (Mehroof & Griffiths, 2010a, 2010b), and diminished agreeableness (Peters & Malesky, 2008). In spite of the substantial evidence for the role of personality traits, far less is known about

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interactions between traits and specific uses of the Internet in increasing the risk of being addicted to the Internet.

In terms of risk populations, students have been identified (Widyanto & Griffiths, 2006) for several reasons. They have a natural affinity towards the Internet (Veen & Vrakking, 2006) and their conspicuous Internet literacy has been linked to Internet addiction (Leung & Lee, 2012). Moreover, they typically have (i) free and unlimited access, (ii) flexible schedules, and (iii) freedom from parental interference. Additionally, their online activities are not externally controlled, university bodies expect that they make use of the technology, and university settings can foster social intimidation and alienation (Moore, 1995; Young, 2004). Moreover, psychological and developmental factors associated with young adulthood may contribute to the allure of the Internet for students. They do not only find themselves in the process of developing their identities, but they also start to establish intimate relationships at that particular stage of their lives. To develop one's identity means to become detached from one's parents to a certain extent leading to internal conflicts which are repeatedly resolved by the escape into addictions of all sorts, including Internet addiction (Lanther & Windham, 2004). Accordingly, the Internet can become a source of self-medication (Castiglione, 2008).

Allied to this, the forming of online relationships is more facile than doing the same in real life. On the Internet, people disclose personal information more readily because of the anonymity of the medium (Kandell, 1998; Mantovani, 2001). By the same token, young students may be hampered in the processes of forming an individual identity and establishing real, meaningful and intimate relationships outside of the arena of the virtual world. In addition to this, students are likely to create a new student culture which necessitates the Internet as a tool for communication, information sharing and community formation (Kandell, 1998). Some studies have shown that as many as six in 10 students jeopardize their academic and professional performance because of their Internet habits (Kubey, Lavin, & Barrows, 2001; Young, 1998), and that in order to cope, they engage in Internet activities excessively (Castiglione, 2008).

In university student populations, Internet addiction prevalence estimates range from 0.8% in Italy (Poli & Agrimi, 2012), 0.9% in Jordan (Al-Qudah, 2001), 2.8% in Iran (Ghamari, Mohammadbeigi, Mohammadsalehi, & Hashiani, 2011), 5.6% in China (Dong et al., 2012), 9.8% in the USA (Anderson, 2001), to 15.1% in Taiwan (Lin, Ko, & Wu, 2011), 16.2% in Poland (Ličwinko, Krajewska-Kułak, & Łukaszuk, 2011), and 18.3% in Great Britain (Niemz, Griffiths, & Banyard, 2005). However, the wide range of prevalence estimates indicates that the variety of psychometric instruments utilized does not allow for a clear determination of actual prevalence rates for Internet addiction. None of the above studies have made use of assessment tools that allow for a determination of clinically relevant Internet addiction. Furthermore, and to the authors' knowledge, no study (to date) has ever assessed the interactions between the usage of specific Internet applications and personality traits as risk factors for Internet addiction. In the present study, these shortcomings will be overcome. In order to address the gaps in empirical knowledge, the aims of this study were (i) to assess the prevalence of clinically significant levels of Internet addiction in an English student sample, and to (ii) discern the interplay between personality traits and specific Internet uses in increasing the risk for Internet addiction. Based on previous research, in the present study, the hypotheses were that (i) the use of Internet applications that allow social functions (i.e., SNSs, chatting, forums, messengers) and gaming would be strong risk factors for Internet addiction, and (ii) the particular personality traits (i.e., high neuroticism, low extraversion, and low agreeableness) would be risk factors for Internet addiction.

## 2. Method

### 2.1. Design

This study used a cross-sectional online data gathering technique. Emails were sent to students' personal email accounts and contained information about the study as well as the link to the online questionnaire. The total questionnaire contained 120 questions and required approximately 15 min to complete.

### 2.2. Participants

A convenience sample comprising 2,257 students from an English university in the East Midlands participated in the study. The sample characteristics are presented in Table 1. The mean age was 22.67 years (SD = 6.34 years), with a range from 18 to 64 years. In terms of gender distribution, approximately one-third of the sample was male and two-thirds female. Participants were from 94 countries, 78.1% were born in the United Kingdom, 8.7% in another European country, 7.2% in Asia, and 3.4% in Africa. The majority (82.8%) were studying for an undergraduate degree, with 14.1% and 3.1% studying for a Master's degree and a PhD degree, respectively. Most students identified humanities as their primary discipline (45.8%), with social sciences and life sciences being identified by 29.2% and 25.1%, respectively. The students had used the Internet for an average of 9.9 years (SD = 2.9 years).

### 2.3. Materials (measurement instruments)

In addition to basic demographic information, the online survey comprised a number of different psychometric tools to assess Internet addiction and personality traits.

#### 2.3.1. Internet addiction

In order to assess Internet addiction, the Assessment for Computer and Internet Addiction-Screener (AICA-S; Wölfling, Müller, & Beutel, 2010) was used. The screener is a brief self-report instrument, based on the original Scale for the Assessment of Pathological Computer Gaming (Wölfling, Müller, & Beutel, 2011). The AICA-S includes questions relating to key sociodemographic data as well as structural provisions, such as Internet access and the onset of Internet use. More specifically, it targets the frequency of specific Internet usage domains, such as online games, shopping, gambling, emails, chats/forums, social networking, messengers, and information research. Additionally, it enquires into associated negative consequences and the extent to which usage is pathological from a diagnostic point of view. Fourteen out of the total sixteen main questions are used in order to accumulate a clinical score, on the basis of which the participants' online usage behavior can be categorized in normal or addictive (from 13.5 points onwards) (Müller & Wölfling, 2011).

The individual diagnostically relevant items derive from the diagnostic criteria of substance dependence as specified by the international classification manuals, the DSM-IV-TR (APA, 2000) and the ICD-10 (World Health Organization, 1992). These include craving, tolerance, withdrawal, loss of control, preoccupation and negative consequences concerning poorer health, family conflicts or deteriorating achievements (Wölfling et al., 2010). A recent literature review of empirical studies assessing online gaming addiction to date indicates that the applicability of substance dependence criteria for Internet addiction appears valid over and above other classification efforts (Kuss & Griffiths, 2012c). In addition to these addiction criteria, the AICA-S enquires into further scientifically relevant themes associated with Internet addiction,

Table 1  
Sociodemographics of total sample and subsamples of not addicted and addicted students.

Students (N = 2,257)	N	Percent of total	Not addicted (n)	Percent of total	Addicted (n)	Percent of total	Overall V <sup>2</sup>	Effect size
Age (years)								
Mean (SD)	22.67 (6.34)		22.69 (6.36)		22.26 (5.69)			
18–21 years	1366	62.0	1321	59.9	45	2.0		
22–25 years	473	21.5	457	20.7	16	0.7		
26–30 years	168	5.3	161	7.3	7	0.3		
31–40 years	116	5.3	115	5.2	1	0		
41–65 years	82	3.7	80	3.6	2	0.1	2.78	CV = .01
Sex								
Male	794	35.6	767	34.4	27	1.2		
Female	1438	64.6	1396	62.5	42	1.9	0.39	g = .01
Relationship status								
Yes	307	13.8	302	13.6	5	0.2		
No	1910	86.2	1848	83.4	62	2.8	2.36	g = .03
Field of study								
Humanities	972	45.8	944	44.5	28	1.3		
Social sciences	619	29.2	602	28.4	17	0.8		
Natural sciences	532	25.1	514	24.2	18	0.8	0.45	CV = .02
Level of study								
Bachelor's	1555	82.8	1505	80.1	50	2.7		
Master's	264	14.1	255	13.6	9	0.5		
Doctorate	59	3.1	59	3.1	0	0	2.00	CV = .03

Note 1: A respondent is classified as "addicted user" when he or she scored >13 on the AICA-S.

Note 2: Due to missing values, the sum total of participants may not equal 2257 for each variable analyzed.

namely mood modification<sup>1</sup> (Item 11, which asks how frequently the participant is online in order to avoid negative feelings, such as boredom or sorrow), as well as quantitative and qualitative usage measures (such as Item 1 assessing mean online hours per day, compared to Item 3, which enquires into the frequency of Internet usage on the basis of the following answer options: every day, 2–3 times a week, once a week, once a month or less than once a month). In terms of its psychometric qualities, the AICA-S is reliable in its measure of Internet addiction and it is valid in terms of assessing Internet addiction exclusively and accurately (Wöfling et al., 2010).

### 2.3.2. Personality measures

Personality traits were assessed using the NEO Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992b). It is a valid and reliable instrument for measuring basic personality traits that stem from a variety of personality frameworks and language uses related to personality as well as statistical factor analyses. The NEO-FFI is the 60-item self-report short version of the original NEO-Personality Inventory-Revised (NEO-PI-R; Costa & McCrae, 1992a) and measures the big five personality traits. The first one, Neuroticism, is associated with anxiety, angry hostility, depression, self-consciousness, impulsiveness, and vulnerability. The second, Extraversion, is characterized by warmth, gregariousness, assertiveness, activity, excitement-seeking, and positive emotions. The third, Openness to Experience, includes fantasy, aesthetics, feelings, actions, ideas, and values. The fourth, Agreeableness, relates to trust, straightforwardness, altruism, compliance, modesty, and tendermindedness. Finally, the fifth, Conscientiousness, is distinguished by competence, order, dutifulness, achievement striving, self-discipline, and deliberation (Costa & McCrae, 1992b).

## 3. Results

Results indicated that 3.2% of the students in the present sample were classified as being addicted to the Internet. Initially, students

who were classed as addicted to the Internet and those who were not were compared regarding (i) their overall Internet use, (ii) the number of problems they experienced, and (iii) their AICA-S scores. This was done using independent samples t-tests assuming unequal variances due to the unequal group sizes. For the main analyses, the assumptions of linearity, independence of errors, and multicollinearity of the relevant variables were checked. For all analyses, weighted data were used in order to balance out the unequal gender distribution, and predictors were centered at their mean to evade multicollinearity problems of the interaction terms (Aiken & West, 1991). Following the inspection of data regarding the assumptions that yielded a satisfactory results, a logistic regression analysis was performed with Internet addiction status as binary outcome variable (i.e., the dependent variable was addicted versus not addicted) and the main effects of all application uses and all personality traits as predictors. In addition to this, gender was added. Male gender has been repeatedly claimed to be a risk factor for Internet addiction (Leung & Lee, 2012; Tsai et al., 2009). Due to the absence of significant gender differences in the sample, gender was excluded from any further analyses. This also allowed for the development of a more parsimonious model. The significant predictors as well as all interactions between the significant personality traits and the significant Internet application uses were included in another logistic regression analysis. The final model includes all significant interactions as well as the relevant main effects predictive of Internet addiction. In order to discern the simple effects, linear regression analyses were performed.

As presented in Table 2, the addicted students used the Internet significantly longer than the non-addicted students for leisure purposes on weekdays ( $t(53.76) = -2.10, p < .05$ ), and weekend days ( $t(55.11) = -7.28, p < .01$ ). All of the addicted students used the Internet every day, compared to 91.7% of the non-addicted students. Moreover, the addicted students experienced significantly more problems due to their Internet use compared to the non-addicted students ( $t(62.68) = -12.41, p < .01$ ). Finally, the addicted students scored significantly higher on the AICA-S than the non-addicted students ( $t(77.57) = -44.19, p < .01$ ).

The baseline model including no predictors was significant ( $b = -3.340, Wald V^2 (1) = 761.17, p < .01$ ), indicating that the

<sup>1</sup> The relationship between behavioral addictions generally and Internet addiction specifically and mood modification is confirmed in empirical studies conducted by Grüsser and Thalemann (2006) as well as Holden (2001).



Table 2  
Internet use and Internet addiction in addicted and not addicted students.

	Addicted (n = 71) M (SD)	Not addicted (n = 2,160) M (SD)	t(df)
Internet use			
Hours/weekdays	7.79 (9.52)	5.05 (5.55)	2.10* (53.76)
Hours/weekend days	8.47 (4.05)	4.39 (3.56)	7.28** (55.11)
Addiction			
AICA-S score	15.66 (2.02)	4.71 (2.66)	44.19* (77.57)
Number of problems	3.61 (1.54)	1.12 (1.36)	12.41** (62.68)

\* p < .05.  
\*\* p < .01.

Table 3  
Logistic regression of personality and Internet application use on Internet addiction.

	B (SE)	95% CI for Exp(B)		
		Lower	Exp(B)	Upper
Constant	-4.35 (.23)			
Shopping * neuroticism	-.60* (.26)	.33	.55	.91
Games * openness	.50* (.24)	1.01	1.64	2.64
Chats/forums	.47** (.13)	1.24	1.60	2.08
Shopping	.86** (.24)	1.48	2.35	3.74
Messengers	.42** (.14)	1.15	1.52	2.00
SNSs	.59* (.25)	1.11	1.81	2.95
Games	.18 (.14)	.91	1.20	1.56
Neuroticism	1.20** (.21)	2.10	3.33	5.05
Agreeableness	-.61* (.26)	.33	.54	.91
Openness	.41 (.26)	1.50	1.03	2.52

chance for being addicted to the Internet by the overall study population was .03.

In comparison, the final model as presented in Table 3 predicted Internet addiction status significantly ( $\chi^2(10) = 115.53, p < .01$ ) and explained 21.5% of the variance in scores (Nagelkerke's  $R^2 = .215$ ). In terms of personality traits, neuroticism was the strongest predictor of Internet addiction ( $b = 1.20, \text{Wald } \chi^2(1) = 31.81, p < .01$ ). Moreover, every unit increase in neuroticism increased the odds to be addicted to the Internet by 233%. Students addicted to the Internet scored significantly higher on the NEO subscale of neuroticism ( $M = 3.44, SD = 0.69$ ) than non-addicted students ( $M = 2.90, SD = 0.70, \chi^2 = 170.91, p < .01$ ).

The second personality trait predictive of Internet addiction was agreeableness ( $b = -.61, \text{Wald } \chi^2(1) = 5.47, p < .05$ ). Every unit increase in the agreeableness score decreased the odds of being addicted to the Internet by 46%. Students addicted to the Internet scored significantly lower on the NEO subscale of agreeableness ( $M = 3.31, SD = 0.58$ ) than non-addicted students ( $M = 3.55, SD = 0.49, \chi^2 = 130.10, p < .01$ ). In addition to this, students addicted to the Internet scored significantly higher on the NEO subscale of openness ( $M = 3.47, SD = 0.49$ ) than non-addicted students ( $M = 3.33, SD = 0.50, \chi^2 = 120.59, p < .01$ ).

Regarding Internet application use, online shopping appeared as the strongest predictor of Internet addiction ( $b = .86, \text{Wald } \chi^2(1) = 13.06, p < .01$ ). Every unit increase in online shopping increased the odds of being addicted to the Internet by 135%. Addicted students scored significantly higher on online shopping ( $M = 2.16, SD = 0.74$ ) than not addicted students ( $M = 1.87, SD = 0.72, \chi^2 = 11.84, p < .01$ ). Furthermore, all social applications significantly increased the odds of being addicted to using the Internet. The use of social networking sites increased the odds by 81% ( $b = .59, \text{Wald } \chi^2(1) = 5.62, p < .05$ ), chat rooms and forums increased the odds by 60% ( $b = .47, \text{Wald } \chi^2(1) = 12.66, p < .01$ ), and using instant messengers increased the odds by 52% ( $b = .42, \text{Wald } \chi^2(1) = 8.82, p < .01$ ). Compared to non-addicted students, addicted students scored significantly higher on their use of social

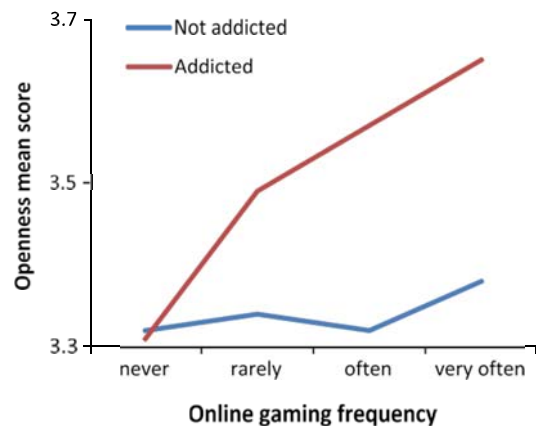


Fig. 1. Interaction effect of gaming frequency and openness on Internet addiction.

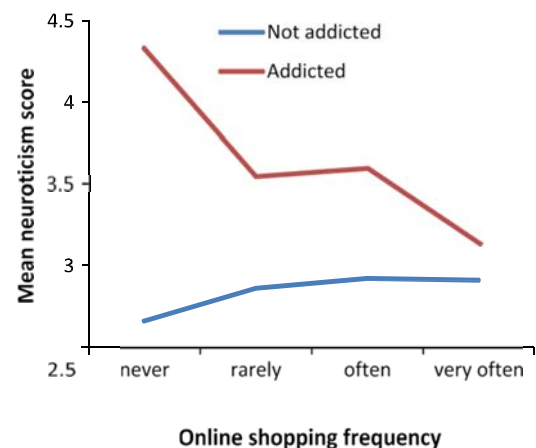


Fig. 2. Interaction effect of online shopping frequency and neuroticism on Internet addiction.

networking sites ( $M = 2.78, SD = 0.57, \text{vs. } M = 2.53, SD = 0.80, \chi^2 = 10.36, p < .05$ ), online chat rooms and forums ( $M = 1.40, SD = 1.12, \text{vs. } M = 0.80, SD = 0.87, \chi^2 = 48.71, p < .01$ ), and online instant messengers ( $M = 2.06, SD = 0.99, \text{vs. } M = 1.51, SD = 0.97, \chi^2 = 40.40, p < .01$ ).

In addition to the significant main effects, two interactions appeared as important predictors of Internet addiction. Firstly, the interaction between openness to experience and online gaming increased the odds of being addicted to the Internet by 64% ( $b = .50, \text{Wald } \chi^2(1) = 4.20, p < .05$ ). On closer inspection of the simple effects (see Fig. 1), it appeared that in the addicted group, openness to experience significantly predicted the extent of online gaming ( $b = .55; F(1) = 4.43, p < .05; R^2 = .06$ ). No such effect was discerned in the non-addicted group ( $b = .03; F(1) = .74, \text{ns}$ ).

Secondly, the interaction between neuroticism and online shopping decreased the odds of being addicted to the Internet by 45% ( $b = -.60$ , Wald  $\chi^2(1) = 5.50$ ,  $p < .05$ ). On closer inspection of the simple effects (see Fig. 2), it appeared that in the addicted group, neuroticism significantly predicted the extent of online shopping ( $b = -.30$ ;  $F(1) = 5.70$ ,  $p < .05$ ;  $R^2 = .08$ ). No such effect was discerned in the non-addicted group ( $b = .03$ ;  $F(1) = 1.38$ , ns).

#### 4. Discussion

In this study, the risk for Internet addiction was assessed on the basis of the interactions between personality traits and the use of specific Internet applications with an assessment tool that allowed for a determination of clinically relevant Internet addiction. To the authors' knowledge no previous studies have done this. Based on the clinical self-report tool utilized, it was found that a total of 3.2% of the students in the present sample were classified as being addicted to the Internet. The prevalence in this student sample appears to be situated on the rather conservative end of Internet addiction estimates in students from a variety of countries that range from 0.8% (Poli & Agrimi, 2012) to 18.3% (Niemz et al., 2005). The very high estimate of nearly 20% in Niemz et al.'s study is the only prevalence estimate available for English students so far. Rather than assessing established and validated addiction criteria as based on the diagnostic manuals, it merely inquired into problems due to extensive use. In contrast, the AICA-S assesses Internet addiction as based on actual diagnostic criteria and is used in daily clinical practice, making it the only diagnostic tool of its kind utilized to date. Consequently, rather than limiting the pathological classification to the presence of individual impairments, the AICA-S can be seen as initial indicator for real and potentially clinically relevant maladaptive behaviors. Therefore, the rather conservative prevalence of 3.2% found here appears reasonable and substantiated.

Regarding the hypotheses, it was found that the use of all social applications significantly increased the risk for being addicted to the Internet, which is in line with the hypotheses concerning the use of specific online applications. Some previous research has indicated that communication pleasure is the strongest predictor of Internet addiction (Chou & Hsiao, 2000), which is supportive of the present conjecture indicating that extensive use of social online applications is a risk factor for Internet addiction. Of all the online applications examined in this study, it was the use of SNSs that most increased the risk of being addicted to the Internet (i.e., 81% increased chance). In light of the empirical evidence base, this finding appears corroborated. To date, the literature base investigating SNS addiction is reasonably scarce. However, it suggests that SNSs are mostly used for the maintenance of established offline networks that are important for academic and professional opportunities, and thus might explain why some individuals become addicted to using them (Kuss & Griffiths, 2011). The most prominent SNS with more than 900 million users worldwide, Facebook, was in fact specifically developed as a virtual community for students (Carlson, 2010), and therefore it may not be surprising that it is students who use it excessively and in a potentially addictive manner. Interestingly, recent research indicates that females may appear to be a particular population at risk (Andreassen, Torsheim, Brunborg, & Pallesen, 2012), which indicates that further research into this aspect is required.

The next Internet application that significantly increased the risks of being addicted to the Internet was online chat/forums (i.e., increased chance by 60%). Unlike SNSs and instant messengers, chat rooms and forums are commonly used to interact with strangers and/or virtual acquaintances rather than real life friends (Wellman & Gulia, 1999). In a previous study (Whitty, 2002), it was

found that people tend to use chat rooms for emotional support and this may indicate that when there is no emotional support available in the real life setting, a person is more likely to turn to the Internet for this purpose. Students who have just left their familiar home surroundings, study in different cities and/or countries may feel more alienated and start using chat functions of the Internet to excess. This explanation is supported by other research (Simkova & Cincera, 2004), indicating that students who use online chat functions are more likely to be addicted to the Internet relative to other students.

Online forums, on the other hand, can be used for a variety of purposes, such as being a platform for knowledge collection as well as discussion (Cheng, Liu, & Shieh, 2012). Furthermore, similar to online chat rooms, online forums may serve the function of giving and receiving support (Morrow, 2006) in a variety of domains, such as occupational problems (Deryakulu & Olkun, 2007), and providing professional advice to those struggling with their physical and/or mental health (Smithson et al., 2011; Welz et al., 2011). As with online chat rooms, online forums may be a substitute for real life contacts, and engagement with them could lead to excess, as suggested by the results of this study. However, it needs to be noted that in this study, the online usage of chat rooms and forums was assessed together. Unlike forums, chat rooms are a synchronous mode of communication, and therefore require direct interaction in real time. Alternatively, the asynchronicity of forums may potentially have a different effect on the risk of developing Internet addiction. Therefore, merging the use of chat rooms and forums may have decreased the specificity of measure because it is unclear to what extent the usage of each of these Internet applications was specifically a risk factor for Internet addiction.

The final social Internet application to increase the risk for being addicted to the Internet was online instant messaging (i.e., increased chance by 51%). Previous research has found that the reasons for increased use of instant messengers (e.g., ICQ, MSN) in young populations are media richness and presentational control (Sheer, 2010). Moreover, previous research suggests that in addition to being emotionally open online, heavy use of the messenger ICQ predicts problematic Internet use over and above the use of any other online (social) Internet application (Leung, 2004). Synchronous communication tools such as ICQ may be used in order to modify mood and to escape real lives and real life problems, and could therefore result in the development of problematic behaviors (Wellman, 1996), that are in turn exacerbated through a simultaneous retreat from real life relationships (Leung, 2004). This may therefore result in a vicious cycle in such a way that real life problems lead to escape via Internet usage, which in turn increases those problems, so that the students find even more reason to continuously engage in online activities.

This study also demonstrated that engaging in online gaming increased the risks of being addicted to the Internet when paired with higher openness to experience. Students who played online games frequently and whose scores on the NEO-FFI subscale for openness were elevated at the same time, had a 64% increased risk of being addicted to the Internet. This is an original finding that has yet to be replicated. Increased novelty seeking that is linked to openness to experience has been associated with Internet addiction (Ko et al., 2010). Moreover, it appears from research into substance dependence that openness to experience is associated with marijuana use, which differentiates the latter from any other drug users (Terracciano, Löckenhoff, Crum, Bienvenu, & Costa, 2008). The associations between marijuana addicts and Internet gaming addicts with regards to higher openness to experience require further examination in the future.

For the first time in any empirical study, online shopping was found to be a significant risk factor for Internet addiction in a university student population. Frequent engagement in this activity

significantly increased the odds for being addicted to the Internet by 81%. Students shop online because of convenience, price, and larger selection of products (Delafrooz, Paim, & Khatibi, 2010), customer service (Ahuja, Gupta, & Raman, 2003), anonymity and pleasure (Kukar-Kinney, Ridgway, & Monroe, 2009). Anonymity and pleasure have been found to have strong correlations with compulsive buying, indicating that the absence of social interaction and the possibility to buy unobserved may facilitate compulsive shopping behaviors online (Kukar-Kinney et al., 2009). In light of students who spend large amounts of their time online for the purpose of research, coursework, and socializing, online procrastination may potentially lead to shopping excess. On the one hand, they may devote large amounts of time to researching the best deal, which, on the other hand, will reward them with a pleasurable experience that is just one click away.

Counter-intuitively, this study found that Internet addicts who shopped online frequently had decreased neuroticism scores. High neuroticism has been repeatedly linked with Internet addiction (Dong et al., 2012; Tsai et al., 2009), and was found to increase the odds of being addicted to the Internet by 233% (making it the strongest predictor in the present study). Due to the increased odds for Internet addiction as a consequence of both frequent shopping and high neuroticism, it would be expected that an interaction of the two would have a similar effect on increasing the risk. However, the interaction between online shopping and neuroticism decreased the odds for being addicted to the Internet by 45%. From a hedonistic viewpoint, this finding could be explained by the speculation that in order to make themselves feel better, neurotics shop online frequently, which in turn reduces their perceptions of depression and anxiety, which are commonly associated with neuroticism. Just as neurotics are found to use drugs such as nicotine for the purpose of self-medication (McClernon, Hiott, Westman, Rose, & Levin, 2006), students' use of online shopping in this study may fulfill a similar purpose. This finding is unprecedented and adds to our knowledge about the associations between both problematic and specific uses of the Internet and personality.

Low agreeableness increased the risk of Internet addiction by 46%. Low agreeableness corresponds to what Zuckerman identified as aggression–hostility (Zuckerman, 2002). In a previous study, aggressive behaviors were linked to Internet addiction in adolescents after controlling for watching violence on television (Ko, Yen, Liu, Huang, & Yen, 2009). The authors explained this relationship by arguing that online anonymity may lead to a decrease of personal responsibility and deindividuation (Zimbardo, 1969). Online disinhibition (Joinson, 1998) as demonstrated in flaming and other aggressive behaviors on the Internet may therefore be transferred into real life (Ko et al., 2009), and may have significant negative consequences both for the addicted individual as well as their interpersonal relations both online and offline.

Unlike the predicted hypothesis, the scores on the extraversion subscale of the NEO-FFI did not have an influence on the risk of being addicted to the Internet. This could be explained by previous findings indicating that both extraversion as well as introversion may play a role in the extent of Internet use (Ross et al., 2009; Zywicki & Danowski, 2008). People with large offline social networks, who are more extroverted, and who have higher self-esteem, use online networks for social enhancement, supporting the principle of 'the rich get richer'. On the other hand, people with only a limited number of real life contacts compensate for their introversion, low self-esteem, and low life-satisfaction by using SNSs for online popularity, thus supporting the social compensation hypothesis of 'the poor get richer' (Barker, 2009; Ellison, Steinfield, & Lampe, 2007; Mehdizadeh, 2010). Therefore, high introversion and high extraversion scores, respectively, might have cancelled out each other's effects on Internet addiction in the present study.

Overall, the included variables explained 21.5% of the variance in addiction. Compared to prior studies, this percentage is relatively low. For instance, Hsu, Wen, and Wu (2009) conducted a study on addiction and found five experience factors, curiosity, role playing, belonging, obligation, and reward predict addiction. In their study, the five factors predicted 65.1% of the variance in addiction. The relatively low R square value in this study may indicate there are still some other risk factors that require further study in order to explain Internet addiction. In addition, the present study examined the risk of addiction using a clinically verified cut-off point, whereas Hsu et al. (2009) looked at the extent of addiction from a dimensional point of view that may have contributed to dissimilar explained variances.

#### 4.1. Limitations

The present study is not without its limitations. Firstly, other Internet applications that have not been assessed here (i.e., the use of YouTube, online video streaming, online support groups, etc.) may also impact upon Internet addiction. These online applications and their relationship with excessive and/or addictive use need to be evaluated in the future. Secondly, the AICA-S does not specifically address a time criterion in determining Internet addiction status. Therefore, researchers are encouraged to replicate the findings by examining the occurrence of the specified addiction symptoms within the period of the last 12 months, as utilized for substance dependence (American Psychiatric Association, 2000). In addition to this, it needs to be noted that a self-report tool in and of itself can never be the sole criterion upon which to base an actual mental health diagnosis. It can merely be an indicator of potentially addictive behaviors. Therefore, it is recommended that ideally, self-reports should be supplemented with that of significant others' reports and/or a professional assessment via a structured clinical interview (Beard, 2005). Thirdly, a convenience sample was used which limits the generalizability of findings beyond English university populations. Bearing this in mind, cross-cultural comparisons using the same measurement instruments are warranted. Fourthly, as gender did not significantly increase the risk of being addicted to the Internet, it was excluded from further analyses in line with our aim to arrive at a parsimonious model. This does not preclude the possibility that gender interacts with one or more of the other predictors in increasing Internet addiction risk. Therefore, care should be taken in future studies that focus on gender to investigate these relationships further.

#### 4.2. Implications and conclusions

Overall, the present study integrated previous findings concerning the influence of both, specific personality traits, as well as the usage of particular Internet applications, into a coherent framework, drawing on previous literature. In addition to this, for the first time, it showed the interaction of the assessed variables in increasing the risk factors for being addicted to the Internet. Findings from this research have implications for university and government bodies who may put regulatory mechanisms in place that limit the usage of potentially addictive Internet applications particularly for those students whose personality puts them at risk for developing Internet addiction. In terms of prevention, children and adolescents with specific risk factors may be targeted via their schools to educate them about the potential risks the problematic engagement with specific online applications can bring about. Furthermore, clinicians will benefit from this piece of research as findings of the present study may aid them in developing targeted treatment approaches that benefit high-risk individuals by tailoring therapy according to their individual needs. Finally, this research informs future studies that may specifically (i) replicate



the original findings (i.e., the specific interaction effects) (ii) in other populations, and potentially (iii) supplement the self-reports with additional diagnostic tools, such as professional interviews, and (iv) assess the extent to which gender mediates the detected findings. In sum, the present research adds to the current pool of knowledge that substantiates the American Psychiatric Association's endeavours of including Internet Use Disorder in the upcoming version of the DSM.

## References

- Ahuja, M., Gupta, B., & Raman, P. (2003). An empirical investigation of online consumer purchasing behavior. *Communications of the ACM*, 46(12), 145–151.
- Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park: Sage.
- Al-Qudah, K. (2001). Internet addiction among students at Jordanian universities. *Journal of Arabic and Human Sciences*, 4(2), 71–88.
- American Psychiatric Association (2000). *Diagnostic and statistical manual for mental disorders IV, text-revision*. Washington, DC: American Psychiatric Association.
- American Psychiatric Association. (2012). R 40 internet use disorder. DSM-5 development. (07.09.2012) <<http://www.dsm5.org/ProposedRevision/Pages/proposedrevision.aspx?rid=573#>>.
- Anderson, K. J. (2001). Internet use among college students: An exploratory study. *Journal of American College Health*, 50(1), 21–26.
- Andreassen, C. S., Torsheim, T., Brunborg, G. S., & Pallesen, S. (2012). Development of a Facebook addiction scale. *Psychological Reports*, 110(2), 1–17.
- Barker, V. (2009). Older adolescents' motivations for social network site use: The influence of gender, group identity, and collective self-esteem. *CyberPsychology & Behavior*, 12(2), 209–213.
- Beard, K. W. (2005). Internet addiction: A review of current assessment techniques and potential assessment questions. *CyberPsychology & Behavior*, 8(1), 7–14.
- Caplan, S. E., Williams, D., & Yee, N. (2009). Problematic Internet use and psychosocial well-being among MMO players. *Computers in Human Behavior*, 25(6), 1312–1319.
- Carlson, N. (2010). At last – The full story of how Facebook was founded. *Business Insider*. (02.08.12) <<http://www.businessinsider.com/how-facebook-was-founded-2010-3#>>.
- Castiglione, J. (2008). Internet abuse and possible addiction among undergraduates: A developing concern for library and university administrators. *Library Review*, 57(5), 358–371.
- Cheng, S. S., Liu, E. Z. F., & Shieh, R. S. (2012). Identifying the indicators attracting users to online question and answer discussion forums. *Social Behavior and Personality*, 40(2), 283–292.
- Chou, C., & Hsiao, M. C. (2000). Internet addiction, usage, gratification, and pleasure experience: The Taiwan college students' case. *Computers & Education*, 35(1), 65–80.
- Costa, P. T., & McCrae, R. R. (1992a). *NEO PI-R professional manual*. Odessa, TX: Psychological Assessment Resources.
- Costa, P. T., & McCrae, R. R. (1992b). *Revised NEO personality inventory (NEO-PI-R) and the NEO five-factor inventory (NEO-FFI): Professional manual*. Odessa, FL: Psychological Assessment Resources.
- Delafrooz, N., Paim, L. H., & Khatibi, A. (2010). Students' online shopping behavior: An empirical study. *Journal of American Science*, 6(1), 137–147.
- Deryakulu, D., & Olkun, S. (2007). Analysis of computer teachers' online discussion forum messages about their occupational problems. *Educational Technology & Society*, 10(4), 131–142.
- Dong, G., Wang, J., Yang, X., & Zhou, H. (2012). Risk personality traits of Internet addiction: A longitudinal study of Internet-addicted Chinese university students. *Asia-Pacific Psychiatry*, e-pub ahead of print.
- Ellison, N. B., Steinfield, C., & Lampe, C. (2007). The benefits of Facebook "friends": Social capital and college students' use of online social network sites. *Journal of Computer-Mediated Communication*, 12(4).
- Ghamari, F., Mohammadbeigi, A., Mohammad-salehi, N., & Hashiani, A. A. (2011). Internet addiction and modeling its risk factors in medical students, Iran. *Indian Journal of Psychological Medicine*, 33(2), 158–162.
- Griffiths, M. (2000). Internet addiction – Time to be taken seriously? *Addiction Research*, 8(5), 413–418.
- Griffiths, M. D. (2005). A "components" model of addiction within a biopsychosocial framework. *Journal of Substance Use*, 10, 191–197.
- Grüsser, S. M., & Thalemann, C. N. (2006). *Verhaltenssucht – Diagnostik, Therapie, Forschung*. Bern: Hans Huber.
- Holden, C. (2001). Compulsive behaviors: "Behavioral" addictions: Do they exist? *Science*, 294(5544), 980–982.
- Hsu, S. H., Wen, M. H., & Wu, M. C. (2009). Exploring user experiences as predictors of MMORPG addiction. *Computers & Education*, 53(2), 990–999.
- Huang, Y.-R. (2006). Identity and intimacy crises and their relationship to Internet dependence among college students. *CyberPsychology & Behavior*, 9(5), 571–576.
- Joinson, A. N. (1998). Causes and effects of disinhibition on the Internet. In J. Gackenback (Ed.), *The psychology of the Internet* (pp. 43–60). New York, NY: Academic Press.
- Kandell, J. J. (1998). Internet addiction on campus: The vulnerability of college students. *CyberPsychology & Behavior*, 1(1), 11–17.
- Kim, E. J., Namkoong, K., Ku, T., & Kim, S. J. (2008). The relationship between online game addiction and aggression, self-control and narcissistic personality traits. *European Psychiatry*, 23, 212–218.
- King, D. L., Delfabbro, P. H., Griffiths, M. D., & Gradisar, M. (2011). Assessing clinical trials of Internet addiction treatment: A systematic review and CONSORT evaluation. *Clinical Psychology Review*, 31(7), 1110–1116.
- Kittinger, R., Correia, C. J., & Irons, J. G. (2012). Relationship between facebook use and problematic Internet use among college students. *Cyberpsychology, Behavior & Social Networking*, 15(6), 324–327.
- Ko, C.-H., Hsiao, S., Liu, G.-C., Yen, J.-Y., Yang, M.-J., & Yen, C.-F. (2010). The characteristics of decision making, potential to take risks, and personality of college students with Internet addiction. *Psychiatry Research*, 175(1–2), 121–125.
- Ko, C. H., Yen, J. Y., Liu, S. C., Huang, C. F., & Yen, C. F. (2009). The associations between aggressive behaviors and Internet addiction and online activities in adolescents. *Journal of Adolescent Health*, 44(6), 598–605.
- Kubey, R. W., Lavin, M. J., & Barrows, J. R. (2001). Internet use and collegiate performance decrements: Early findings. *Journal of Communication*, 51(2), 366–382.
- Kukar-Kinney, M., Ridgway, N. M., & Monroe, K. B. (2009). The relationship between consumers' tendencies to buy compulsively and their motivations to shop and buy on the Internet. *Journal of Retailing*, 85(3), 298–307.
- Kuss, D. J. (2012). Substance and behavioral addictions: Beyond dependence. *Addiction Research & Therapy*, S6.
- Kuss, D. J., & Griffiths, M. D. (2011). Online social networking and addiction – A review of the psychological literature. *International Journal of Environmental Research and Public Health*, 8(9), 3528–3552.
- Kuss, D. J., & Griffiths, M. D. (2012a). Internet and gaming addiction: A systematic literature review of neuroimaging studies. *Brain Sciences*, 2, 347–374.
- Kuss, D. J., & Griffiths, M. D. (2012b). Internet gaming addiction: A systematic review of empirical research. *International Journal of Mental Health and Addiction*, 10(2), 278–296.
- Kuss, D. J., & Griffiths, M. D. (2012c). Online gaming addiction in children and adolescents: A review of empirical research. *Journal of Behavioral Addictions*, 1(1), 1–20.
- Lanther, R. P., & Windham, R. C. (2004). Internet use and college adjustment: The moderating role of gender. *Computers in Human Behavior*, 20, 591–606.
- Leung, L. (2004). Net-generation attributes and seductive properties of the Internet as predictors of online activities and Internet addiction. *CyberPsychology & Behavior*, 7(3), 333–348.
- Leung, L., & Lee, P. S. N. (2012). The influences of information literacy, internet addiction and parenting styles on internet risks. *New Media & Society*, 14(1), 117–136.
- Ličwinko, J., Krajewska-Kulak, E., & Łukaszuk, C. (2011). Internet addiction among academic youth in Białystok. *Progress in Health Sciences*, 1(1), 124–130.
- Lin, M.-P., Ko, H.-C., & Wu, J. Y.-W. (2011). Prevalence and psychosocial risk factors associated with Internet addiction in a nationally representative sample of college students in Taiwan. *CyberPsychology, Behavior and Social Networking*, 14(12), 741–746.
- Mantovani, F. (2001). Cyber-attraction: The emergence of computer-mediated communication in the development of interpersonal relationships. In L. Anolli, R. Ciceri, & G. Riva (Eds.), *Say not to say: New perspectives on miscommunication* (pp. 236–250). Amsterdam: IOS.
- McClernan, F. J., Hiott, F. B., Westman, E. C., Rose, J. E., & Levin, E. D. (2006). Transdermal nicotine attenuates depression symptoms in nonsmokers: A double-blind, placebo-controlled trial. *Psychopharmacology*, 189(1), 125–133.
- Mehdizadeh, S. (2010). Self-presentation 2.0: Narcissism and self-esteem on facebook. *CyberPsychology, Behavior and Social Networking*, 13(4), 357–364.
- Mehroof, M., & Griffiths, M. D. (2010a). Online gaming addiction: The role of sensation seeking, self-control, neuroticism, aggression, state anxiety, and trait anxiety. *CyberPsychology & Behavior*, 13, 313–316.
- Mehroof, M., & Griffiths, M. D. (2010b). Online gaming addiction: The role of sensation seeking, self-control, neuroticism, aggression, state anxiety, and trait anxiety. *CyberPsychology & Behavior*, 13(3), 313–316.
- Moore, D. (1995). *The Emperor's virtual clothes: The naked truth about the internet culture*. Chapel Hill, North Carolina: Alogonquin.
- Morgan, C., & Cotten, S. (2003). The relationship between Internet activities and depressive symptoms in a sample of college freshmen. *CyberPsychology & Behavior*, 6(2), 133–142.
- Morrow, P. R. (2006). Telling about problems and giving advice in an Internet discussion forum: Some discourse features. *Discourse Studies*, 8(4), 531–548.
- Müller, K. W., & Wölfling, K. (2011). Computer game and Internet addiction: Aspects of diagnostics, phenomenology, pathogenesis, and therapeutic intervention. *Suchttherapie*, 12(2), 57–63.
- Niemz, K., Griffiths, M., & Banyard, P. (2005). Prevalence of pathological Internet use among university students and correlations with self-esteem, the general health questionnaire (GHQ), and disinhibition. *CyberPsychology & Behavior*, 8(6), 562–570.
- Peters, C. S., & Malesky, L. A. (2008). Problematic usage among highly-engaged players of massively multiplayer online role playing games. *CyberPsychology & Behavior*, 11(4), 480–483.
- Polli, R., & Agrimi, E. (2012). Internet addiction disorder: Prevalence in an Italian student population. *Nordic Journal of Psychiatry*, 66(1), 55–59.
- Porter, G., Starcevic, V., Berle, D., & Fenech, P. (2010). Recognizing problem video game use. *Australian and New Zealand Journal of Psychiatry*, 44(2), 120–128.

- Ross, C., Orr, E. S., Sisc, M., Arseneault, J. M., Simmering, M. G., & Orr, R. R. (2009). Personality and motivations associated with Facebook use. *Computers in Human Behavior*, 25(2), 578–586.
- Sheer, V. C. (2010). Hong Kong adolescents' use of MSN vs. ICQ for developing friendships online: Considering media richness and presentational control. *Chinese Journal of Communication*, 3(2), 223–240.
- Simkova, B., & Cincera, J. (2004). Internet addiction disorder and chatting in the Czech Republic. *CyberPsychology & Behavior*, 7(5), 536–539.
- Smithson, J., Sharkey, S., Hewis, E., Jones, R., Emmens, T., Ford, T., et al. (2011). Problem presentation and responses on an online forum for young people who self-harm. *Discourse Studies*, 13(4), 487–501.
- Terracciano, A., Löckenhoff, C. E., Crum, R. M., Bienvu, O. J., & Costa, P. T. (2008). Five-factor model personality profiles of drug users. *BMC Psychiatry*, 8(22).
- Tsai, H. F., Cheng, S. H., Yeh, T. L., Shih, C. C., Chen, K. C., & Yang, Y. C. (2009). The risk factors of Internet addiction – A survey of university freshmen. *Psychiatry Research*, 167(3), 294–299.
- van der Aa, N., Overbeek, G., Engels, R. C. M. E., Scholte, R. H. J., Meerkerk, G.-J., & Van den Eijnden, R. J. J. M. (2009). Daily and compulsive Internet use and well-being in adolescence: A diathesis-stress model based on Big Five personality traits. *Journal of Youth and Adolescence*, 38, 765–776.
- Veen, W., & Vrakking, B. (2006). *Homo zappiens: Growing up in a digital age*. London: Network Continuum Education.
- Wellman, B., & Gulia, M. (1999). Net users don't ride alone: Virtual communities as communities. In P. Kollock & M. Smith (Eds.), *Communities and cyberspace*. New York: Routledge.
- Wellman, B. (1996). An electronic group is virtually a social network. In S. Kiesler (Ed.), *Research milestones on the information highway*. Hillsdale, NJ: Lawrence Erlbaum.
- Welz, T., Lynch, S., Nathan, B., Lockyer, S., Adegbite, K., Clift, P., et al. (2011). Ch@t-space – A novel patient internet forum for users of a large, multi-ethnic HIV clinic. *HIV Medicine*, 12, 58.
- Whitty, M. T. (2002). Liar, liar! An examination of how open, supportive and honest people are in chat rooms. *Computers in Human Behavior*, 18(4), 343–352.
- Widyanto, L., & Griffiths, M. (2006). "Internet addiction": A critical review. *International Journal of Mental Health and Addiction*, 4, 31–51.
- Wölfling, K., Müller, K. W., & Beutel, M. E. (2011). Reliability and validity of the scale for the assessment of pathological computer gaming (CSV-S). *Psychotherapie, Psychosomatik, Medizinische Psychologie*, 61, 216–224.
- Wölfling, K., Müller, K., & Beutel, M. (2010). Diagnostic measures: Scale for the Assessment of Internet and Computer Game Addiction (AICA-S). In D. Mücken, A. Teske, F. Rehbein, & B. te Wildt (Eds.), *Prevention, diagnostics, and therapy of computer game addiction* (pp. 212–215). Lengerich: Pabst Science.
- World Health Organization (1992). *ICD 10: The ICD-10 classification of mental and behavioral disorders: Clinical descriptions and diagnostic guidelines*. Geneva, Switzerland: World Organization.
- Xiuqin, H., Huimin, Z., Mengchen, L., Jinan, W., Ying, Z., & Ran, T. (2010). Mental health, personality, and parental rearing styles of adolescents with Internet addiction disorder. *CyberPsychology, Behavior and Social Networking*, 13(4), 401–406.
- Young, K. (1998). *Caught in the net*. New York: Wiley.
- Young, K. S. (2004). Internet addiction – A new clinical phenomenon and its consequences. *American Behavioral Scientist*, 48(4), 402–415.
- Young, K. (2010). Internet addiction over the decade: A personal look back. *World Psychiatry*, 9(2), 91.
- Yuen, C. N., & Lavin, M. J. (2004). Internet dependence in the collegiate population: The role of shyness. *CyberPsychology & Behavior*, 7(4), 379–383.
- Zimbardo, P. G. (1969). The human choice: Individuation, reason, and order vs. deindividuation, impulse, and chaos. In W. J. Arnold & D. Levine (Eds.), *Nebraska Symposium on Motivation*. Lincoln, NE: University of Nebraska.
- Zuckerman, M. (2002). Zuckerman-Kuhlman Personality Questionnaire (ZKPQ): An alternative five-factorial model. In B. De Raad & M. Perugini (Eds.), *Big five assessment* (pp. 377–396). Seattle, WA: Hogrefe and Huber.
- Zywica, J., & Danowski, J. (2008). The faces of Facebookers: Investigating social enhancement and social compensation hypotheses: Predicting Facebook and offline popularity from sociability and self-esteem, and mapping the meanings of popularity with semantic networks. *Journal of Computer-Mediated Communication*, 14(1), 1–34.

### Appendix III

*The Compulsive Internet Use Scale (Meerkerk et al., 2009), utilised Dutch Translation and English Original*

Kun je van de onderstaande ervaringen aangeven hoe vaak je deze hebt?

	Nooit	Zelden	Soms	Vaak	Zeerv vaak
Hoe vaak vind je het moeilijk om met internetten te stoppen?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hoe vaak ga je langer door met internetten, terwijl je je had voorgenomen om te stoppen?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hoe vaak zeggen anderen (bijvoorbeeld ouders of vrienden) dat je minder zou moeten internetten?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hoe vaak ga je liever internetten dan dat je je tijd met anderen doorbrengt (bijvoorbeeld vrienden of ouders)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hoe vaak kom je slaap te kort door het internetten?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hoe vaak ben je in gedachten aan het internetten, ook als je niet online bent?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hoe vaak verheug je je op de volgende keer dat je kunt internetten?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hoe vaak denk je dat je eigenlijk minder zou moeten internetten?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hoe vaak heb je geprobeerd om minder tijd aan internetten te besteden en is dat niet gelukt?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hoe vaak voel je je rot wanneer je niet kunt internetten?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hoe vaak raffel je je huiswerk af om te kunnen internetten?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hoe vaak maak je je huiswerk niet omdat je wilt internetten?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hoe vaak ga je internetten omdat je je rot voelt?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hoe vaak ga je internetten om een probleem te vergeten?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*How often . . .*

1. do you find it difficult to stop using the Internet when you are online?
2. do you continue to use the Internet despite your intention to stop?
3. do others (e.g., partner, children, parents) say you should use the Internet less?
4. do you prefer to use the Internet instead of spending time with others (e.g., partner, children, parents)?
5. are you short of sleep because of the Internet?
6. do you think about the Internet, even when not online?
7. do you look forward to your next Internet session?
8. do you think you should use the Internet less often?
9. have you unsuccessfully tried to spend less time on the Internet?
10. do you rush through your (home) work in order to go on the Internet?
11. do you neglect your daily obligations (work, school, or family life) because you prefer to go on the Internet?
12. do you go on the Internet when you are feeling down?
13. do you use the Internet to escape from your sorrows or get relief from negative feelings?
14. do you feel restless, frustrated, or irritated when you cannot use the Internet?

## Appendix IV

### *The Quick Big Five Scale (QBF; Vermulst et al., 2009), Original Dutch Version and English Translation*

In de nu volgende lijst zie je woorden over eigenschappen van mensen. Geef nu aan in welke mate jij zelf die eigenschappen bezit. Probeer zo eerlijk mogelijk te antwoorden, ook als je een eigenschap eigenlijk helemaal niet zo leuk van jezelf vindt.

	Klopt helemaal niet	Klopt niet	Klopt meer niet dan wel	Klopt deels niet/deels wel	Klopt meer wel dan niet	Klopt wel	Klopt helemaal wel
Fantasierijk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Prikkelbaar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Slordig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Terughoudend	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Prettig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Onderzoekend	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Zenuwachtig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Zorgvuldig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hulpvaardig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Snel geraakt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ordelijk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gesloten	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Veelzijdig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vriendelijk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ongerust	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nauwkeurig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Klopt helemaal niet	Klopt niet	Klopt meer niet dan wel	Klopt deels niet/deels wel	Klopt meer wel dan niet	Klopt wel	Klopt helemaal wel
Spraakzaam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vernieuwend (Origineel)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Behulpzaam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Schuchter (Verlegen)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aangenaam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Artistiek	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Angstig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Netjes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Teruggetrokken	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Systematisch	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sympathiek	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nerveus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Creatief	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## PERSONALITY CHARACTERISTICS

Behavioural Science Institute, University of Nijmegen, The Netherlands

Below you see a list of 30 words about common personality characteristics. We are asking you to fill out this questionnaire by indicating to which degree these 30 characteristics apply to you.

How do you see yourself in comparison with other people? Try to give your answers in an honest way, even if a characteristic is less pleasant for you. There are no good or wrong answers, it is only important to indicate how you think you are.

The answers are ranging from "not at all applicable" to "completely applicable":

not at all applicable to me	not applicable to me	more not than often applicable to me	at average applicable to me	more often than not applicable to me	applicable to me	completely applicable to me
1	2	3	4	5	6	7

**Circle for each of the 30 words what is applicable to you.**

1	agreeable	1	2	3	4	5	6	7		16	thorough	1	2	3	4	5	6	7
2	imaginative	1	2	3	4	5	6	7		17	talkative	1	2	3	4	5	6	7
3	irritable	1	2	3	4	5	6	7		18	innovative	1	2	3	4	5	6	7
4	sloppy	1	2	3	4	5	6	7		19	cooperative	1	2	3	4	5	6	7
5	reserved	1	2	3	4	5	6	7		20	anxious	1	2	3	4	5	6	7
6	deep	1	2	3	4	5	6	7		21	bashful	1	2	3	4	5	6	7
7	nervous	1	2	3	4	5	6	7		22	pleasant	1	2	3	4	5	6	7
8	careful	1	2	3	4	5	6	7		23	artistic	1	2	3	4	5	6	7
9	quiet	1	2	3	4	5	6	7		24	fearful	1	2	3	4	5	6	7

10	helpful	1	2	3	4	5	6	7	25	neat	1	2	3	4	5	6	7
11	touchy	1	2	3	4	5	6	7	26	withdrawn	1	2	3	4	5	6	7
12	organized	1	2	3	4	5	6	7	27	systematic	1	2	3	4	5	6	7
13	introverted	1	2	3	4	5	6	7	28	sympathetic	1	2	3	4	5	6	7
14	complex	1	2	3	4	5	6	7	29	high-strung	1	2	3	4	5	6	7
15	kind	1	2	3	4	5	6	7	30	creative	1	2	3	4	5	6	7

**Appendix V**

*Assessment for Internet and Computer Game Addiction Scale (AICA-S)*

**AICA-S**  
(Wölfling, K., Müller, K.W. & Beutel, M.E., 2010)

The following questions are related to your internet behaviour. Please answer all of them truthfully and completely. Please be aware that there are no „right” or “wrong” answers. So just fill in the answer that you consider as the most suitable one.

Please note that all the questions are related to the way you use the internet in your **leisure time** and not for university/work-related issues.

**I) Which applications of the internet do you use preferably?**

never (0)	rarely (1)	often (2)	very often (3)	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	online games (e.g. MMORPGs, ego-shooter etc.)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	shopping sites (e.g. ebay, amazon)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	chats or forums
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	E-Mail
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	online-sex (e.g. erotica, pornography)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	online-gambling (e.g. poker, casinos, bets)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	online communities (e.g. facebook)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Informational sites (e.g. wikipedia)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	weblogs
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	online messengers (e.g. MSN, ICQ, Skype)

(1) How many hours do you spend on the internet on an average weekday (Monday to Friday)?  
\_\_\_\_\_ hours

(2) How many hours do you spend on the internet on a day of the weekend?  
\_\_\_\_\_ hours

(3) How often do you use the internet?  

 every day

2-3 times per week

once a week

once a month

less than once a month

(4) How many hours do you actively spend on the internet?

less than one hour

1-2 hours

2-4 hours

4-6 hours

more than 6 hours

(5) How strongly are you mentally preoccupied with the internet during a day?

<input type="text" value="0"/>	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>
<b>not at all</b>	<b>moderately</b>	<b>considerably</b>	<b>strongly</b>	<b>very strong</b>

(6) How frequently are you online despite that you had planned not to be online or have you been online more often or for a longer time than planned?

<input type="text" value="0"/>	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>
<b>never</b>	<b>seldom</b>	<b>sometimes</b>	<b>often</b>	<b>very often</b>

(7) Do you feel moody if you cannot be online?

<input type="text" value="0"/>	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>
<b>never</b>	<b>seldom</b>	<b>sometimes</b>	<b>often</b>	<b>very often</b>

(8) Did you recognize having to be online more often or for a longer time to feel good or relaxed again?

<input type="text" value="0"/>	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>
<b>never</b>	<b>seldom</b>	<b>sometimes</b>	<b>often</b>	<b>very often</b>

(9) How intense is your desire for being online on the average?

<input type="text" value="0"/>	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>
<b>not at all</b>	<b>moderately</b>	<b>considerably</b>	<b>strongly</b>	<b>very strong</b>

(10) How often can you not resist an overwhelming urge to be online?

<input type="text" value="0"/>	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>
<b>never</b>	<b>seldom</b>	<b>sometimes</b>	<b>often</b>	<b>very often</b>

(11) How frequently do you avoid negative temper or feelings by surfing the internet?  
For example: Do you surf the internet when feeling sad, disappointed or angry?

<input type="text" value="0"/>	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>
<b>never</b>	<b>seldom</b>	<b>sometimes</b>	<b>often</b>	<b>very often</b>

(12) How often have you tried to quit or restrict surfing the internet?

<input type="text" value="0"/>	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>
<b>never</b>	<b>seldom</b>	<b>sometimes</b>	<b>often</b>	<b>very often</b>

(12.1) if you have tried to quit or restrict it, did you succeed?

<input type="text" value="0"/>	<input type="text" value="1"/>
--------------------------------	--------------------------------

**no**      **yes**

(13) How frequently did you forget something important (e.g. homework, chores) because you were online all the time?

0	1	2	3	4
<b>never</b>	<b>seldom</b>	<b>sometimes</b>	<b>often</b>	<b>very often</b>

(14) How often did you have the impression of being online too often or being online for too many hours?

0	1	2	3	4
<b>never</b>	<b>seldom</b>	<b>sometimes</b>	<b>often</b>	<b>very often</b>

(15) Did you face problems or negative consequences because of your internet usage?

<b>yes</b>		<b>no</b>		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	problems at school (e.g. poor grades)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	problems with family members or friends (e.g. quarrels)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	financial problems (e.g. debts)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	neglect of other recreational activities
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	neglect of your friends or your girlfriend / boyfriend
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	health problems (e.g. lack of sleep or unhealthy nutrition)

## Appendix VI

### *NEO-Five Factor Inventory (NEO-FFI; Costa & McCrae, 1992)*

Tick **SD** if you **strongly disagree** or the statement is definitely false.

Tick **D** if you **disagree** or the statement is mostly false.

Tick **N** if you are **neutral** on the statement, if you cannot decide, or if the statement is about equally true and false.

Tick **A** if you **agree** or the statement is mostly true.

Tick **SA** if you **strongly agree** or the statement is definitely true.

Tick only one response for each statement. Respond to all of the statements, making sure that you fill in the correct response.

1. I am not a worrier.
2. I like to have a lot of people around me.
3. I don't like to waste my time daydreaming.
4. I try to be courteous to everyone I meet.
5. I keep my belonging neat and clean.
6. I often feel inferior to others.
7. I laugh easily.
8. Once I find the right way to do something, I stick to it.
9. I often get into arguments with my family and colleagues.
10. I'm pretty good about pacing myself so as to get things done on time.

11. When I'm under a great deal of stress, sometimes I feel like I'm going to pieces.
12. I don't consider myself especially "light-hearted".
13. I am intrigued by the patterns I find in art and music.
14. Some people think I'm selfish and egotistical.
15. I am not a very methodical person.
16. I rarely feel lonely or blue.
  
17. I really enjoy talking to people.
18. I believe letting students hear controversial speakers can only confuse and mislead them.
19. I would rather cooperate with others than compete with them.
20. I try to perform all the tasks assigned to me conscientiously.
21. I often feel tense and jittery.
22. I like to be where the action is.
23. Poetry has little or no effect on me.
24. I tend to be cynical and skeptical of others' intentions.
25. I have a clear set of goals and work toward them in an orderly fashion.
26. Sometimes I feel completely worthless.
27. I usually prefer to do things alone.
28. I often try new and foreign foods.
29. I believe that most people will take advantage of you if you let them.
30. I waste a lot of time before settling down to work.
31. I rarely feel fearful or anxious.
32. I often feel as if I'm bursting with energy.
33. I seldom notice the moods or feelings that different environments produce.
34. Most people I know like me.
35. I work hard to accomplish my goals.



36. I often get angry at the way people treat me.
37. I am a cheerful, high-spirited person.
38. I believe we should look to our religious authorities for decisions on moral issues.
39. Some people think of me as cold and calculating.
40. When I make a commitment, I can always be counted on to follow through.
41. Too often, when things go wrong, I get discouraged and feel like giving up.
42. I am not a cheerful optimist.
43. Sometimes when I am reading poetry or looking at a work of art, I feel a chill or wave of excitement.
44. I'm hard-headed and tough-minded in my attitudes.
45. Sometimes I'm not as dependable or reliable as I should be.
46. I am seldom sad or depressed.
47. My life is fast-paced.
48. I have little interest in speculating on the nature of the universe or the human condition.
49. I generally try to be thoughtful and considerate.
50. I am a productive person who always gets the job done.
51. I often feel helpless and want someone else to solve my problems.
52. I am a very active person.
53. I have a lot of intellectual curiosity.
54. If I don't like people, I let them know it.
55. I never seem to be able to get organized.
56. At times I have been so ashamed I just wanted to hide.
57. I would rather go my own way than be a leader of others.
58. I often enjoy playing with theories or abstract ideas.
59. If necessary, I am willing to manipulate people to get what I want.
60. I strive for excellence in everything I do.

## Appendix VII

### *Interview Schedule for Therapists*

#### **Therapist**

- Where are you currently working?
- How long have you been working as a therapist?
  - Which academic/vocational qualifications do you have for giving psychotherapy?
- How would you describe your approach towards psychotherapy in general?
  - Which class of psychotherapy would you place yourself in?
    - Why?
- How long have you been working with patients being treated for Internet addictions?

#### **Therapy**

- What kind of therapy is provided for patients suffering from Internet addictions at your institute/hospital?
  - How do you apply this therapy?
  - What is the goal of the therapy?
- How long has this form of therapy been applied?
- What are the completion rates among patients?
  - What are the factors influencing successful therapy completion?
  - What are the drop-out rates?

- Why do you think patients drop out of treatment?

### **Patients**

- How would you describe the patients treated here?
  - What kinds of personalities do they have?
  - What are the problems they experience because of their addictions?
  - How and why do they decide to start therapy?
    - What kinds of motivations do they have?
      - External/internal
  - What are their long-term prospects once they complete therapy?

### **Internet applications**

- What kinds of experiences have you made with patients suffering from addictions to different Internet applications?
- To what extent do you think that patients who suffer from addictions to different Internet applications differ from each other?
  - Do they differ in personality?
    - In how far so?
  - Are there different comorbidities present?
  - Do you use different treatment approaches?
    - What kinds?
- How would you rate the severity of the different forms of addictions on the Internet?
  - What are the therapy completion rates?
  - What are the problems likely to be faced by patients suffering from addictions to using different Internet applications?

(based on Smith, Flowers, & Larkin, 2009, p. 62)

## Appendix VIII

### *Original German Quotations*

<sup>1</sup> "Also wenn jahrelang wirklich das mein einziger Wohlfühlraum ist, sich vielleicht mein dopaminerges System umgebaut hat, dann ist das schon ausgeprägter (...) also nach dem Motto das Störungsbild ist dort ausgeprägter. Deswegen sind die höher belastet. Bei den Jugendlichen, die ich habe, ist vielleicht das Störungsbild an und für sich noch nicht so stark ausgeprägt, aber die Belastung ist teilweise genauso hoch oder sogar noch höher." (P18).

<sup>2</sup> die Entwicklungsmöglichkeiten im Jugendalter häufig noch besser sind als im Erwachsenenalter." (P18).

<sup>3</sup> "(...) der pathologische Internetgebrauch ist eingebettet in die Problematik der Entwicklung von Identität (...) die Identitätskonflikte, in die noch überhaupt nicht gefestigte Kontrollfunktion für Emotionsregulation (...)." (P18).

<sup>4</sup> "Und Unterschiede [zwischen Altersgruppen] sind halt im Grad der Reflexion, also dass die Älteren einfach schon mehr drüber nachdenken, wie kann [ich das Internet] in mein Leben integrieren, dass es mich nicht in meinem Leben, in meiner sozialen Kompetenz, in meinem beruflichen, in meinem schulischen Werdegang behindert, und die Jugendlichen machen sich da eigentlich keinen Kopf drum. Die haben da einfach zu wenig Problembewusstsein. (...) Und die Erwachsenen, oder ja, kann man ja sagen, die sind da reflektierter. Da kann's schon auch sein, dass die mal ein Wochenende durchspielen, Lanparty machen oder so, aber irgendwie insgesamt schaffen sie's dann halt doch eher, ihren Beruf zu machen oder ihre Ausbildung oder ihr Studium." (P5).

<sup>5</sup> "Die sind also in ihrer Geschäftsfähigkeit grundsätzlich nicht eingeschränkt und frei. Und die Krankheitseinsicht ist auch oft begrenzt. Und der Überblick über die Konsequenzen ist aber leider noch nicht so hundertprozentig ausgeprägt wie man's ganz gerne hätte." (P6).

<sup>6</sup> "(...) bei Erwachsenen die Situation eher so aussieht, dass wegen der Folge von life events, sprich Scheidung, Kündigung, Arbeitslosigkeit, ein Rückzug in die virtuelle Welt stattfindet, also ich sag so mehr oder weniger statt n Wirtshaus, statt dem Gasthaus, statt dem Alkoholmissbrauch oder statt der Alkoholabhängigkeit halt die Computervariante, und das halt auch sehr sehr lange dauert, bis der Betreffende erstens einmal ein Problembewusstsein entwickeln kann oder entwickelt um entsprechend eine Konsequenz zu ziehen. Und zweitens ja auch die Flexibilität in der Änderung nicht wirklich mehr großartig ist weil der Arbeitsmarkt halt schlecht ist oder weil die Chance auf eine neue Beziehung relativ gering ist und wozu soll ich's überhaupt machen? Bin ja halbwegs zufrieden mit meinen 10 Charakteren in irgendeinem Online-Rollenspiel. Oder ich habe eine Position im Forum XY. Ich bin dort wichtig, hab dort eine wirklich wichtige Position, die ich in der realen Welt sicher nicht mehr erreichen werde." (P9).

<sup>7</sup>“(…) weil die Jugendlichen dann ja quasi in 6, 8, 10 Monaten vor Augen haben, selbsttätig vollverantwortlich für sich selber zu sein und die Eltern auf einmal realisieren, dass die Ausbildung nicht richtig funktioniert, kein Beruf in Sicht ist, kein Studium gut funktioniert.“ (P4).

<sup>8</sup>“Ich denke, dass das ein entscheidender Grund ist, warum Jungs so sehr davon betroffen sind, weil die sozial ja einfach nicht so gefestigt sind, so kompetent sind einfach auch und meistens an so Dingen wie miteinander zu sprechen (...). Jungs haben ja im Kontakt untereinander eher die Strategien, gemeinsam etwas tun zu wollen, aber die wissen nicht, was sie untereinander tun sollen außer vielleicht 'ne W-Lan-Party zu organisieren. Und diese anderen Dinge, was früher Jungs und junge Männer gemacht haben, das ist für die alles langweilig. Wenn man denen solche Sachen vorschlägt, weiß ich nicht, mit dem Fahrrad mal irgendwohin zu fahren und sich mit ein paar anderen Jungs zu treffen, wieso, ist doch langweilig oder ist viel zu anstrengend. Also da ist ganz viel Bequemlichkeit und ganz viel fehlende Sozialkompetenz da.“ (P12).

<sup>9</sup>“(…) das kann sehr viel zu tun haben mit 'nem Selbstwert, 'ner Selbstwertproblematik, mit 'ner Leere, was das reale Leben angeht und da bietet so ein online-Rollenspiel wie World of Warcraft, das bietet 'ne Menge an emotional übersteigerten Inhalten. Das wirkt so innerlich auffüllend. Das strukturiert den Alltag, das spielt einem Sozialkontakte zu, in dieser funktionalen Verknüpfung, mit dem, was da in diesem Spiel geschieht, ja.“ (P2).

<sup>10</sup>“Im Netz bin ich viel netter als sonst. (...) sozialer, freundlicher, kompetenter (...) als in der realen Welt.“ (P12).

<sup>11</sup>“(…) die von bestimmten Leistungen und von bestimmter Präsenz abhängig sind. (...) Aber wenn ich zu einer Gruppe gehöre, die erst ab acht Stunden pro Tag jemanden aufnimmt ab acht Stunden Spielzeit, dann habe ich mir da ja was Unheimliches erarbeitet und man muss sich klarmachen, dass im Hintergrund heutzutage der Profigamer und der Profientwickler stehen als Rollenmodell.“ (P6).

<sup>12</sup>“(…) was kann man im Internet alles nicht machen. Also man kann nicht sich in echt verlieben in Führungsstrichen, man kann dort nicht wirklich Sex haben, man kann dort kein Kind gebären. Man kann dort nicht wirklich krank werden geschweige denn gepflegt werden. Man kann dort nicht sterben. Man kann dort nicht in den Tod begleitet werden und auch nicht begraben werden. Das sind alles Dinge, die mit der existentiellen Dimension des Menschseins zu tun haben, die, wo der Mensch auch sich in seiner Menschlichkeit beweist und wo aus meiner Sicht traditionell Frauen eine größere Affinität, vor allen Dingen aber auch eine größere Stärke drin haben aus meiner Sicht. 56:21 Und ist für mich noch mal so eine Brücke, zu verstehen, warum Frauen da vielleicht eher vor geschützt sind, medienabhängig zu werden.“ (P4).

<sup>13</sup>“(…) und zwar ist es aktuell so nach meiner klinischen Erfahrung, dass die Jungs deutlich früher, wie auch übrigens bei anderen psychiatrischen Erkrankungen, dass sie deutlich früher nach außen auffällig werden und soziale Regeln nicht mehr so richtig beachten und irgendwie externalisiert auffällig werden oder durch einen ganz auffälligen Rückzug in dem Sinne, während Mädchen es wesentlich länger schaffen, ihre sozialen Verpflichtungen und Anforderungen aufrecht zu erhalten, also auch schulisch zu funktionieren und langsamer und schleichender dann in die Problemverhaltensweisen reinrutschen.“ (P6).

<sup>14</sup>“austauschen mit ihren Freundinnen (...) die doch sehr viel Zeit im Internet verbracht haben, tun das in der Regel in sozialen Communities, chatten, auseinandersetzen, sich schreiben.“ (P5).

<sup>15</sup>“die Zahl der 14-18jährigen Mädchen mit einem pathologischen Internetgebrauch die Zahl der Jungen übersteigert. (...) und es stellt sich heraus, dass die Mädchen eben nicht Rollenspiele in erster Linie betreiben sondern sich in diesen sozialen Foren sehr exzessiv bewegen, um dort nicht wie bei den Jungen eine narzisstische Gratifikation über die Spiele zu erfahren, sondern um soziale Interaktion mit anderen Mädchen zu erfahren und vor allen Dingen verstanden werden möchten in ihren ganz individuellen Problemenkonstellationen. D.h. die wünschen die direkte Interaktion. Sie wünschen, dass sie verstanden werden. Sie wünschen das sich-äußern-können. Das ist ja eine völlig andere Qualität und Nutzungsintention als wir es bei den Jungen sehen. Es ist ja auch fast ein Gegenprinzip zu dieser völlig narzisstischen fast schizoiden Relation, die bei den Jungen passiert. Die Mädchen bleiben immer im Kontakt und sie treffen sich dann teilweise auch mit denen, die sie da im Internet kennengelernt haben. Und das Interessante ist eben, seit einigen Monaten, und das ist ultraneu für uns, bekommen wir diese Mädchen mit so ausgeprägten Störungsbildern, dass wir sie auch auf die Station aufnehmen müssen. (...) da müssen wir uns auch noch Strategien einfallen lassen ganz gezielt, um an die Mädchen viel besser heranzukommen, denn da tut sich einfach eine enorme Kluft auf. Epidemiologisch betrachtet sind sie eine ganz wichtige Gruppe, aber wir kriegen sie bisher noch nicht in die Beratung und Behandlung hinein. (...) das ist zumindest für Deutschland ein bundesweites Phänomen, da muss sich also Gesundheitspolitik Gedanken machen.“ (P18).

<sup>16</sup>“Offenbar werden die Mädchen eher sich selber überlassen und das Problembewusstsein der Eltern ist noch nicht so, dass die sich sagen, ich suche jetzt mal hier nach Hilfe, wie das bei den Jungen der Fall ist. Auf der anderen Seite, (...) die Mädchen bleiben im sozialen Kontakt, auch bei einem übermäßigen Gebrauch. Dieses Spielen mit Computerspielen bei den Jungen ist

auffälliger auch für die Eltern als es bei den Mädchen ist, obwohl die Folgen dann ja wiederum relativ ähnlich sind, was so die Leistungsmotivation angeht, den fehlenden Schulbesuch angeht. Obwohl es ist wahrscheinlich wie bei allen Süchten bei den Mädchen ja so, wenn Sie mal so an die Tablettenabhängigkeit der Frauen denken, es ist ja auch eine wahnsinnig stille Sucht. Vieles passiert da mehr im Verborgenen und es wird auch länger kaschiert. Es wird länger von den Mädchen auch zu kaschieren versucht. Dieser Drang der Normalitätsdarstellung, der ist denke ich mal bei den Mädchen sehr viel ausgeprägter, so dass auch für sie selber der Wunsch, das Verhalten zu verändern, sich wahrscheinlich sehr viel später konkretisiert als bei den Jungen. Es ist die perfekte Sucht.“ (P18).

<sup>17</sup> “Also im Laufe der Jahre sind mir einige Frauen, einige weibliche Patienten untergekommen, bei denen diese exzessive Internetnutzung eigentlich bei der Kontaktaufnahme nicht im Vordergrund stand. Da zeigte sich das eher so im Verlauf der Behandlung, dass die ja auch noch ständig in irgendwelchen Chatrooms unterwegs sind und hier und da Kontakte knüpfen. Also mit anderen Worten, ich hab' das schon immer mal wieder bei Frauen erlebt (...), die dann in irgendwelchen sozialen Netzwerken verschiedenster Art unterwegs sind und dann meinen, irgendwelche Menschen darüber kennenzulernen, (...) und auch das hatte Aspekte von exzessiver Internetnutzung, war aber von den Patienten eigentlich so nicht benannt.“ (P2).

<sup>18</sup> “(...) sind das sehr, sehr einsame, sehr sozial unterversorgte Menschen, sowohl auch von der Familie als auch vom sozialen Umfeld, Freundeskreis, das Gefühl einer Gemeinschaft anzugehören“ (P11).

<sup>19</sup> “Bei den Jungen mit einem pathologischen Internetgebrauch geht es ja in erster Linie um die Selbstunsicheren, schüchternen, teilweise wenn sie zu uns kommen geradezu schizoiden Jungen, die große Probleme in der Kontaktaufnahme haben und die ja schon im sehr frühen Lebensalter durch eine enorme Selbstunsicherheit, Kränkbarkeit auffielen, bei der Einschulung bereits eine randständige Position im Klassenverband eingenommen haben, nie so recht Kontakt zu Gleichaltrigen aufnehmen mochten, und wo also im Vordergrund ja die Ängstlichkeit bis hin zur Angststörung, die Selbstwertproblematik bis hin zur Schizoidie steht.“ (P18).

<sup>20</sup> “(...) die Internet- Computerspieler, das sind hauptsächlich junge Männer, die auf dem Weg in ein selbstbestimmtes autonomes Erwachsenenleben eigentlich gescheitert sind, also häufig eine abgebrochene Schulausbildung oder Berufsausbildung haben, ein abgebrochenes Studium, die so richtig jetzt im Erwachsenenleben noch nicht angekommen sind mit Freunden, Partnerschaft, Sexualität, beruflichem Erfolg, und sich entweder ängstlich von den Anforderungen des konkreten realen Umfelds und des Erwachsenseins zurückziehen, ängstlich vor allen Dingen im Sinne von soziophob oder narzisstisch gekränkt, sich gekränkt aus der realen Umwelt zurückziehen, oder dann eher depressiven, manchmal auch beides. Und die dann im Internet erstmal quasi im Computerspiel eine vermeintliche Lösung finden für ihre Probleme, also Problematiken mit Selbstsicherheit und Selbstwertgefühl, und dann den Helden spielen, das mit anderen auch tun, aber in relativ unverbindlichen Beziehungen das tun, die aber dann wenn sie das immer mehr betreiben, sich immer mehr darin verstricken und die Welt da draußen wird dann als immer bedrohlicher und kränkender eigentlich erlebt. Und die Möglichkeiten, sich dort zurechtzufinden, dort selbstsicher aufzutreten, erfolgreich zu sein, werden immer geringer. Und dann kommen sie in einen typischen Kreislauf der Abhängigkeit.“ (P4).

<sup>21</sup> “Bei denen, die ich dann tatsächlich gesehen hab', war es so, dass das ziemlich depressive, depressiv erscheinende junge Männer waren, die irgendwie so aus dem Leben rausgefallen waren, aus'm normalen Leben rausgefallen waren, und wenig Freunde hatten und darüber über ihr Wirken, über etwa Online-Rollenspiele oder über irgendwelche Chatrooms oder so, darüber haben die halt wieder sozusagen Zugang zu Sozialkontakten gekriegt. Die hatten Peergroups, die eben dann online stattfanden, und darüber hatten sie dann so ein Wirkungsfeld, das sie halt im realen Leben nicht mehr hatten.“ (P2).

<sup>22</sup> “Also das ist definitiv mein Eindruck, dass Menschen, die naja, familiär, arbeitsmäßig stabil eingebunden sind, die haben ja anderes zu tun als 40 Stunden in der Woche WoW zu spielen. Und diejenigen, die sich diese Zeit nehmen können, 40 oder 60 Stunden WoW in der Woche zu spielen, die haben halt sonst auch nix mehr.“ (P2).

<sup>23</sup> “Also bei den Medienabhängigen in Führungsstrichen, egal ob das jetzt Jugendliche oder Erwachsene sind, wir haben nicht die Extrovertierten, Aufbrausenden, wir haben eher die Introvertierten, Ruhigen, Schüchternen, Ängstlichen, leicht Depressiven, Selbstunsicheren, mit einem mangelnden Selbstwertgefühl oder geringer Selbstwirksamkeitserwartung.“ (P17).

<sup>24</sup> “Im Endeffekt haben alle Abhängigkeitspatienten ein Riesenproblem mit ihrem Selbstwertgefühl weil Abhängigkeitserkrankungen immer noch den Nimbus haben, es ist zwar eine Krankheit, aber ich bin selber Schuld weil ich es nicht schaffe, dieses Verhalten in den Griff zu bekommen. Und aufgrund dieser Annahmen ist es natürlich ein ziemlicher Dämpfer für das Selbstwertgefühl.“ (P9).

<sup>25</sup> “Ein Paradebeispiel ist immer eine alleinerziehende Mutter, zwei kleine Kinder, die Oma irgendwie weit weg, also nicht die Möglichkeit, 1, 2-mal die Woche weggehen zu können. Aber sie hat einen PC. Natürlich ist es möglich, nachdem die Kinder dann im Bett liegen, um 8, halb 9, statt fernsehen z.B. in einem Forum oder in einem Chat mich auszutauschen. Und do.t sind dann Menschen, die mich verstehen, die mir zuhören, mit denen ich über Alltagsdinge reden kann, über andere Dinge, die

mich interessieren, was auch immer. Das ist ja attraktiv. (...) Und so ist dann mehr oder weniger der Einstieg. Natürlich gibt's dann da drinnen so Flash-Events, so und auf einmal kippt's. Auf einmal ist mir der Chat wichtiger als meine Kinder. (...) den Samstag, Sonntag sind wir wieder nicht rausgegangen, obwohl sehr schönes Wetter war. Warum bin ich nicht rausgegangen? Ah ja, genau, weil ich war ja im Chat. Und das mit dem Mittagessen ist auch nicht mehr so. Meine Kinder müssen auch schon 10 Mal sagen: Ich habe Hunger, bevor ich reagiere. Und dann eher schnell, schnell, weil ich will ja schon wieder weiter diskutieren, tratschen, oder mit dem Avatar, in den ich mich jetzt gerade verliebt hab', oder wo ich glaub', dass das der Wahre, Einzige ist, weiter kommunizieren.“ (P9).

<sup>26</sup> “Ein großer Anteil derer, die WoW exzessiv genutzt haben, das waren Söhne allein erziehender Mütter. Entweder waren die Mütter alleinerziehend oder aber der Vater war anderweitig abwesend. (...) Unmittelbar gab es ziemlich die Konstellation, dass die so 'ne nörgelnde Mutter hatten, also eine nörgelnde Mutter mit wahrlich schriller Stimme, die ihnen so die Hölle heiß gemacht hat. Ich will die Mütter gar nicht abwerten. (...) man kann da natürlich genervt sein, wenn man zu jeder Tages- und Nachtzeit in das Zimmer des Jungen kommt und immer sitzt er da dran. Klar hebelt das einen aus und nervt einen das. Aber im Endeffekt war das so 'ne Residualsituation, die ich so kennengelernt hab', dass die furchtbar nörgelig waren und auch keinen Bezug mehr zu ihrem Sohn hatten. Das war die eine Seite. Und es gab auf der anderen Seite eben auch keinen Vater, der irgendwas mit denen unternommen hat, der denen irgendwas im Leben gezeigt hat. Der irgendwie präsent, ansprechbar, Ratgeber, sonst was war. Also all diese Strukturen waren irgendwie nicht großartig vorhanden und es scheint so gewesen zu sein, dass diese Abenteuerwelt in World of Warcraft so ein bisschen das kompensiert, was sie an realem Väterlichen nicht haben.“ (P2).

<sup>27</sup> “Die Mutter, die vielleicht nach der Trennung irgendwie in so eine Rolle geflutscht ist, dass sie mit dem Jugendlichen auf einer Augenhöhe stand, die dann im Grunde eingeknickt ist, wenn er dann das erste Mal ausgerastet ist, und den PC unbedingt wieder anhaben wollte und dann sich da aufgebaut hat und sie dann gesagt hat, na gut, wusste ich nichts entgegenzuhalten, und der hat gelernt: ich muss ja erst mal hier Rambazamba machen. Also ich muss erst hier die Tür aus der Angel hauen, und dann kriege ich das, was ich will.“ (P17).

<sup>28</sup> “Also wir haben fast immer im Grunde gerade bei dem PC-Thema diese “broken home“ Geschichte, die im Hintergrund steht, mit einer langen Konfliktenwicklung, wo im Grunde jeder so aus seinem Schützengraben guckt, das Familienklima ist drastisch nach unten gebrochen. Also es geht nur noch um dieses Streitthema, was alles beherrscht.“ (P17).

<sup>29</sup> “Also für mich gibt es zwei große Belastungen, die jeder Mensch erleidet, weil wir alle nicht im Paradies großwerden. Also in der Kindheit sind es Defizite, d.h. Situationen, in denen wir etwas, was wir für unsere Persönlichkeitsentwicklung bräuchten, zu wenig bekommen, Aufmerksamkeit, Förderung, Wertschätzung, oder Situationen, in denen Menschen, meistens ältere Menschen, über unsere Grenzen gehen und uns verletzen, bis hin zu schlimmen und schlimmsten Verletzungen, wie sexuellen Missbrauch, physischen, psychischen Missbrauch. In der Regel sind Süchte ein Versuch des Menschen, diese Defizite oder Verletzungen zu kompensieren, irgendwie damit fertig zu werden, es auszugleichen. Also relative oft ist es halt ja, wie soll ich sagen, der Versuch, sich auf diesem Weg Wertschätzung, Anerkennung zu holen weil der normale, natürliche Weg, z.B. über die Peergroup, das soziale Netz in der Schule, den familiären Kontext, nicht gut funktioniert, und im Internet, wenn wir jetzt an Spieler denken, die da viel Zeit hineinstecken, (...) die sind dann halt eine bekannte Gestalt und eine geschätzte Gestalt mit einem hohen Level und bekommen über diesen Weg eben über eine spezifische Fähigkeit, die sie sich da aufgebaut haben, Wertschätzung und Anerkennung.“ (P5).

<sup>30</sup> “Einer meiner Patienten ist bei einer Klassenfahrt ziemlich runtergeputzt worden und da hat er sich nicht wehren können gegen seine Mitschüler. Das würde man mit Mobbing wahrscheinlich am nächsten umschreiben, und er war wehrlos dieser Situation ausgesetzt. Und da war es dann so, dass er sich dem eigentlichen Leben nicht mehr stellte und der Umstand, dass es halt 'ne Onlinemöglichkeit gab, der verführte halt dazu, eben diesen Weg zu gehen und dann immer mehr in diese virtuelle Welt zu flüchten und die andere eben abzulehnen und wegzuschieben. Und das ist nicht nur bei dem so gewesen, sondern meines Erachtens ist es bei allen, die ich kennengelernt habe, mehr oder weniger deutlich sichtbar gewesen.“ (P2).

<sup>31</sup> “(...) oder sie sind aus dem üblichen Leben rausgefallen, sei es sie waren unglücklich verliebt, sei es sie haben sich sozial ausgestoßen gefühlt, wogegen kein Kraut gewachsen war, sei es sie sind beruflich in der Lehre abgelehnt worden, oder waren dann nicht erfolgreich.“ (P2).

<sup>32</sup> “(...) wann die Suchtentwicklung begonnen hat, und warum, natürlich auch in welchem besonderen Momenten diese Suchtverhalten auftritt, wo dann (...) die Risikomomente entstehen, in welchen Bereichen das Suchtverhalten eine Problemlösungsstrategie ist.“ (P3).

<sup>33</sup> “Ganz häufig (...) bei den Jugendlichen, die wir haben, egal ob Junge oder Mädchen in der Ambulanz jetzt oder auch stationär, oft ist ein realweltliches Mobbing der Anlass dafür, dass so ein heftiger sozialer Rückzug stattgefunden hat. Also da gab's oft so ein auslösendes Ereignis.“ (P17).



<sup>34</sup>“(...) er ist sicherlich deutlich mehr rückfallgefährdet und insgesamt absturzgefährdeter (...) als ein reiner Chatter.“ (P11).

<sup>35</sup>“(...) und deren Weg in die Abhängigkeit häufig länger ist (...) und auch dramatischer schädigt“ (P4).

<sup>36</sup>“(...) ist nicht das Spiel, sondern es ist die Kommunikation. Es ist die kommunikative Ebene bzw. die Gruppe, die Gruppenzusammengehörigkeit. (...) Es ist ausschließlich der soziale Faktor, weil das Spiel selber ist ja in der Regel mehr oder weniger nimmer die Herausforderung für die Betroffenen. (...) die meisten meiner Patienten, die in Onlinespielen waren, haben dann im Endeffekt kaum mehr aktiv gespielt. Sie waren zwar online, haben aber hauptsächlich gechattet oder halt sonstige Plätze im allgemeinen oder im Handeschannel verbreitet.“ (P9).

<sup>37</sup>“(...) es sind oftmals die einzigen sozialen Funktionen oder Kontakte, die noch übrig sind. Und das ist auch fällt mir jetzt gerade so ein, das ist auch unheimlich schwierig im Zusammenhang mit wenn die Eltern das verbieten oder den Computer abbauen, dass damit auch zwar nicht mehr gespielt werden kann, aber dass da meistens auch jeglicher Sozialkontakt von den Jugendlichen mit einem Schlag abbricht.“ (P12).

<sup>38</sup>“(...) diese rollenspielsüchtigen Menschen eher sozusagen selbstunsicher, von der Erziehung her unterdrückte Menschen sind, die in den Rollenspielen durch die Belohnungssysteme eine gewisse innere Aufwertung erfahren und deswegen der Rollenspielsucht immer mehr verfallen, weil sie eigentlich von außen keine wirklichen Inputs von Selbstwertstärkung erhalten.“ (P11).

<sup>39</sup>“(...) dass da eben so diese Realwelt in den Hintergrund tritt“ (P11).

<sup>40</sup>“Im Facebook wird man vielleicht eher dazu tendieren, ein Idealbild zu präsentieren. (...) im Chatroom wird man vielleicht Seiten herauslassen, die man sonst vielleicht nicht gerne präsentieren würde.“ (P3).

<sup>41</sup>“(...) das ist ja auch die Schwierigkeit, dass man ja eigentlich sonst hauptsächlich von Internetsucht gesprochen hat (...). Aber eigentlich ist das wahnsinnig unpräzise weil das Internet selbst wieder ein großer Raum ist aus ganz verschiedenen Angeboten. Und wenn man sich das Phänomen anschaut, ganz wichtig ist, (...) dass man sich die Angebote im Internet anschaut, die besonders dann zum Suchtverhalten führen, wie online Glücksspiel, online Rollenspiele oder Computerspiele, wie die sozialen Netzwerke.“ (P3).

<sup>42</sup>“(...) welche Bedürfnisse werden denn befriedigt, um welche Grundmotive geht es hier? Und was sucht der einzelne, und was hat er dann sozusagen im Netz dort gefunden? Was schafft dort vielleicht die Befriedigung, was schafft dort vielleicht den Kick, oder auch vielleicht auch was Rauschähnliches?“ (P17).

<sup>43</sup>“(...) weil man ja immer schaut, wo haben wir jetzt diese Krücke, oder noch einmal zu schauen, wofür steht denn dieses Suchtverhalten, was sucht dieser Mensch genau in diesem Verhalten, in diesem Suchtmittel, was ist da die Sehnsucht oder die Hilfe, die die betroffene Person sich da erhofft, (...) welche Bedürfnisse befriedigen sie bei ihm oder wieso helfen sie ihm in dieser Situation. (...) und was das eigentliche Bedürfnis ist, das ganz wichtig ist, das offenzulegen, weil sozusagen oft diese tieferliegende Bedürftigkeit dem Betroffenen gar nicht so bewusst ist. Und wenn das selber mal gemacht wird, ist es schon einmal sehr viel erreicht, weil der Betroffene mehr Zugang zu seinen Gefühlen und zu seinen eigenen Bedürfnissen bekommt. (...) bei der Suchterkrankung sehe ich ja oft, dass Menschen die eigenen Gefühle und ihr Inneres (...) zudecken und zumachen und sich nicht so stark spüren wollen“.

<sup>44</sup>“Ich vermute, dass das nicht sehr sinnvoll ist, zwischen diesen verschiedenen Applikationen zu unterscheiden weil das Internet so schnelllebig ist, dass man dann alle Nase lang zu neuen diagnostischen Kategorien kommen müsste.“ (P2).

<sup>45</sup>“(...) weil sie im Prinzip doch sehr genau so ein isoliertes Suchtverhalten zeigen, vor dem Monitor, ganz egal, was sie machen. (...) Das Problemverhalten ist immer Suchtverhalten.“ (P19).

<sup>46</sup>“Einfach weil die natürlich auch ganz ähnliche Verhaltensweisen an den Tag legen, weil es gar nicht so darauf ankommt, was die im Internet machen, sondern eben dass sie so lange Zeit davor verbringen und so wenig andere Alternativerfahren machen.“ (P19).

<sup>47</sup>“(...) Polymediomanie, analog zur Polytoxikomanie, weil es diesen Typus von Jugendlichen gibt, dem es letztlich egal ist, was es er mit elektronischen Medien tut. Also es geht um die Benutzung der Geräte selbst. Ob nun gechattet wird, gesurft, gespielt, oder was auch immer, wo das wahllos austauschbar ist, wie bei einem Polytoxikomanen, wo es letztlich auch irgendwann egal ist, was er nimmt.“ (P6).

<sup>48</sup> “(...) das sind die Applikationen, die Möglichkeiten, die ich innerhalb des *Facebook*bereichs habe. Das ist sowohl die Kommunikation im Sinne von Chats oder Kommentare abgeben als auch mich durch die Freundeslisten durchzuklicken bis hin zu nebenbei noch ein paar Spiele zu spielen, wie *Farmville* oder sonstige Dinge. Also das kann durchaus ausufernd in einen relativ strukturierten Tagesablauf, der sich halt dann ausschließlich online abspielt.“ (P9).

<sup>49</sup> “Dann gibt es diesen kleinen Kreis von Leuten, die permanent daran denken, die da gar nicht innerlich aussteigen können, die im Grunde dauernd damit beschäftigt sind, die vor allen Dingen jede nicht gespielte Minute als verlorene Minute sehen weil die Spiele ja weitergehen. Das muss man sich ja klarmachen. Wenn ich aussteige, geht das Spiel ja weiter. Das ist ja wie am Roulettetisch, wenn ich da nicht mehr mitspiele, spielt halt der nächste. Und diese Unendlichkeit und dieser Sog, der spielt für eine kleine Gruppe da die entscheidende Rolle. Und das wären aus meiner Sicht die wirklich Süchtigen, die dann auch alles dafür tun, diese Verhaltensweise zu zeigen.“ (P6).

<sup>50</sup> “Also ich würde da auch die normalen Suchtkriterien anlegen, wie man sie bei stoffgebundenen oder anderen Verhaltenssuchten anlegen würde, also wenn das Verhalten wirklich so eine Eigendynamik entwickelt hat, dass der Mensch selbst den Eindruck hat, er ist nicht mehr so ganz Herr dessen, was er da tut. Und wenn’s ihm wirklich schwer fällt, mal für eine gewisse Zeit es nicht zu tun, also was weiß ich, die Hardware geht kaputt. Und für diesen Menschen ist es dann wirklich unaushaltbar, der muss dann sofort irgendwie neue Hardware kriegen, geht zu Kumpels oder sonst irgendwas (...). Dann natürlich schon die Überwertigkeit der Ausprägung, also dass die Vielfalt des Lebens auf der Strecke bleibt, dass sein einziges Tun, also vor dem Computer hocken und zocken und chatten, einen so großen Anteil ausmacht, dass der Rest drunter leidet.“ (P5).

<sup>51</sup> “(...) wo also innerhalb von wenigen Monaten die normalen sozialen Bezüge alle aufhören und eigentlich nur noch die Problemverhaltensweise gepflegt wird oder der Drogenkonsum, und wenn man das dann unterbricht, (...) dass dann relativ schnell sich zeigt, also so nach zwei Wochen ungefähr, ob es sich wirklich um eine Suchtthematik im engeren Sinne gehandelt hat, oder einfach nur einen sagen wir mal Intensivgebrauch“ (P3).

<sup>52</sup> “(...) die Ähnlichkeit sehe ich (...) mehr auf der Endstrecke, nämlich bei den Auswirkungen. Das Handlungsspektrum, das Fühlen, Denken, die Identität engt sich immer mehr auf das Konsumieren ein.“ (P18).

<sup>53</sup> “Also auf jeden Fall auch wenn eben eine Toleranzentwicklung da ist, also wenn die Zeiten sich innerhalb kurzer Zeit von einer Stunde oder zwei Stunden täglich auf bis zu 24 Stunden hochschaukeln. Also den Extremfall, den ich hier gehabt hab, von auch einem 13- oder 14-Jährigen, (...), er teilweise 24 Stunden am Tag gespielt hat und nur jeden zweiten Tag so 5-6 Stunden geschlafen hat. Ja, das ist diese Toleranzentwicklung.“ (P12).

<sup>54</sup> “(...) dass die sehr exzessiv mit dem Internet umgehen, dass sie da Kontrollverlust haben, dass sie bis tief in die Nacht am Rechner sitzen.“ (P2).

<sup>55</sup> “Auf jeden Fall wenn die Jugendlichen selber sagen, und das kommt oft vor, dass sie das nicht unter Kontrolle haben, die Zeiten, die sie am Computer verbringen, also nicht einfach aufhören können und dass sie solche Ideen mit denen ja oft auch die Eltern kommen, du kannst spielen von bis, kriegst so gewisse festgelegte Uhrzeiten oder so, dass die Jugendlichen diese Zeiten völlig unterschätzen und gar nicht merken, wie die Zeit vergeht und dann trotzdem immer wieder länger spielen und es dahingehend immer Streitigkeiten gibt. Das ist auch so ein Ding was ganz typisch ist und was ich da auch mit unter die Suchtkriterien einrechne.“ (P12).

<sup>56</sup> “ewig innere Unruhe und Angespanntheit, Gereiztheit, Getrieben“ (P12).

<sup>57</sup> “(...) dass die Eltern zum Teil eben auch körperlich angegriffen werden, wenn die verbieten, zu spielen bzw. den PC wegnehmen oder das Internet kündigen oder irgendwie solche Sachen. Also, wo die Jugendlichen dann in Verbindung mit bringen, ich kann jetzt nicht spielen, weil mein Vater oder meine Mutter oder beide das und das veranlassen haben. Und diese körperlichen, also bis hin zu körperlichen Auseinandersetzungen, die sind schon manchmal ziemlich krass. Oder eben irgendwie in die depressive Richtung gesehen. Ich kann nicht mehr spielen, ich seh‘ keinen Sinn mehr im Leben, und dann auch suizidale Phantasien oder sogar Absichten entwickeln. Das würde ich auf jeden Fall unter Entzugserscheinungen werten.“ (P12).

<sup>58</sup> “Also wir haben im stationären Bereich Fälle gehabt, die uns ein Handy abgegeben haben. Das zweite durften wir im Schuh finden, und mit dem dritten haben sie weitergespielt. Und das sind natürlich Fälle, wo man wirklich sagen muss, hier ist typisches Suchtverhalten, Verschleierungsverhalten usw. vorhanden, massiver Art.“ (P3).

<sup>59</sup> “Im Grunde genommen in schweren Stadien werden sämtliche Formen der Aktivität, aber auch der Selbstdefinition, sich über die Aktivität in dem Spiel manifestieren.“ (P18).

<sup>60</sup>“(...) im Grunde dann auch unzufriedener mit ihrem Leben waren, das Depressionsniveau erhöht war.“ (P17).

<sup>61</sup>“Das sieht man bei den schwer Betroffenen ja auch, dass die bis nachts zwei, drei Uhr dann spielen und bis zum Mittag oder noch länger dann schlafen und der Rest der Zeit dann eben im Internet verbracht wird.“ (P18).

<sup>62</sup>“Typischerweise stellt sich dann heraus, dass die betreffenden Jugendlichen bereits seit geraumer Zeit nicht mehr zur Schule gehen. Schulabsentismus ist ein wesentliches Symptom. Und es stellt sich heraus, dass die ihre Freizeitaktivitäten, Hobbies in der Vergangenheit sehr stark vernachlässigt haben, dass die soziale Kontakte, Freundeskreis vernachlässigt haben, dass sie ihre schulischen, häuslichen Pflichten nicht mehr ausführen, sondern sich immer mehr des Aktivitäts- und Handlungsspektrums auf den Computer- bzw. das Computerspielen bzw. das Internetspiel in der Vergangenheit bezogen hat. Und die Eltern berichten uns typischerweise über Konfliktsituationen, die sich um diesen pathologischen Internetgebrauch herum in der Familie etabliert haben. Diese Konflikte sind sehr chronifiziert. Typischerweise sind hier Triangulierungsprozesse drin, in der Gestalt, dass ein Elternteil sehr weich und nachgiebig den Internetaktivitäten gegenüber sich darstellt und ein anderes eher die regulierende Funktion in der Familie einnimmt und keine gemeinsame elterliche Position jetzt dem Spielverhalten des Kindes eingenommen wird.“ (P18).

<sup>63</sup>“Typisch war, dass sie entweder die Schule nicht mehr besuchten oder aber dass die Schule nur noch so stand-by lief und mit minimalem Aufwand betrieben worden ist und das, was ihnen eigentlich wichtig war, das fand dann während ihrer Onlinekontakte statt indem sie bei World of Warcraft bestimmte Stufen erreichen, dass man bestimmte Charaktere ausstattet und dass man da eben Erfolge hat und das reale Leben fand eigentlich gar nicht mehr statt. Also, ich kann mich an eine Mutter erinnern, die dann gesagt hat: Ich seh' den überhaupt nicht mehr und bei den Mahlzeiten ist der praktisch nicht da, wenn man irgendwas unternimmt, ist er nicht da, sondern immer nur am Rechner, was dann immer wieder in der Familie zu mehr oder weniger großen Eskalationen führte.“ (P2).

<sup>64</sup>“(…) wenn die Familien Kinder- und Jugendpsychiatrische Beratung in Anspruch nehmen, dann ist die Schule kurz vor dem Ende. Dann ist der seit Wochen und Monaten nicht mehr zur Schule gegangen. Dann hat's mal fiesen Ärger in der Familie gegeben bis hin zu aggressiven Auseinandersetzungen. Das heißt wir kommen erst dann zum Handkuss wenn die allgemeine Beratung oder Ratgeberlesen oder Eltern- und Familienberatung, wenn das alles nicht funktioniert hat oder man gesagt hat, das reicht nicht.“ (P6).

<sup>65</sup>“Also da gibt's ja noch diese Frage, gehe ich zur Schule oder nicht. Da trenne ich ziemlich deutlich, ob die in so einem Tief gerade sind, was ja häufig während der 9. Und 10. Klasse zumindest bei Gymnasiasten häufig ist, weil die ja dann immer noch 2 bis 3 Jahre vor sich haben, und die also pubertätsbedingt also häufig so ein Tief haben, keine Lust, also so eine extreme Schulunlust da ist und in dem Zusammenhang eben die Schule auch zum Teil verweigern oder eben schwänzen. Aber die Jugendlichen können schon selber gut sagen, ob sie Schule schwänzen um zu spielen oder ob sie die Schule schwänzen weil sie keine Lust haben, Schulangst haben oftmals auch, also unter massivem Leistungsdruck stehen, eben gerade auch die Gymnasiasten, und eigentlich dann zu Hause am Computer sitzen weil sie nicht wissen, was sie die ganze Zeit machen sollen, wo sie früher in der Schule waren.“ (P12).

<sup>66</sup>“(…) gleichzeitig auch die Motivation zu stärken, mit einer möglichen Abstinenz umzugehen, (...) und dann natürlich Rückfälle sind auch ganz, ganz entscheidend und wichtig, auch im Rahmen der Therapie sind sie oft ganz, ganz wertvoll, weil man dann sieht sozusagen, Rückfälle sind sozusagen ein Marker, die zeigen dorthin, wo die Patienten schwach sind und wo besonders gearbeitet werden muss.“ (P3).

<sup>67</sup>“Ja, also Rückfall gehört ja quasi zur Sucht mit dazu. Also der Unterschied ist ja häufig immer, ob man dann dauerhaft rückfällig wird oder ob man nach einem Rückfall auch wieder therapeutisch arbeitet. Bei den PC-Spielern ist es so, dass vielen bisher noch gar nicht so wirklich eine abstinenten Lebensführung gelungen ist. Bei den Glücksspielern hat man ja häufig so eine ein-Drittel-Quote. D.h. ein Drittel lebt dauerhaft abstinent, ein Drittel lebt zeitweilig abstinent und ein Drittel lebt quasi chronisch spielend weiter.“ (P13).

<sup>68</sup>“(…) ein junger Mensch mit einer Computersucht (...) hat mit einer für mich mindestens 95%igen Wahrscheinlichkeit, aber wahrscheinlich sogar noch höher, eine komorbide psychische Störung, entweder aus dem F9er Katalog, ICD-10, die Kinder- und Jugendpsychiatrischen Diagnosen, d.h. also die emotionalen Entwicklungsstörungen, die man da gut nutzen kann oder F3er, F4er Katalog, Angststörungen, depressive Störung, oder sie können auch eine beginnende Persönlichkeitsstörung diagnostizieren.“ (P18).

<sup>69</sup>“Wir haben in der Kinder- und Jugendpsychiatrie eine Selektion von wesentlich gestörteren Leuten, die teilweise auch sehr lange Vorgeschichten haben von Depression, von ADS, von Teilleistungsstörungen, Legasthenie.“ (P6).

<sup>70</sup> “Ich persönlich komme eben von meinem Background her aus der Tiefenpsychologie, habe deswegen auch am Anfang, als es ums Thema Internet- und Computerspielabhängigkeit ging, stark meinen Fokus darauf gesetzt, was haben wir denn noch für Probleme und für eine Psychopathologie und für Diagnosen. Und da kann man sagen, ja, die haben viel Depression, Angsterkrankungen, Persönlichkeitsstörungen und vielleicht noch ADHS, und es ist auch wichtig für die Behandlung. Aber das sind letztendlich Diagnosen, die man sonst bei Suchterkrankungen auch häufig komorbid findet.“ (P4).

<sup>71</sup> “(...) die haben natürlich noch bei der Verhaltenssucht den Effekt, (...) dass natürlich auch Substanzabhängigkeiten als Komorbidität auftreten, und umgekehrt genauso. Die Untersuchung (...) stationärer Suchtkrankmeldungen hat ja auch gezeigt, dass im Rahmen der stationären Patienten, die also für substanzbezogene Abhängigkeiten gerade noch eine Therapie machen, die Prävalenz von Internetsucht sehr deutlich höher war als bei einer Normalbevölkerung.“ (P19).

<sup>72</sup> “Soziale Ängstlichkeit ist noch der nächste Punkt, oder eben die soziale Phobie, aber auch Persönlichkeitsstörungen. Da haben wir eben vor allen Dingen auch so die schizoide Persönlichkeitsstörung. (...) Bei den Persönlichkeitsstörungen sind das eher Tendenzen. Bei den anderen Erkrankungen sind das häufig diagnostizierbare, also soziale Phobie zum Beispiel, oder Agoraphobie, und bei der Depression ist das so ein Mittelding, dass manchmal Tendenzen, aber manchmal eben auch schon wirklich diagnostizierbar ist.“ (P19).

<sup>73</sup> “Und bei der Gruppe ist es in der Tat so, dass das Ganze sehr stark fokussiert ist auf den Mediengebrauch und die Komorbidität ja im Grunde genommen gar nicht wirklich angesprochen wird und berücksichtigt wird. Und naja, das ist eben das große Problem mit diesen Kurzzeit manualisierten Programmen, dass die kein Profil, keinen Ansatz für die Komorbidität bieten und das führt dann dazu, dass, wenn die Programme abgeschlossen sind und wo die Jugendlichen dann das Programm dann erfolgreich durchlaufen haben aber auch ihre Krückenfunktion verloren (...). Dann bricht die Komorbidität am Ende hervor, und das ist ein ungelöstes Problem für all diese Gruppenprogramme im Moment noch weil da geht es dann ja darum, die Spreu vom Weizen zu trennen, und diejenigen, die auffällige Komorbiditäten haben, dann auch in weiterführende Therapieangebote zu bringen, die dann im zweiten Schritt vor allen Dingen auf die Komorbidität fokussieren.“ (P18).

<sup>74</sup> “Wir haben sehr viele Sozialphobien gesehen, Angsterkrankungen, aber auch high functioning Autismus, also Asperger-Patienten, schizoide Patienten, also alle die, die sonst eigentlich sonst auch nicht unbedingt in die Psychiatrie kommen. Das waren jetzt meine (...) Erfahrungen über vier, fünf Jahre, dass die mit dem Level und dem Aufhänger Mediensucht oder Internetsuchtklärung, dass die darüber eine gewisse Bereitschaft hatten, sich in die Psychiatrie zu begeben.“ (P6).

<sup>75</sup> “(...) häufig passiert da Folgendes (...), Leute kamen vielleicht in die Klinik meinetwegen wegen der Sozialphobie oder der Anpassungsstörung, und da gingen sie dann nach Hause, und dann ging das dann nach kurzer Zeit wieder schief weil man sich mit dem Medienthema nicht auseinandergesetzt hat.“ (P17).

<sup>76</sup> “Ich persönlich komme eben von meinem Background her aus der Tiefenpsychologie, habe deswegen auch am Anfang als es ums Thema Internet- und Computerspielabhängigkeit ging, stark meinen Fokus darauf gesetzt, was haben wir denn noch für Probleme und für ne Psychopathologie und für Diagnosen. Und da kann man sagen, ja die haben viel Depression, Angsterkrankungen, Persönlichkeitsstörungen und vielleicht noch ADHS, und es ist auch wichtig für die Behandlung, aber das sind letztendlich Diagnosen, die man sonst bei Suchterkrankungen auch häufig komorbid findet, wenn das noch kein Grund ist, deswegen das nicht als Suchterkrankung zu verstehen.“ (P4).

<sup>77</sup> “Was wir dann eben gemacht haben, ist erstmal eine ausführliche Diagnostik im Hinblick auf die Frage: Haben sie das oder haben sie's nicht, welcher mediale Bereich genau jetzt da das abhängig machende Agens ist. Natürlich haben wir viel mit untersucht, ob es nun Computerspiele sind oder irgendwas anderes.“ (P4).

<sup>78</sup> “Es gibt dann natürlich nach dem ICD jetzt keine Kinderdiagnose in dem Sinne. Aber es läuft eben unter der Erwachsenen diagnose mit, und die Kriterien kann ein 13jähriger genauso erfüllen wie ein 16 oder 18-Jähriger. (...) [Das Vorhandensein einer Suchterkrankung] wird ja immer am aktuellen Verhalten getestet. Das heißt, er könnte quasi eine abstinente Phase haben und hätte dann keine Diagnose mehr. Aber eine Sucht bleibt ja eigentlich lebenslang bestehen und es ist nur ein Unterschied, wie man lebt, ob man eben abstinent lebt und es schafft oder eben seiner Sucht nachgibt. Und so ist es bei denen ja letztendlich auch. Es ist auch ganz unterschiedlich, ob die gerade am Spielen sind oder nicht, je nachdem, also manche haben auch keinen Zugang oder die Eltern haben den PC abgebaut. Aber deswegen ist die Sucht nicht weg.“ (P12).

<sup>79</sup> “Deshalb wird über den F9er Katalog hinaus in Deutschland ja auch das multiaxiale Diagnoseschema verwendet, wo die F9er Kategorie bzw. ICD-10 Diagnose nur eine von sechs Operationalisierungsmöglichkeiten darstellt. Wir beurteilen natürlich auch das Entwicklungsniveau. Ist es altersgerecht? Ist es retardiert? Ist es übermäßig fortgeschritten? Wir beurteilen die Kognition und die Intelligenz in diesem multiaxialen Klassifikationsschema. Wir beurteilen auch nach einem operationalisierten System die sozialen Konflikte, wo dann auch so familiäre Unterstützung bzw. Familienprobleme eine Rolle spielen. Und dann natürlich auch die somatische Entwicklung. Also ich will damit sagen, es ist komplexer deshalb, weil die

entwicklungspsychologischen Stadien natürlich ja altersabhängig sind und sie bei einem 12-, 13jährigen völlig andere Voraussetzungen finden als bei einem 16-, 17jährigen, und insofern ist die Diagnostik natürlich immer sehr entwicklungsabhängig und muss dann für die emotionale, soziale, körperliche Reife der Jugendlichen immer berücksichtigt werden.“ (P18).

<sup>80</sup> “(...) wenn es im Diagnosenkatalog keine diagnostische Entität gibt, gibt es auch keinen sozialpolitischen oder gesundheitspolitischen Handlungsdruck. Und wir lösen das Problem des pathologischen Internetgebrauchs ja nicht allein durch die hochqualifizierten medizinischen oder psychotherapeutischen Beratungsangebote. Wir müssen ja auch Angebotsstrukturen in der Jugendhilfe, in der Suchthilfe oder im Allgemeinen Familienberatungsdiensten etablieren um dem immer größer werdenden Behandlungsnachfragen überhaupt nachzukommen. Und da sehen wir, dass in Deutschland wenig Bereitschaft in den Städten, Kommunen, Gemeinden, und Ländern vorhanden ist, entsprechende Ressourcen aus öffentlichen Mitteln zu schaffen.“ (P18).

<sup>81</sup> “In der Klinik, da haben wir’s natürlich leichter. (...) Da ist im Grunde die Finanzierung über die Krankenkasse gesichert. In dem Moment, wo jemand stationär aufgenommen wird, da gibt es auch eine Diagnose. Wir lehnen die dann an an das Glücksspiel, also eine Störung der Impulskontrolle nicht näher bezeichnet. Und häufig haben wir ja auch noch eine andere Nebendiagnose dabei, sei es die Störung des Sozialverhaltens und der Emotion, sei es die Anpassungsstörung, sei es die soziale Ängstlichkeit. Also da ist das kein Thema. Da hatten wir auch noch nie, dass im Grunde die Kasse oder der MDK [Medizinischer Dienst der Krankenversicherung] da sich quergestellt.“ (P17).

<sup>82</sup> “(...) damit im kassenärztlichen Erstattungsverfahren wir es leichter haben in der Versorgung (...).“ (P17).

<sup>83</sup> “Also ich glaube und hoffe schon, dass es realistisch ist [Internetsucht in die diagnostischen Manuale aufzunehmen]. So wie pathological gambling eben eine Kategorie ist, die man nutzen kann oder die es natürlich auch gibt. Also von der Problemklasse würde ich sagen, ob man nun von pathologischen Spielen oder von exzessiver Internetnutzung spricht, ich würde sagen, das ist gleichrangig zu sehen und ich hoffe, dass das diagnostisch irgendwann entsprechend dem Rechnung getragen wird.“ (P2).

<sup>84</sup> “Es ist ja so, dass im Moment ja wohl der Vorschlag tatsächlich favorisiert wird, pathologisches Glücksspiel als bisher einzige Verhaltenssucht gemeinsam in ein Kapitel zu packen mit den anderen stoffgebundenen Abhängigkeitserkrankungen. Und Internetabhängigkeit wird ja diskutiert als Kandidat zumindest also für die Aufnahme, was schon enorm ist, womit die Internetabhängigkeit vorbeigezogen ist an Sportsucht, Kaufsucht, Arbeitssucht, Sexsucht. Und insofern da das DSM-5 ja eher ein dynamisches System werden soll, also spricht nicht erst in 2 Jahrzehnten überarbeitet werden soll, kann es schon sein, dass es schneller geht. Aber ich rechne nicht damit, dass das innerhalb der nächsten fünf Jahre passiert.“ (P4).

<sup>85</sup> “Jetzt ist Sucht im Prinzip eine Abhängigkeitserkrankung und es wird auch im neuen ICD-10 so sein und in der revidierten Form vom DSM-4 (...) dass die Abhängigkeitserkrankungen nicht mehr gespalten werden in Abhängigkeit von psychotropen Substanzen und halt irgendwo in irgendeiner Unterkategorie liegen die nichtstofflichen Abhängigkeiten, sondern dass das alles in eine Gruppe kommt. (...) Also Abhängigkeitserkrankung und dann die Untergruppe psychotrop oder halt Verhalten. (...) Das pathologische Glücksspiel ist ja die einzige nicht stoffliche Abhängigkeit, die heute zur Diagnose existiert. Es hat wenigstens eine Nummer. Und alle anderen Dinge werden ja durch unter was auch immer subsummiert, Impulskontrollstörung oder sonstige Dinge, was ja nicht stimmt in Wirklichkeit. Es ist mehr oder weniger die Kategorie, wo scheinbar keiner gewusst hat, wo es hingehört. Mir fällt jetzt nicht wirklich ein, wo [Internetsucht] besser hinpasst [als in die Suchtkategorie]. Es erfüllt die Kriterien der Abhängigkeitserkrankungen in allen Punkten. Wenn man so will, sämtliche diagnostischen Richtlinien oder Vorschläge gehen in die Richtung.“ (P9).

<sup>86</sup> “Nein. Das ist nicht so, weil die Sucht eben die einschränkendste Störung ist, und die anderen Begleiterkrankungen sozusagen werden im Nachhinein behandelt. (...) Das ist ja ganz typisch, wenn du einen Alkoholiker hast, musst du den doch erst entgiften, bevor du mit dem Psychotherapie machen kannst. Genauso ist es bei einer Verhaltenssucht ja auch, dass die Patienten eben deswegen bei uns die 6-8 Wochen Komplettabstinenz haben, damit sie eben klar sind im Kopf um Psychotherapie aufzunehmen. Ansonsten ist das eben ganz schwer möglich.“ (P19).

<sup>87</sup> “(...) wenn Betroffene gekommen sind ohne Krankheitseinsicht, oder Angehörige gekommen sind, dann haben wir häufig mit den systemischen Therapeuten, (...) zusammengearbeitet, die eben die Internetabhängigkeit mehr auch als ein Symptom eines wenn man so will erkrankten Systems, also sich das System Familie oder Ehe angeschaut, geschaut haben, was können die Ehepartner oder die Eltern, die vielleicht alleine gekommen sind ohne den Betroffenen, verändern, damit derjenige selbst sich verändert und befähigt wird eine Krankheitseinsicht zu gewinnen.“ (P4).

<sup>88</sup> “(...) da kommt jetzt so der ökonomische Aspekt mit hinein. Es gibt Kernmodelle, die glaube ich auch im Bereich pathologischer Internetgebrauch Sinn machen. Die fangen mit der am wenigsten aufwendigen und am wenigsten invasiven

Therapieform an und gehen dann für diejenigen, die davon nicht hinreichend profitieren, in die komplexeren Therapieformen hinein. (...) Und insofern wäre natürlich die Wunschvorstellung (...) erstmal an die Komorbidität ran. Ich fürchte nur, das wird sich ökonomisch, sozial-ökonomisch, gesundheits-ökonomisch nicht durchsetzen.“ (P18).

<sup>89</sup> “[Süchte] sind in sehr vielen Bereichen vergleichbar. Also ob jemand substanzgebundene Sucht hat oder nicht substanzgebundene, immer ist ein Suchtverhalten da, um Defizite oder etwas zu kompensieren oder als Problemlösungsstrategie zu fungieren (...). Ein Mensch greift ja auch nach einem Suchtmittel oftmals als eine Art Krücke. Und je nachdem in welchem Bereich jemand diese Krücke benötigt, in diese Richtung geht dann oft die Wahl des Suchtmittels, d.h. das ist jetzt einfach (...) bei dem Internet ganz, ganz ähnlich. Es gibt ja auch eine Vielzahl von Angeboten und Möglichkeiten sozusagen in ein Suchtverhalten hineinzurutschen. (...) das Suchtverhalten ist eine Art Krücke und das Bild einer Krücke ist natürlich, dass dann sozusagen jemand ein weiteres Bein hat. Wenn jemand schwach ist, dann nimmt er eine Krücke und das Bein wird immer schwächer, und dann wird die Krücke immer mehr gebraucht. Dann kommt die Sucht. Und es gibt ganz unterschiedliche Krücken für ganz unterschiedliche Defizite und (...) unterschiedliche Suchtformen und auch unterschiedliche Angebote im Internet.“ (P3).

<sup>90</sup> “Wenn ich die exzessiven Onliner vergleiche mit denen, die mit dem Trinken Problemen ausweichen, dann find' ich da schon Parallelen (...). Jemand, der sozusagen so ein klassischer Problemtrinker ist, der eigentlich ein Selbstwertproblem hat, dem kann es dann natürlich gelingen, durch sein Trinken irgendwie so ein Gefühl zu haben, dass er eigentlich doch viel besser ist, also eine eigene Grandiosität anstoßen um dann eben in so einer etwas traulicheren harmonischeren Welt zu leben, indem er eben alkoholisiert ist, und davon gibt es schon auch was in diesen Onlinewelten. Man kommt dann in so eine Szene, da kennt man die Regeln genau. Da weiß man genau, was passiert. (...) Und man kann abtauchen in diese andere Welt. (...) Und meines Erachtens gibt's da phänomenologisch schon Parallelen.” (P2).

<sup>91</sup> “(...) wo ich sehr große Parallelen sehe, ist die Persönlichkeitsstruktur, also der mangelnde Selbstwert, das Wegdrücken mittels des Suchtmittels von schlechten Empfindungen, von negativen Emotionen, oft auch eine ziemlich deutliche Gereiztheit, eine praktisch aggressive Haltung (...). Dazu sicherlich rigide Muster, die in beiden Suchtverhalten sehr deutlich auftreten.“ (P11).

<sup>92</sup> “Im Endeffekt sind sie von der Biochemie, von der psychopharmakologischen Reaktion (...) im Transmittersystem her gleich. Es geht um's Belohnungssystem. Es geht um's dopaminäre System und das weiß man heute (...) auch Dank neuer bildgebender Verfahren, dass dieselben Areale im Gehirn betroffen sind, mesokortisch, limbisches System usw. (...) immerhin wissen wir, dass da Parallelitäten durchaus da sind. D.h. man weiß das aus diesen Versuchen mit Patienten, die mal alkoholkrank waren und denen man dann halt im funktionellen Magnetresonanztomographieautomaten halt Reizbilder hinhält, die dann dieselben Muster aufweisen wie bei Glücksspielsüchtigen oder Internetsüchtigen.“ (P9).

<sup>93</sup> “Wenn ich's vergleichen würde, (...) es gibt mittlerweile auch eine Menge Jungs, auch wieder mehr Jungs als Mädchen, die z.B. schon vor der Pubertät Cannabis konsumieren und da treten ähnliche Phänomene auf, wie bei Internetsucht, nämlich dass halt viele Lebensbereiche (...) auf der Strecke bleiben, also die schulische Leistung sinkt ab. Die schaffen es halt gerade noch oder fliegen raus und oft (...) gibt's dann eine sogenannte Komorbidität, also dass beides vorhanden ist. Also die Jungs hocken viel bekifft rum, und sie hocken viel vor dem Computer. (...) Es sind halt zwei Süchte, die mit einem hohen (...) persönlichen Gewinn sozusagen ausgestattet sind, sonst würden es die Jugendlichen nicht machen. Also Cannabis konsumieren ist für die ein hoher persönlicher Gewinn. Der Zustand und das im Kreise der Kumpels zu tun ist etwas Positives, und dasselbe gilt für im Kreise der Kumpels oder allein zocken.“ (P5).

<sup>94</sup> “Für mich ist Sucht immer ein Ausdruck von Schwäche, von persönlicher Schwäche, und es ist ein dysfunktionaler Versuch, persönliche Schwäche irgendwie zu kompensieren, weiterzukommen.“ (P5).

<sup>95</sup> “Es kann auch hier natürlich ein Symptomwechsel stattfinden von einer stoffungebundenen Phase, die man vielleicht während der Schulzeit gut realisieren kann, zu einer dann eher stoffgebundenen Phase, die vielleicht dann mit dem Arbeitsleben oder dem Studium besser zu kombinieren ist. Und das ist dann einfach die (...) Frage, ob sich hier jugendtümliche Suchtverhaltensweisen überlagern, wo diese Trennung von stoffgebunden und –ungebunden für den Einzelpatienten ja dann auch gar nicht mehr so wichtig ist.“ (P6).

<sup>96</sup> “Ich glaube, da kommt noch eine biologische Dimension dazu, denn die Droge macht doch mehr im sogenannten Rewardsystem, im Suchtgedächtnis, als es der pathologische Internetgebrauch tut weil die psychotrope Substanz doch unmittelbar auf unterschiedliche Neurotransmittersysteme einwirkt und dann komplexe Regulationsmechanismen ins Rewardsystem verändert, wie wir es bei den stoffgebundenen Süchten sehen. Wir sehen zwar auch mit bildgebenden Verfahren bei pathologischen Internetgebrauch, dass da offenbar auch Prozesse im Rewardsystem ablaufen, aber aus meiner persönlichen Einschätzung heraus sind die nicht so tiefgreifend, und Veränderungen im Suchtsystem, im Rewardsystem, sind dann ja auch



sehr häufig für Rückfälle in die Sucht verantwortlich, und da sind die Eingriffe offenbar bei den stoffgebundenen Süchten dann gravierender.“ (P18).

<sup>97</sup> “Also da erleben die sich schon auch ziemlich unterschiedlich, denn bei den substanzgebundenen Störungen geht es ja ganz viel um Konsumbeschaffung, Konsumieren, Auswirkungen des Konsumierens, auch um den Peeraspekt, also das Konsumieren auch in der Gruppe von Gleichaltrigen. Und beim pathologischen Internetgebrauch ist es ja doch mehr eine ganz narzisstische Position, die die da einnehmen. Also ich will sagen, bei den Cannabiskonsumenten bleibt ja auch im fortgeschrittenen Suchtverlauf viel mehr an sozialer Kompetenz und sozialer Interaktionsfähigkeit und auch Bereitschaft, sich mit Gleichgesinnten auseinanderzusetzen, vorhanden, während bei dem pathologischen Internetgebrauch, dieses Stadium der schizoiden Isolierung, also der völlig narzisstischen Selbstwahrnehmung, ja relativ schnell im Vordergrund steht. Also da finden die glaube ich nicht so viele Parallelen in der Sucht, da unterscheiden sich die Gruppenverläufe.“ (P18).

<sup>98</sup> “Also ich denke, dass bei der substanzgebundenen Sucht der gravierende Unterschied ist, dass sie meistens sehr lange heimlich praktiziert wird, und das ist bei der Internetsucht gerade gar nicht der Fall, sondern es ist ja meistens nur relativ schnell auch auffällig im Familienverband, dass sie sich da aus allem rausnehmen, zurückziehen, vor der Mühle sitzen.“ (P11).

<sup>99</sup> “Es ist ja ein Phänomen, was ich total faszinierend finde, (...) dass die Nebenwirkungen von Parkinsonmitteln, also Dopaminagonisten, zu Verhaltenssüchten führen können. Da gibt’s ganz viele Fälle und auch Untersuchungen zu, aber es führt offensichtlich nicht zu stoffgebundenen Abhängigkeiten mit den Nebenwirkungen. Also es gibt Menschen, die kriegen Dopaminagonisten als Parkinsonpatienten und hatten nie mit Glücksspiel zu tun gehabt, und werden glücksspielabhängig. Wir hatten eine Patientin, die ist internetabhängig geworden durch so sein Medikament.“ (P4).

<sup>100</sup> “Sucht geht so um’s Leben. (...) Es geht so um das Leben vom Jetzt. Es geht so um das ganze Spektrum des menschlichen Lebens, auch natürlich um die Frage, wofür lebe ich (...). Das ist etwas ganz Besonderes bei der Suchterkrankung. Da geht es wirklich um ganz existentielle Dinge. (...) Umso umfassender muss auch Therapie sein.“ (P3).