



Development of an Instrument to Assess Expectations for the Use of Online Gaming, Social Networking Sites, and Online Pornography: the Marburg Internet Use Expectations (MINUS-X) Questionnaire

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Abstract

User's expectations contribute to the maintenance of problematic use of online gaming (OG), social networking (SN), and online pornography (OP). Since an instrument to assess use expectations across applications is lacking, this study aimed at developing and testing such a questionnaire. It consists of a general module (GM), which includes expectations relevant to all three applications, and three application-specific modules. A pilot and a validation study were conducted with 2880 German adults. We conducted item analyses, exploratory factor analyses (EFA), exploratory structural equation modelling, and correlation analyses. The EFA revealed six factors for the GM and two factors for each specific module. The GM demonstrated measurement invariance between applications. The instrument showed excellent psychometric properties, indicating its suitability for assessing expectations concerning the use of OG, SN, and OG reliably and validly. It could be helpful for treating patients with problematic use of the applications and investigating the role of the relevant expectations.

Keywords Online gaming · Social networking sites · Online pornography · Questionnaire development · Expectations · Problematic use

Introduction

According to meta-analyses, approximately 6.0% of the worldwide population suffer from some type of excessive use of online media that is associated with problems such as sleep deprivation and conflicts with family members and in professional life

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(Alimoradi et al., 2019; Pan et al., 2020). In current research, excessive Internet use is conceptualized as a behavioral addiction specified by the Internet application used (Brand et al., 2016, 2019). Users are not addicted to the Internet per se, but to specific online *activities*, such as online gaming, online shopping, social networking sites, dating apps, or online pornography. Brand and colleagues advanced an integrated model of the development and maintenance of these specific subtypes of Internet addiction (IA). It is called the Interaction of Person-Affect-Cognition-Execution (I-PACE) model (Brand et al., 2014b, 2016, 2019). Problematic use can occur with all of these applications, but since most findings exist for the use of online gaming (OG), social networking sites (SNS), and online pornography (OP), we focus on these three in this study (Brand et al., 2014b, 2016, 2019; Davis, 2001; Griffiths, 2000; Widyanto & Griffiths, 2006).

Online Gaming

With 2.69 billion gamers worldwide, OG is a widespread leisure activity (Statista, 2021a). Studies suggest that motives like achievement, competition, socializing, escapism, immersion into the game, and recreation/entertainment are able to explain engagement in OG (Brandtner et al., 2022; Demetrovics et al., 2011; Melodia et al., 2022; Yee, 2006). Whereas unproblematic for the majority, for a small percentage of gamers OG can be associated with certain negative consequences, some of which have been identified as symptoms of problematic use (e.g., Király et al., 2014; Kuss et al., 2014; Torres-Rodríguez et al., 2018). Problematic use of OG is included as a diagnosis in both ICD-11 (World Health Organization, 2019) and DSM-5-TR (as a condition for further study; APA, 2022). According to the American Psychiatric Association, Internet gaming disorder (IGD) is characterized by the presence of five of the following symptoms within the last 12 months and related suffering or impairment: (1) preoccupation with games; (2) withdrawal symptoms when gaming is taken away; (3) tolerance, resulting in the need to spend increasing amounts of time engaged in games; (4) unsuccessful attempts to control participation; (5) loss of interest in previous hobbies and entertainment as a result; (6) continued excessive use despite experience of psychosocial problems; (7) deceiving others regarding the amount of gaming; (8) use of games to escape negative moods; and (9) jeopardizing or losing a significant relationship, job, or education/career opportunity because of participation in games. A recent meta-analysis using these criteria found that the global prevalence of problematic OG use is 3.05% (Stevens et al., 2020).

Social Networking

In 2020, over 4 billion people were active SNS users (Statista, 2021b). Again, for most people this is solely a recreational activity, mostly satisfying motives such as enjoyment, entertainment, mood regulation, managing relationships (social/long-distance/romantic) and events, being and keeping others informed, and showing conformity with peers (Pertegal et al., 2019; Shin & Lim, 2017; Tosun, 2012). However, for some, it can result in over-engagement in time and effort to the detriment of other activities, interpersonal relationships, studies/employment, and general well-being

(Andreassen & Pallesen, 2014). Problematic use of SNS resembles that of OG, however, is not a recognized diagnosis and with official criteria, resulting in diverging prevalence estimates from 1.6 to 34% (Andreassen, 2015; Bányai et al., 2017; Kuss & Griffiths, 2017). In a large-scale multicentric study with a representative sample of 222,532 11- to 15-year-olds from 44 countries, the prevalence was 7.6% (Boer et al., 2022).

Online Pornography

OP is online material that aims at creating or enhancing sexual feelings in the recipient and contains explicit descriptions or depictions of genitals and sexual acts (Hald & Malamuth, 2008). Its use is one of the most popular Internet activities (Short et al., 2012), since it often is used to satisfy curiosity about sexuality-related content and fantasies, for mood regulation, distraction, and relaxation, to reach sexual arousal and satisfaction, as well as to improve real-life sexual techniques and relationships—within a context of anonymity and affordability (Albright, 2008; Bőthe et al., 2021; Castro-Calvo et al., 2018; Cooper et al., 2003; Goodson et al., 2000; Paul & Shim, 2008; Reid et al., 2011). As with OG and SNS, the consumption is unproblematic for most users, but for a minority, it can become excessive, displaying criteria of addiction comparable to those in OG, as well as specific negative consequences like impaired real-life sexual satisfaction and relationships, pressure to perform, meet a standard of beauty and gender stereotypes as displayed in OP (Albright, 2008; Cooper et al., 2003; Duffy et al., 2016; Hald & Malamuth, 2008; Wéry & Billieux, 2017). The exact conceptualization of excessive OP use is still controversial, resulting in differing assessment tools and a broad range of prevalence rates from 0.7 to 9.8% (Ballster-Arnal et al., 2017; Bőthe et al., 2018; Najavits et al., 2014; Ross et al., 2012). In a nationally representative sample of Australian adults, prevalence rates of 1.2% for women and 4.4% for men were reported (Rissel et al., 2017).

Expectations and Internet Addiction

The I-PACE model acknowledges that expectations play a significant role in the development and maintenance of Internet-related disorders (Brand et al., 2016). Expectations are future-directed cognitions that express “if-then” regularities that focus on the occurrence of particular types of events (Craske et al., 2014; Kirsch, 1997; Kube et al., 2016; Montgomery & Kirsch, 1997; Seligman et al., 2013; Stewart-Williams & Podd, 2004) and serve to guide human behavior. If a person experienced repeatedly that engaging in Internet activities satisfies their needs or motives, they may form expectations regarding future fulfilment of these motives by using the Internet again, e.g., “I use the Internet ... to gain positive emotions.” or “... to distract from problems” (Brand et al., 2014a, p. 5). Positive and negative reinforcement may further strengthen the expectations (Brand et al., 2016). The addictive behavior will then be regarded as the most efficient means to gain gratification or reduce negative feelings and thereby encourage an inflexible and habitual use of Internet applications as a (dysfunctional) coping strategy (Brand et al., 2014a, 2019; Laier et al., 2018).

Expectations become an important component in vicious circles contributing to the maintenance of behavioral addictions related to the Internet and use of more functional coping strategies diminishes (Brand et al., 2014a; Laier et al., 2018). However, in contrast to many other risk factors, expectations can be modified by means of therapy (Brand et al., 2016; Rief & Glombiewski, 2016). The clinical importance of exploring and if necessary, modifying patients' expectations, has been emphasized with regard to a wide range of mental disorders (Bandura, 1977; Beck & Haigh, 2014; Casale et al., 2016; Kube et al., 2016; Rief et al., 2015; Seligman et al., 2013; Spada et al., 2015). Various mostly Likert-style questionnaires for the assessment of Internet-related cognitions have already been introduced, e.g., the Generalized Problematic Internet Use Scale 2 by Caplan (2010) or the Online Cognition Scale by Davis et al. (2002) and their application-specific adaptations (e.g., Komnenić et al., 2015), as well as the Sex and the Internet Survey Instrument (Goodson et al., 2000). However, these inventories also include other constructs such as attitudes towards the Internet and pornography, e.g., "How important is it to you that other people have a way of learning about sexuality-related topics using the Internet?" (Goodson et al., 2000, p. 134). Previous scales that only measure expectations, such as the Positive/Negative Outcome Expectancy of Internet Use Questionnaire (P/NOEIUQ; Lin et al., 2008), the Refusal Self-Efficacy of Internet Use Questionnaire (RSEIUQ; Lin et al., 2008), the Internet Use Expectancies Scale (IUES; Brand et al., 2014a), the Internet Self-Efficacy Scale (Eastin & La Rose, 2000), the Metacognitions about Online Gaming Scale (MOGS; Spada & Caselli, 2015), or the Positive Outcome Expectancy of Internet Gaming Questionnaire (POEIGQ; Wu et al., 2016), tend to display only very specific scales of expectations, e.g., positive reinforcement and negative reinforcement (Brand et al., 2014a) or Internet self-efficacy (Eastin & La Rose, 2000). In the field of social networking sites and online pornography, exclusive measurements of expectations are entirely missing. Therefore, in order to assess, compare, and modify expectations regarding the use of the Internet, a comprehensive instrument of expectations applicable to the three major areas and general Internet use is needed.

Aims of the Present Study

The listed instruments have been developed to assess only specific types of expectations about general Internet use and individual Internet applications (e.g., Eastin & LaRose, 2000; Lin et al., 2008; Spada & Caselli, 2015). However, a comprehensive instrument capable of measuring expectations related to the most common types of specific applications that can assess commonalities and differences is lacking. Theoretical models as well as first research suggest that common expectations may include expectations related to avoidance of unpleasant other activities (e.g., procrastination), which may be subject to mechanisms of negative reinforcement, whereas application-specific expectations may often be related to features of the specific application's content that are experienced as rewarding by the users (e.g., achievement in gaming, sexual gratification in online pornography) (Brand et al., 2016). The lack of an instrument capable of assessing these expectations in a uniform manner impedes research into the cognitive factors related to the excessive use of online pornography, social networking, and online gaming. The present study aims to introduce a modular questionnaire that measures expectations relevant across the main Internet applications (OG, SNS, and OP) as well as expectations specific to each of them.

Methods

Questionnaire Development

a) *Item Generation*

A broad pool of items was deductively generated based on theoretical considerations and empirical findings. For this purpose, we first examined literature that focuses on expectations and Internet applications (see Introduction). Existing questionnaires on expectations and similar constructs such as cognition and motivation in problematic Internet use (including OG, SNS, and OP) were also inspected (e.g., Caplan, 2010; Davis et al., 2002; Demetrovics et al., 2011; King & Delfabbro, 2016; Komnenić et al., 2015; Spada & Caselli, 2015), as well as questionnaires dealing with experienced past-time effects of Internet-related activities (Hald & Malamuth, 2008). Further sources for items were discussions with users of the respective applications and reading relevant forum postings to generate items from user content we observed in the real world not subject to social desirability or research-consciousness of the informants. This pool contained various types of expectations that people associate with the use of OG, SNS, and OP.

b) *Item Formulation*

The items were formulated in accordance with recommendations for questionnaire construction (Bühner, 2011).

c) *Review of the Items*

In a next step, we examined which expectations could potentially be relevant for all three Internet applications and which are relevant only for a specific application. The former were conceptualized as general expectations, and the latter as application-specific expectations (for a schematic illustration, see Fig. 1). We then removed ambiguous, less relevant, or redundant items.

d) *Preliminary Selection of Items*

In order to avoid ceiling effects and to increase the questionnaire's ability to differentiate in the clinical setting, we also removed items that might be regarded as trivial and would probably have been highly endorsed by all participants (e.g., "If I use social networking sites, I can communicate with my friends"). Instead, we focused on items that are likely to be endorsed selectively by fewer users (e.g., "If I play online games, I am liked more than anywhere else in life"). The preliminary item pool for the questionnaire consisted of 82 general and 90 application-specific expectations (OG = 31; SNS = 21; OP = 38).

e) *Rating Scale*

The participants rated their agreement with the expectation expressed in each item on a six-point scale from "do not agree at all" (1) to "agree completely" (6). The six point scale was chosen due to its psychometric properties and the absence of a neutral midpoint (Bühner, 2011).

f) *Pilot Study*

A pilot study was conducted with an online sample of OG, SNS, and OP users. Participants were recruited via university mailing lists, general and application-specific forums (e.g., Reddit), and SNS (e.g., Facebook). A total of 966 participants (52.7% male, mean age 27.6 ± 9.2 years) completed the pilot questionnaire. The majority of participants reported using mainly SNS ($n = 517$), followed by OG ($n = 340$) and OP ($n = 109$).

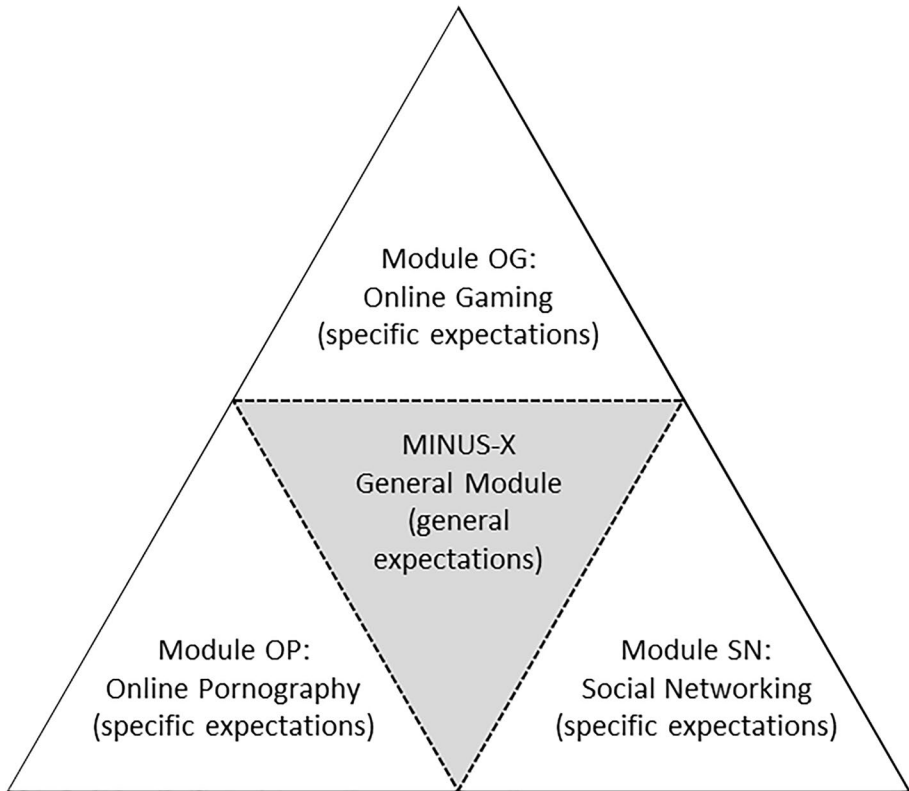


Fig. 1 Structure of the MINUS-X. The general module comprises 26 general use expectations and combines with each of the modules for online gaming (14 specific expectations), social networking (15 specific expectations), and online pornography (12 specific expectations) to form three expectation questionnaires: for online gaming, the MINUS-XOG (26 + 14 = 40 items); for social networking, the MINUS-XSN (26 + 15 = 41 items), and for online pornography, the MINUS-XOP (26 + 12 = 38 items)

g) *Final Item Selection*

Items for the final questionnaire were selected on the basis of analyses of the distribution of missing answers, item difficulty and participant comments, exploratory factor analyses (EFAs), and reliability analyses. Items were excluded in an iterative process if they showed unsatisfactory item characteristics. The final version of the questionnaire consisted of 26 general and 41 application-specific expectations (module OG = 14; module SN = 15; module OP = 12; see SDC 1). The instrument was named the *Marburg Internet Use eXpectations (MINUS-X) Questionnaire*.

Participants and Procedure

Participants were recruited via university mailing lists, Internet discussion boards, and SNS. The University's local ethics committee approved the study. All participants received complete study information and provided informed consent before they were able to

access the online survey. Participation requirements were a minimum age of 18 years, being a native German speaker, and regular use of OG, SNS, or OP (self-evaluated by the participants).

After their informed consent, participants provided sociodemographic information and selected which application (OG, SNS, or OP) they mainly used. They were then redirected to the corresponding version of the MINUS-X. Afterwards, participants completed further questionnaires on expectations and usage behavior.

In total, 3792 participants (29 ± 10.7 years; 61.6% male) fulfilled the inclusion criteria, their choice of preferred application resulted in three subsamples: OG: $n = 1015$, SNS: $n = 805$, and OP: $n = 1972$ participants. Participants who had not completed the MINUS-X or the Internet Gaming Disorder Questionnaire (IGDQ) or who had provided unreliable information were excluded from the analysis (see Flowchart in Fig. 2).

To increase the statistical comparability of the respective samples and to prevent any subsample from exerting an undue influence on the analyses, the subsamples were adjusted for size. As the SNS subsample was the smallest, the other subsamples were reduced with random sampling to $n = 638$ each. The cumulative sample thus comprised a total of 1914 participants.

Measures

Sociodemographic Information and Usage Behavior

We collected information about age, gender, education, employment and relationship status, Internet use (hours/typical week and session length), which SNS/OP sites the participant mostly uses, which games they play, and how long they use SNSs, OG, or OP (hours/typical week).

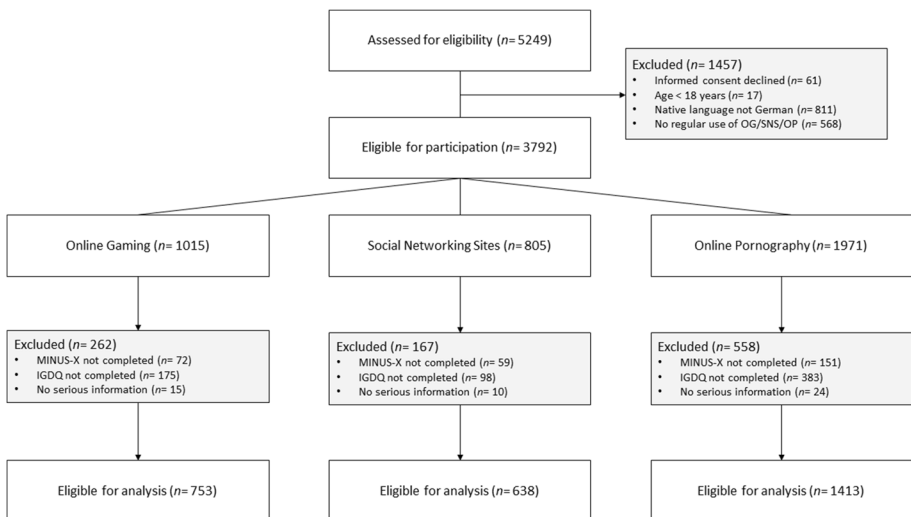


Fig. 2 Flowchart of study participants

MINUS-X

The MINUS-X is designed to capture a wide range of expectations for OG, SNS, and OP use. The questionnaire has a modular structure and consists of a general module and three specific modules (OG, SN, OP). The general module includes expectations that are potentially relevant for all three applications, whereas the expectations in the specific modules are relevant for the use of the specific application. All items are answered on a six-point Likert scale from 1 (=“do not agree at all”) to 6 (=“agree completely”). The psychometric properties of the questionnaire are reported in the results sections.

Internet Use Expectancies Scale

The Internet Use Expectancies Scale (IUES) (Brand et al., 2014a) assesses core motives for Internet use with eight items, which are assigned to two subscales: positive expectations (four items, for example: “I use the Internet to experience pleasure”) and avoidance expectations (four items, for example: “I use the Internet to distract from problems”). Respondents express their agreement on a six-point rating scale (1 = “completely disagree” to 6 = “totally agree”). In the present study, the internal consistencies of the subscales were good with $\omega = 0.86$ (positive expectations) and $\omega = 0.81$ (avoidance expectations).

Internet Gaming Disorder Questionnaire and Versions Adapted for SNS and OP Use

The German version of the Internet Gaming Disorder Questionnaire (IGDQ) and validated versions adapted to SNS and OP use were employed to whether participants showed problematic use of OG, SNS, or OP (Jeromin et al., 2016; Mennig et al., 2020; Petry et al., 2014). The IGDQ comprises nine items corresponding to the DSM-5 criteria for IGD with a dichotomous answer format of “no” (0) and “yes” (1). The total score is the sum of responses (score range: 0–9). A score of ≥ 5 indicates problematic use. In the present study, the internal consistencies of the questionnaires were good to excellent with $\omega_{ordinal} = 0.87$ (OG), $\omega_{ordinal} = 0.90$ (SNS), and $\omega_{ordinal} = 0.89$ (OP).

Short Internet Addiction Test

The German version of the Short Internet Addiction Test (sIAT) (Pawlikowski et al., 2013) is a short version (12 items) of the Internet Addiction Test (Young, 1998) that comprises two factors: loss of control/time management (e.g., “How often do you find that you stay on-line longer than you intended?”, p. 1215) and craving/social problems (e.g., “How often do you feel depressed, moody, or nervous when you are off-line, which goes away once you are back on-line?”, p. 1215). The items were adapted to the use of OG, SNS, and OP and reformulated accordingly (e.g., “How often do you try to cut down the amount of time you spend watching online pornography and fail?”). Participants rate the frequency on a five-point rating scale (1 = “never “ to 5 = “very often”). A higher overall score indicates a greater level of problematic use. The internal consistencies of the adapted scales were good to excellent with $\omega = 0.85$ (OG), $\omega = 0.88$ (SNS), and $\omega = 0.90$ (OP).

Statistical Analyses

Analyses were performed using R version 4.0.4 (R Core Team, 2020) and JASP version 0.14.1 (JASP Team, 2020).

Item Analyses

Standard item analyses were conducted and item means, standard deviations, item difficulties, average inter-item-correlation, and item-total correlations were calculated for the general module as well as the application-specific modules.

Validity

Factor Structure The factor structure was examined by conducting exploratory factors analyses (EFAs) and exploratory structural equation modelling (ESEM; Asparouhov & Muthén, 2009; Marsh et al., 2014). The samples (OG, SNS, and OP) were randomly divided into two subsamples of $n=319$ and the EFAs were conducted with the subsamples OG1, SNS1, and OP1 and the ESEMs with OG2, SNS2, and OP2. To compare the subsamples with respect to key variables (age, problematic use, MINUS-X score), independent t tests were calculated. EFAs for the general expectations were performed for the pooled sample ($OG1 \cup SNS1 \cup OP1 = 957$), and the specific expectations were analyzed in separate EFAs for each specific sample (OG1, SNS1, OP1, each $n=319$). To ascertain the suitability of the data for EFA, the Kaiser–Meyer–Olkin (KMO) criterion and Bartlett’s test were conducted. The number of factors to be extracted was determined by using parallel analysis (Horn, 1965). Extraction was performed by maximum likelihood estimation with oblique rotation (Promax with the Kaiser normalization).

To validate the results of the EFA, ESEM models with the subsamples OG2, SNS2, and OP2 were calculated. ESEM is a novel approach that is less restrictive than traditional confirmatory factor analyses (Asparouhov & Muthén, 2009; Marsh et al., 2014). In general, ESEM leads to an improved model fit and deflated interfactor correlations, which increases the discriminant validity of the factors and better represents the data (Arens & Morin, 2016; Marsh et al., 2014; Tóth-Király et al., 2017). To assess the model’s goodness-of-fit, the following cut-off criteria were used: comparative fit index (CFI) > 0.90, Tucker-Lewis Index (TLI) > 0.90, and root mean square error of approximation (RMSEA) < 0.08 (Hu & Bentler, 1999).

Measurement Invariance For the general module, measurement invariance was evaluated to ensure that the same construct is being assessed across all three different groups by computing groupwise ESEMs between all three groups following the guidelines of Vandenberg and Lance (2000), Cheung and Rensvold (2002), and Chen (2007). Tests for factorial invariance were completed in a hierarchical order by applying an initial analysis, in which the only invariance constraint was that all groups exhibit the same free and fixed loadings (configural invariance). In a second step, factor loadings were restricted (metric invariance), followed by item intercepts (scalar invariance), and finally residual variances (strict invariance). For the stepwise comparisons, differences in CFI and RMSEA values were examined. An increase in CFI of 0.01 or less (Cheung & Rensvold, 2002) and a decrease in RMSEA of

0.015 or less (Chen, 2007) between a model and the previous model in the invariance hierarchy indicate that the null hypothesis (measurement invariance exists) cannot be rejected.

Convergent Validity In order to assess convergent validity, we examined correlations between individual subscales of the MINUS-X and the IUES (Brand et al., 2014a), since certain scales and their items show conceptual overlap, e.g., MINUS-X *positive usage expectations* (“then this is the place where I feel best”) and IUES *positive expectancies* (“to experience pleasure”), as well as MINUS-X *escapism* (“then I lose myself in it so much that I disconnect from reality”) and IUES *avoidance expectancies* (“to escape from reality”).

Internal Consistency

Internal consistencies were calculated with coefficient omega or ordinal omega (in case of binominal data). The omega coefficients are more accurate alternatives to Cronbach’s alpha (Gadermann et al., 2012; Peters, 2014).

Associations with Problematic Use

Theoretical and empirical findings assume certain expectations to be associated with problematic use, by promoting Internet applications for mood regulation, thereby facilitating loss of control and craving. Thus, Pearson correlations of individual MINUS-X scales with the sIAT were calculated as an indicator of criterion validity. Furthermore, we classified users with the IGDQ (cutoff ≥ 5 points) in problematic and non-problematic users and compared their MINUS-X scores with independent *t* tests (in the case of unequal variances: Welch’s *t* tests), reporting Hedges’ *g* as a measure of effect size; effects of $g = 0.20$ are regarded as small, $g = 0.50$ as medium, and $g = 0.80$ as large.

Results

Sample Characteristics

Table 1 displays the characteristics of the three samples.

Item Analysis

General Module

The results of the item analysis for the general expectations are displayed in Table 2.1 in Supplementary Materials (SDC 2). In terms of item endorsement, item 21 was the least endorsed (i.e., most difficult) with $p_i = 0.22$ and item 3 the most endorsed ($p_i = 0.60$). The mean item difficulty was $p_i = 0.37$ and the inter-item-correlation for the whole scale was $r = 0.34$. The item-total correlations ranged from $r_{itc} = 0.26$ (item 1) to $r_{itc} = 0.72$ (item 20), with a mean of $r_{itc} = 0.56$.

Table 1 Characteristics of the three samples

	<i>OG sample (n=638)</i>		<i>SNS sample (n=638)</i>		<i>OP sample (n=638)</i>	
	M	SD	M	SD	M	SD
Age (years)	27.0	8.1	25.7	8.4	31.4	12.1
Internet time in a typical week (h)	29.6	17.7	20.7	13.9	22.7	15.7
Duration of a typical Internet session (h)	3.3	3.3	1.9	3.4	2.5	4.3
OG/SNS/OP use in a typical week (h)	15.2	13.8	9.3	10.2	3.5	6.3
IGDQ/SNSDQ/OPDQ score	1.9	1.90	1.2	1.5	1.5	1.8
sIAT score	27.2	7.6	23.6	7.3	21.5	8.1
BSI GSI	0.47	0.49	0.48	0.50	0.51	0.54
MINUS-X score	113	34.4	89.4	27.4	89.4	29.7
	<i>Men*</i>	<i>Women</i>	<i>Men</i>	<i>Women</i>	<i>Men</i>	<i>Women</i>
Sex	453	181	139	492	463	166

* *Note.* *OG*, online gaming: $n=4$; *SNS*, social networking sites: $n=7$; *OP*, online pornography $n=9$ preferred not to specify their sex. *OG*, online gaming; *SNS*, social networking sites; *OP*, online pornography; *IGDQ*, Internet Gaming Disorder Questionnaire; *SNSDQ*, Internet Gaming Disorder Questionnaire adapted to SNS; *OPDQ*, Internet Gaming Disorder Questionnaire adapted to OP; *sIAT*, short Internet Addiction Test, adapted to OG, SNS, OP; *BSI GSI*, Brief Symptom Inventory, Global Symptom Index

Application-Specific Items

The results of the item analysis for the application-specific items are presented in Table 2.2 in Supplementary Materials (SDC 2). For the OG module, item 13 had the lowest endorsement ($p_i = 0.22$) and item 1 the highest ($p_i = 0.65$). The mean item difficulty was $p_i = 0.43$ and the inter-item-correlation $r = 0.34$. The item-total correlations ranged between $r_{itc} = 0.39$ (items 12 and 13) and $r_{itc} = 0.64$ (items 5 and 14), with a mean item-total correlation of $r_{itc} = 0.54$.

Within the SNS module, item 5 was the least ($p_i = 0.22$) and item 1 ($p_i = 0.54$) the most endorsed. The mean item difficulty was $p_i = 0.35$ and the inter-item-correlation $r = 0.34$. Item-total correlations ranged from $r_{itc} = 0.22$ (item 5) to $r_{itc} = 0.71$ (item 3), with a mean item-total correlation of $r_{itc} = 0.55$.

For the OP module, the mean item difficulty was $p_i = 0.44$, with item 7 being the least ($p_i = 0.28$) and item 11 the most endorsed ($p_i = 0.58$). The inter-item-correlation was $r = 0.28$. The item-total correlations ranged between $r_{itc} = 0.28$ (item 3) and $r_{itc} = 0.62$ (item 10), with a mean item-total correlation of $r_{itc} = 0.48$.

Factor Structure

Exploratory Factor Analysis

General Module Bartlett's test ($X^2 = 13,317$, $df = 325$, $p < 0.001$) and the KMO criterion (0.94) indicated that the data were suitable for an EFA. Parallel analysis suggested the extraction of six factors. The results of the exploratory factor analysis for the 26 general

Table 2 Results of the exploratory factor analysis for the general expectations that comprise MINUS-X: factor loadings and percentage of variance explained ($n = 957$; $n = 319$ for each application)

Number	Item	Factor 1 ^a PR	Factor 2 ^b ER	Factor 3 ^c SR	Factor 4 ^d ES	Factor 5 ^e PUE	Factor 6 ^f SA
12	Then I avoid annoying chores	0.94					
8	Then I can put off unpleasant chores	0.94					
3	Then it keeps me from doing other important things	0.76					
18	Then it distracts me from everyday demands	0.68					
22	Then I use it longer than intended	0.50					
15	Then it helps me to get over unpleasant feelings		0.83				
20	Then I am less sad		0.81				
16	Then it easier for me to endure unpleasant situations		0.62				
25	Then I am less angry		0.59				
11	Then it distracts me from being alone		0.54				
26	Then I am superior to others			0.98			
17	Then I am powerful			0.83			
4	Then I become better than others			0.67			
5	Then I am strong			0.50			
19	Then I can be another person than in real life			0.34			
21	Then that is the only place where I can be proud of myself				0.80		
23	Then I think less about not wanting to live like this anymore				0.59		
14	Then life seems less pointless to me				0.59		
24	Then I lose myself in it so much that I disconnect from reality				0.39		
9	Then I will lose contact with my friends and family				0.32		
6	Then this is the place where I feel best					0.82	
7	Then I can relax best					0.79	
13	Then it gives me more than other things in my life					0.49	
10	Then I am less shy						0.56
2	Then I am less afraid						0.50

Table 2 (continued)

Number	Item	Factor 1 ^a PR	Factor 2 ^b ER	Factor 3 ^c SR	Factor 4 ^d ES	Factor 5 ^e PUE	Factor 6 ^f SA
1	Then I can make sure I don't miss anything						0.49

Note. Factor loadings < 0.30 are not displayed

Items completed the sentence: "If I use OG/SNS/OP ..."

^aPR, Procrastination: explained variance = 12.09%

^bER, Emotion regulation: explained variance = 12.28%

^cSR, Self-esteem regulation: explained variance = 10.50%

^dES: Escapism: explained variance = 8.90%

^ePUE, Positive usage expectations: explained variance = 7.26%

^fSA, Social anxiety: explained variance = 4.34%; total variance explained = 54.40%

expectations of the MINUS-X within the subsamples OG 1, SNS 1, and OP 1 are presented in Table 2. The extracted factors explained 55.4% of the variance with factor loadings ranging from 0.34 (item 19) to 0.98 (item 26). No item showed any cross loadings > 0.30 . Factor 1 expressed expectations using OG, SNS, or OP for procrastination (procrastination). The second factor included expectations about regulating unpleasant emotional states with the help of OG, SNS, or OP (emotion regulation). Factor 3 comprised expectations associated with an increase in self-esteem (self-esteem regulation). Factor 4 included expectations aimed at escaping reality by using OG, SNS, or OP (escapism). Factor 5 referred to expectations anticipating a positive outcome of the OG, SNS or OP usage (positive usage expectations). Factor 6 encompassed expectations that when using OG, SNS, or OP, less social anxiety will be experienced (social anxiety).

Application-Specific Items For the OG subsample, Bartlett's test ($X^2 = 1740$, $df = 91$, $p < 0.001$) and the KMO criterion (0.89) indicated that the data were suitable for an EFA. Parallel analysis recommended the extraction of two factors. The extracted factors explained together 45.60% of the variance. The factor loadings ranged between 0.54 (item OG 2) and 0.84 (item OG 10) without any cross loadings > 0.30 . The factors were named "superior reality" (factor 1) and "achievement" (factor 2). For details, see Table 3.

For the SNS subsample, Bartlett's test ($X^2 = 1635$, $df = 66$, $p < 0.001$) and the KMO criterion (0.88) indicated that the data were suitable for an EFA. Parallel analysis recommended the extraction of four factors. Since there were cross and null loadings for the four-factor solution, the respective items were removed (SN4, SN5, and SN6). In the subsequent EFA, two factors were extracted, which explained 48.10% of the variance. The factor loadings ranged from 0.38 (item SN 7) to 0.96 (item SN 15). There were no double loadings > 0.30 . Factor 1 was named "impression management" and factor 2 "social facilitation." For details, see Table 3.

For the OP subsample, Bartlett's test ($X^2 = 1327$, $df = 66$, $p < 0.001$) and the KMO criterion (0.85) indicated suitability for an EFA. Parallel analysis suggested the extraction of two factors. The two extracted factors explained 43.50% of the variance. Factor loadings ranged between 0.37 (item OP 5) and 0.83 (item OP 11). There were no cross loadings > 0.30 . The factors were called "sexual knowledge" (factor 1) and "sexual satisfaction" (factor 2). For details, see Table 3.

Exploratory Structural Equation Models

The ESEM analyses showed an excellent fit for the general module (RMSEA = 0.053) and a good fit for the individual modules OG, SN, and OP ($0.076 \leq \text{RMSEA} \leq 0.080$). See Table 4 for a summary of all fit indices.

Measurement Invariance

In order to test whether the general module MINUS-X measures the same construct in all three samples (OG, SNS, OP), we calculated the measurement invariance for MINUS-X. The configural model (model 1) was tested without specifying any constraints. We considered the fit of the model to be acceptable (CFI = 0.95, RMSEA = 0.063). Next, the model testing weak invariance was examined by constraining factor loadings to be equal across groups (model 2). The model fit was acceptable: CFI = 0.93, RMSEA = 0.061. In

Table 3 Results of the exploratory factor analysis for all three models: factor loadings and percentage of variance explained ($n = 319$)

Number	Item	Factor 1 ^a Superior reality	Factor 2 ^b Achievement
OG 10	Then I am liked more than elsewhere in my life	0.84	
OG 5	Then I can make sure I am accepted	0.75	
OG 11	Then I do it to be accepted by others	0.68	
OG 6	Then I can stand my ground	0.64	
OG 8	Then what others say about me influences how I see myself	0.62	
OG 13	Then I no longer know who I actually am	0.60	
OG 2	Then I can achieve more than elsewhere in my life	0.54	
OG 7	Then I will win if I just try often enough		0.73
OG 9	Then I will win over my enemies		0.70
OG 1	Then I don't give up before I have succeeded in something		0.66
OG 4	Then I only stop when I reached the next goal		0.64
OG 14	Then I can be the best one		0.60
OG 3	Then I have to make up for a defeat at any cost		0.60
OG 12	Then I will certainly play the game to its end		0.60
SN 2	Then I feel pressure to look good, be successful or popular		
SN 11	Then I worry more about what others think of me	0.82	
SN 12	Then what others say about me influences how I see myself	0.81	
SN 3	Then I present myself as I would like to be	0.75	
SN 1	Then I can influence the impression others have of me	0.71	
SN 14	Then I will be more popular	0.53	
SN 10	Then it is easier for me to defend a different opinion	0.49	
SN 15	Then it is easier for me to make contacts	0.39	
SN 13	Then it is easier for me to make new friends		0.96
			0.93

Table 3 (continued)

Number	Item		
SN 8	Then I can assert myself better		0.64
SN 9	Then I say things, that I would not say in real life		0.43
SN 7	Then it is easier for me to argue with others		0.38
		Factor 1 ^e	Factor 2 ^f
OP 11	Then I learn new sexual practices	Sexual knowledge	Sexual satisfaction
OP 10	Then I can satisfy my (current or potential) partner better	0.83	
OP 6	Then I will learn what my (current or potential) partners might be into	0.81	
OP 9	Then I learn what others do during sex	0.78	
OP 12	Then I can communicate better when it comes to sex	0.75	
OP 2	Then my sex life will improve	0.66	
OP 7	Then it gives me more satisfaction than sex with a real partner	0.48	0.74
OP 8	Then it is more exciting than the reality		0.73
OP 1	Then that is the best way for me to feel sexually aroused		0.57
OP 4	Then this is easier for me than sex with a real partner		0.50
OP 3	Then I feel less desire for sex with real partners		0.49
OP 5	Then I find it easier than entering into sexual relationships in real life		0.37

Note. Factor loadings <0.30 are not displayed

Items completed the sentence: "If I play online..." / "If I use social networking sites..." / "If I watch online pornography..."

^aSuperior reality: explained variance = 23.70%; cumulative explained variance = 23.70%

^bAchievement: explained variance = 21.90%; cumulative explained variance = 45.60%

^cImpression management: explained variance = 25.80%; cumulative explained variance = 25.80%

^dSocial facilitation: explained variance = 22.30%; cumulative explained variance = 48.10%

^eSexual knowledge: explained variance = 26.50%; cumulative explained variance = 26.50%

^fSexual satisfaction: explained variance = 17.00%; cumulative explained variance = 43.50%

Table 4 ESEM goodness-of-fit statistics for the general module and specific modules

Questionnaire	X^2	df	$P(X^2)$	CFI	TLI	RMSEA
MINUS-X general module (26 items)	1116.78	304	<0.001	0.94	0.94	0.053 [CI=0.050–0.056]
Module OG (14 items)	250.24	88	<0.001	0.90	0.90	0.076 [CI=0.065–0.087]
Module SN (15 items)	188.128	62	<0.001	0.92	0.92	0.080 [CI=0.067–0.093]
Module OP (12 items)	183.915	62	<0.001	0.92	0.91	0.079 [CI=0.066–0.092]

CFI, comparative fit index; *TLI*, Tucker-Lewis index; *RMSEA*, root mean square error of approximation; *OG*, online gaming; *SN*, social networking; *OP*, online pornography

comparison with the fit indices from model 1, the differences between models 1 and 2 (Δ CFI=0.025, Δ RMSEA=0.002) provided evidence of weak invariance at least regarding Δ RMSEA. Scalar invariance was tested by constraining factor loadings and intercepts to be equal across groups (model 3). These specifications resulted in an acceptable model fit (CFI=0.91, RMSEA=0.068). Compared with model 1, differences between model 2 and model 3 (Δ CFI=0.022, Δ RMSEA=−0.007) provided evidence of scalar invariance at least regarding Δ RMSEA. Given support for strong invariance, we proceeded to test strict invariance by testing models that imposed constraints on factor loadings, item intercepts, and residual variances (model 4). These specifications resulted in unacceptable model fit (CFI=0.82, RMSEA=0.093). In comparison with model 3, the Δ CFI (≥ 0.01) and Δ RMSEA (≥ 0.015) values exceeded the recommended guidelines, failing to support strong invariance. For an overview, see Table 5.

Reliability Analysis

The general module MINUS-X with the 26 general expectations had an internal consistency of $\omega=0.93$. For the internal consistencies of the subscales, see Table 6. The internal consistencies of the whole scale and the subscales would not have improved through the exclusion of items. The results of the reliability analysis for the application-specific items are presented in Table 7. The internal consistencies of the combinations of general and application-specific expectations are as follows: MINUS-XOG $\omega=0.95$, MINUS-XSN $\omega=0.94$, and MINUS-XOP $\omega=0.94$.

Table 5 Tests of measurement invariance across the three applications

Model	Df	χ^2	$\Delta\chi^2$	CFI	RMSEA	Δ CFI	Δ RMSEA
Model 1 ^a	462	1046.6	-	0.95	0.063	-	-
Model 2 ^b	762	1669.2	622.61	0.93	0.061	0.025	0.002
Model 3 ^c	802	1987.5	318.22	0.91	0.068	0.022	0.007
Model 4 ^d	854	3199.5	1212.08	0.82	0.093	0.091	0.025

^aEqual form (unrestricted)

^bEqual loadings (metric)

^cEqual loadings and intercepts (scalar invariance)

^dEqual loadings, intercepts, and residuals (strong invariance)

CFI, comparative fit index; *RMSEA*, root mean square error of approximation

Table 6 Means, standard deviations, mean inter-item correlations, mean item-total correlations, and McDonald's omega of the MINUS-X and its subscales

Scale	Number of items	M	SD	Inter-item correlation	Mean item-total correlation	McDonald's ω
MINUS-X (total scale)	26	2.26	0.68	0.34	0.56	0.93
Procrastination	5	3.28	0.31	0.60	0.72	0.88
Emotion regulation	5	2.26	0.35	0.53	0.66	0.85
Self-esteem regulation	5	1.80	0.33	0.56	0.68	0.85
Escapism	5	1.54	0.15	0.39	0.54	0.77
Positive usage expectations	3	2.49	0.69	0.57	0.64	0.79
Social anxiety	3	2.25	0.29	0.34	0.42	0.63

Correlations with the IUES

The MINUS-X subscales showed weak to strong correlations with the IUES. The strongest correlation was observed between the subscale MINUS-X emotion regulation and IUES avoidance expectations ($r=0.57$, $p<0.001$). For details, see Table 8.

Table 7 Means, standard deviations, mean inter-item correlations, mean item-total correlations, and McDonald's omega of the application-specific modules and its subscales

Scale	Number of items	M	SD	Inter-item correlation	Mean item-total correlation	McDonald's ω
MINUS-XOG	40	2.64	0.74	0.31	0.54	0.95
Module OG (both subscales)	14	2.54	0.81	0.34	0.54	0.88
Module OG, subscale: superior reality	7	1.85	0.36	0.45	0.61	0.86
Module OG, subscale: achievement	7	3.22	0.43	0.44	0.60	0.85
MINUS-XSN	38	2.11	0.81	0.29	0.55	0.94
Module SN (both subscales)	12	2.05	0.56	0.35	0.55	0.86
Module SN, subscale: impression management	7	2.43	0.49	0.45	0.61	0.85
Module SN, subscale: social facilitation	5	2.03	0.40	0.45	0.59	0.82
MINUS-XOP	38	2.13	0.65	0.29	0.52	0.94
Module OP (both subscales)	12	2.69	0.48	0.29	0.48	0.81
Module OP, subscale: sexual knowledge	6	2.82	0.44	0.52	0.67	0.87
Module OP, subscale: sexual satisfaction	6	2.57	0.52	0.37	0.52	0.76

MINUS-XOG, complete questionnaire containing the general module with 26 general expectations plus Module OG (online gaming); *MINUS-XSN*, complete questionnaire containing the general module with 26 general expectations plus Module SN (social networking); *MINUS-XOP*, complete questionnaire containing the general module with 26 general expectations plus module OP (online pornography)

Table 8 Correlations of the MINUS-X subscales with the IUES

	IUES positive	IUES avoidance
MINUS-X procrastination	0.22***	0.53***
MINUS-X emotion regulation	0.49***	0.57***
MINUS-X self-esteem regulation	0.41***	0.31***
MINUS-X Escapism	0.33***	0.49***
MINUS-X Positive usage expectations	0.49***	0.29***
MINUS-X social anxiety	0.31***	0.32***

Note. *** $p < 0.001$ MINUS-X: MINUS-X: general module of the questionnaire containing 26 general expectations; IUES, Internet Use Expectancies Scale

Clinical Relevance

Table 9 displays the correlations of general and application-specific MINUS-X subscales with the sIAT for the total as well as the three specific samples (OG, SNS, OP). For the sIAT, all samples showed the highest correlation with the subscale “procrastination” ($r = 0.58$ to $r = 0.59$) and the lowest with the subscale “social anxiety” ($r = 0.33$ to $r = 0.39$).

When comparing the participants above the cut-off for problematic use ($IGDQ \geq 5$) with the participants below the cut-off within each subsample (OG, SNS, and OP), the participants above the cut-off scored higher on all MINUS-X subscales in each sample (see Table 10). For the OG sample, participants with problematic use had higher scores on every subscale of the MINUS-X. The biggest difference was observed on the subscale “escapism” ($g = 1.55$) and the smallest on “achievement” ($g = 0.77$). In the SNS sample, participants with problematic use also scored higher on all MINUS-X scales. The differences ranged from $g = 0.67$ (procrastination) to $g = 1.59$ (emotion regulation). The same pattern emerged in the OP sample. Here, the largest difference was on the subscale “escapism” ($g = 1.56$) and the smallest on the subscale “sexual knowledge” ($g = 0.30$).

Discussion

This study presented a comprehensive modular questionnaire to capture relevant expectations associated with the use of OG, SNS, and OP (MINUS-X). The general module is designed to assess expectations relevant to the use of all three applications, complemented by three modules comprising application-specific expectations. The results of the psychometric analysis indicate that the MINUS-X is a valid and reliable instrument and allows the direct comparison of user expectations between the three most heavily used Internet applications.

Basic Psychometric Properties

The item difficulties were within the optimum range and item-total correlations indicated that the items represent the respective scales well. The general module in itself as well as in combination with the specific modules showed excellent internal consistencies ($\omega = 0.93$

Table 9 Correlations of the MINUS-X subscales with the sIAT for each sample

	sIAT			
	Total sample ($n = 1914$)	OG sample ($n = 638$)	SNS sample ($n = 638$)	OP sample ($n = 638$)
MINUS-X procrastination	0.59***	0.58***	0.59***	0.58***
MINUS-X emotion Regulation	0.51***	0.45***	0.56***	0.45***
MINUS-X self-esteem regulation	0.48***	0.45***	0.41***	0.41***
MINUS-X escapism	0.57***	0.54***	0.55***	0.56***
MINUS-X positive usage expectations	0.53***	0.51***	0.46***	0.52***
MINUS-X social anxiety	0.39***	0.33***	0.36***	0.39***
Module OG, subscale: superior reality	-	0.49***	-	-
Module OG, subscale: achievement	-	0.40***	-	-
Module SN, subscale: impression management	-	-	0.44***	-
Module SN, subscale: social facilitation	-	-	0.42***	-
Module OP, subscale: sexual knowledge	-	-	-	0.29***
Module OP, subscale: sexual satisfaction	-	-	-	0.43***

Note. *** $p < 0.001$; MINUS X, general module of the questionnaire containing 26 general expectations; OG, online gaming; SV, social networking; OP, online pornography

Table 10 Comparison of the MINUS-X scores of participants with a problematic and non-problematic use of online gaming (OG), social networking (SN), and online pornography (OP)

	IGDQ ≥ 5 (n = 42)		IGDQ < 5 (n = 596)		t	df	g
	M	SD	M	SD			
OG							
MINUS-X procrastination	4.57	0.96	3.45	1.22	7.19***	50.85 ^a	1.02
MINUS-X emotion regulation	4.01	1.26	2.63	1.16	7.40***	636	1.18
MINUS-X self-esteem regulation	3.57	1.39	2.43	1.07	5.21***	44.52 ^a	0.92
MINUS-X escapism	3.15	1.10	1.68	0.75	8.49***	43.72 ^a	1.55
MINUS-X positive usage expectations	4.54	1.16	3.16	1.14	7.56***	636	1.21
MINUS-X social anxiety	3.33	1.24	2.44	1.11	5.00***	636	0.79
Module OG, subscale: superior reality	2.89	1.19	1.78	0.77	5.92***	43.43 ^a	1.10
Module OG, subscale: achievement	3.99	0.92	3.17	1.07	4.84***	636	0.77
SNS							
			SNSDQ < 5 (n = 12)				
	M	SD	M	SD	t	df	g
MINUS-X procrastination	4.42	0.85	3.43	0.80	2.90*	11.98 ^a	0.67
MINUS-X emotion regulation	3.43	0.80	1.94	0.94	5.47***	636	1.59
MINUS-X self-esteem regulation	2.33	1.42	1.42	0.59	5.28***	636	1.54
MINUS-X escapism	2.73	1.09	1.38	0.56	4.29***	11.11 ^a	1.56
MINUS-X positive usage expectations	3.17	0.86	1.89	0.92	4.82***	636	1.40
MINUS-X social anxiety	3.31	0.87	2.52	0.95	2.83**	636	0.82
Module SN, subscale: impression management	3.21	1.07	2.32	0.97	3.16**	636	0.92
Module SN, subscale: social facilitation	2.75	1.19	2.02	0.91	2.75**	636	0.80
OP							
			OPDQ < 5 (n = 613)				
	M	SD	M	SD	t	df	g
MINUS-X procrastination	3.92	1.23	2.55	1.23	5.45***	636	1.11
MINUS-X emotion regulation	3.65	1.15	2.01	1.05	7.62***	636	1.55
MINUS-X self-esteem regulation	2.08	1.06	1.44	0.66	2.96**	24.75 ^a	0.72
MINUS-X escapism	2.76	1.06	1.39	0.64	6.39***	24.73 ^a	1.56
MINUS-X positive usage expectations	3.56	1.17	2.25	1.02	6.24***	636	1.27

Table 10 (continued)

OG	IGDQ ≥ 5 (n=42)		IGDQ < 5 (n=596)		t	df	g
	M	SD	M	SD			
MINUS-X social anxiety	2.40	1.16	1.69	0.88	3.01**	25.14 ^a	0.68
Module OP, subscale: sexual knowledge	3.15	1.20	2.81	1.12	1.49	636	0.30
Module OP, subscale: sexual satisfaction	3.85	1.17	2.51	0.98	6.64***	636	1.35

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

^aWelch's correction; OG, online gaming; SN, social networking; OP, online pornography; IGDQ, Internet Gaming Disorder Questionnaire; SNSDQ, Internet Gaming Disorder Questionnaire adapted to SNS; OPDQ, Internet Gaming Disorder Questionnaire adapted to OP

to $\omega=0.95$)—as did the subscales, especially considering their brevity. An exception is the subscale social anxiety with ($\omega=0.63$). This is probably due to the extreme brevity of the subscale (3 items) and the fact that social anxiety may only be relevant to a subset of users.

Validity

Factor Structure

The EFA revealed a six-factor structure for the general module of the MINUS-X. The six factors together accounted for 55.4% of the total variance.

The factor procrastination captures how much a person expects they can postpone unpleasant tasks or distract themselves from daily duties by using OG, SNS, or OP. Procrastination has been identified as a cognitive factor relevant in problematic OG (King & Delfabbro, 2016; Yeh et al., 2017), SNS (Müller et al., 2020), and Internet use in general (Thatcher et al., 2008), and has its own subscale within the Internet Gaming Cognition Scale (King & Delfabbro, 2014, 2016). It has been linked to the habitual use of OP (Paul & Shim, 2008).

The factor emotion regulation captures how much users expect that they can use OG, SNS, or OP as a coping strategy for aversive emotional states, as was described for all types of problematic Internet use (Caplan, 2010; Hou & Fang, 2014; Kor et al., 2014; Reid et al., 2011; Wegmann & Brand, 2016; Wegmann et al., 2015). This scale resembles the IUES Avoidance Expectancies Scale (Brand et al., 2014a), resulting in the highest correlation found within our analysis of convergent validity.

The factor self-esteem regulation refers to the extent to which people expect that using OG, SNS, or OP will increase their self-esteem and make them feel dominant. These aspects seem most closely related to the motivational factors of competition found in OG (Demetrovics et al., 2011; Yee, 2006) and cognitions regarding gaming-based self-esteem (King & Delfabbro, 2016). SNS and OG were suggested to be used to compensate for low self-esteem and unfavorable real life feedback (King & Delfabbro, 2016; Kuss & Griffiths, 2011).

The factor escapism relates to the expectation of leaving the reality behind and being able to immerse oneself in an alternative reality, which has been identified as a motive for using OG, SNS, or OP (Demetrovics et al., 2011; Kor et al., 2014; Papacharissi & Rubin, 2011; Smock et al., 2011). Emotion regulation and escapism appear related since the escape serves to avoid negative feelings in the real world. However, emotion regulation and escapism are still regarded as separate constructs in OG research with escapism motives correlating higher with problematic use (Demetrovics et al., 2011; Marino et al., 2020).

The factor positive usage expectations captures how much people expect to relax and feel good by using OG, SNS, or OP, correlating highly with the IUES Positive Expectancies Scale (Brand et al., 2014a). Positive outcomes such as entertainment and relaxation are relevant in all aforementioned types of Internet behavior (Demetrovics et al., 2011; Marino et al., 2020; Paul & Shim, 2008; Smock et al., 2011; Wegmann et al., 2017; Wu et al., 2016).

The factor social anxiety captures the expectation of feeling less anxious in social contact and about missing out on something. The factor relates to the concepts of fear of missing out (FOMO; Przybylski et al., 2013), social comfort (Davis et al., 2002), or

preference for online social interactions (POSI; Caplan, 2003), all of which have been linked to problematic Internet, OG, and SNS use (Assunção & Matos, 2017; Fioravanti et al., 2012; Haagsma et al., 2013; Liu & Peng, 2009; Marino et al., 2020; Moretta & Buodo, 2018; Wegmann et al., 2017). Since watching OP itself is a rather passive activity, this might be an indirect way to the facilitation of contact via enhancement of sexual knowledge and performance (Hald & Malamuth, 2008), as well as a direct way of watching OP together with partners of friends in order to get sexually aroused or ease the atmosphere (Paul & Shim, 2008).

For the application-specific modules, the EFA revealed two factors in each case that explained 45.60% (OG), 48.10% (SN), and 43.50% (OP) of the variance. The first factor of the OG module (superior reality) refers to the expectation of achieving social recognition by using OG and escaping into an alternative reality, in which one has a superior self-image. This factor, too, shares features with social comfort (Davis et al., 2002) and POSI (Caplan, 2003). However, expectations of being more easily accepted as a person, which resemble dysfunctional cognitions related to problematic OG (“Gaming is a means of gaining social acceptance”) are more prominent in this factor (King & Delfabbro, 2014, 2016). The factor achievement captures expectations related to the experience of self-efficacy and a feeling of achievement, a well-researched motive for participating in OG (Billieux et al., 2013; Demetrovics et al., 2011; Marino et al., 2020; Yee, 2006).

In the SN module, the factor impression management refers to how much users expect to gain social validation by impression management. This expectation is double-edged since it is accompanied by feeling social pressure regarding the other users. Such motives and fears have been identified as pervasive in SNS research (Ho et al., 2017; Park et al., 2009; Ranzini & Hoek, 2017). The factor social facilitation captures how much people expect SNS use to facilitate social interactions they may find difficult in face-to-face encounters (e.g., defending a different opinion). This factor resembles social comfort (Davis et al., 2002) or preference for online social interactions (Caplan, 2003), constructs that have been linked to problematic SNS use (Assunção & Matos, 2017; Moretta & Buodo, 2018). However, the social facilitation factor includes more approach behavior (being more sociable and dominant) than the social anxiety factor of the general module, which is focused on the reduction of anxiety.

The first factor in the OP module, sexual knowledge, refers to the expectation of acquiring new sexual skills or knowledge using OP and experience enhanced sexual performance in real life. This factor resembles the content of two distinct positive Pornography Consumption Effect Scales (Hald & Malamuth, 2008), i.e., sex life and sexual knowledge. Using OP for these reasons is popular both in clinical and non-clinical populations (Goodson et al., 2000; Goodson et al., 2001; Reid et al., 2011; Sabina et al., 2008), possibly due to the fact that “gaining knowledge” is regarded as a socially acceptable motivation, given that admitting to pornography use may lead to social rejection in many contexts. The factor sexual satisfaction refers to the extent to which OP users expect using OP to be more satisfying and easier than having sex with a real partner. Watching OP in order to become sexually aroused is a common motive (Goodson et al., 2000, 2001; Hald & Malamuth, 2008; Reid et al., 2011; Sabina et al., 2008) and excessive cybersexual behavior is linked to higher sexual arousability by pornographic material (Brand et al., 2011; Laier et al., 2013). Also, adverse effects of OP on real life sexual intercourse (e.g., performance anxiety and reduced functioning) have been documented (Hald & Malamuth, 2008; Kor et al., 2014). The expectation of becoming more attracted to OP than to real-life sex might be due to the possibilities of pursuing sexual

fantasies not available in real life in OP (Paul & Shim, 2008). However, those expectations have not been researched so far. To test the factor structures that resulted from the EFAs, we calculated ESEM models in the other half of the sample. For all models, the relevant fit indices were high and showed an excellent model fit. These results indicate structural validity of the respective modules.

Scale Interpretation

The items describe expectations to experience certain cognitive, emotional, or behavioral consequences of the use of Internet applications. Although they do not form a natural general sum score, any more than items on a personality questionnaire would, these consequences formed meaningful factors when subjected to a factor analysis. The factors draw together related consequences and allow an interpretation as subscales. Nevertheless, high intercorrelations of some subscales and high correlations with addiction scores suggest that respondents with high values in factors linked to problematic use, such as emotion regulation, Escapism, and procrastination, may be prone to using Internet applications as a coping strategy vis-à-vis aversive states of mind. Future research might reveal a second order factor comprising those addiction related factors.

Measurement Invariance

One of the main reasons for the development of the modular instrument was to create an instrument that allows for a direct comparison between the expectations that drive the different forms of online behavior and thus permit a closer investigation of the expectation component of the I-PACE model. Our analyses of measurement invariance ascertained that the general module indeed measures the same theoretical construct across the three domains. The six factors were associated with the same items across all three groups (configural invariance) and the loadings of these items on the corresponding factors were equivalent across the groups (weak invariance), suggesting that each group interprets the measure similarly. Moreover, we found scalar invariance, indicating equivalence between the three groups for all item loadings and intercepts. The fact that partial strong invariance was obtained allows comparison of means across the different user groups. We failed to find evidence for strong invariance, which would have required an additional equality of residual variances across groups. However, strong invariance is rejected as exceedingly rigorous and not necessary for upholding measurement invariance across multiple groups (Vandenberg & Lance, 2000).

Clinical Relevance

The general module of the MINUS-X correlated strongly to moderately with the sIAT, adapted to the respective domains. This suggests that the expectations assessed by the MINUS-X are related to problematic use. In particular, the subscales procrastination and escapism strongly correlated with sIAT scores, dovetailing with findings regarding escapism-related metacognitions and trait procrastination in problematic OG (Casale et al., 2016; Yeh et al., 2017) and SNS (Müller et al., 2020). The high correlations between the MINUS-X and the s-IAT are partly due to the fact that some items are very similar in content (e.g., regarding procrastination).

In a final step, we compared the MINUS-X scores of participants with problematic and non-problematic use according to criteria modelled on DSM-5. We found large differences, especially regarding the subscales emotion regulation and escapism ($g = 1.18$ to $g = 1.59$).

Limitations

The following limitations should be considered when interpreting the results. First, the data were collected using self-report instruments. These are susceptible to subjective biases such as social desirability or lack of introspection. Second, our sample consisted only of adults, so the results cannot be transferred to adolescents without further studies. Third, although we took great methodological care in creating the items of the questionnaire, additional use of community-based participatory research teams to guide prior qualitative research to identify item/scale candidates or Delphi procedures would have been desirable.

Implications

The MINUS-X provides a useful instrument to assess expectations related to problematic OG, SNS, and OP use with demonstrated measurement invariance between the usage domains and allows in-depth research into the expectations driving excessive Internet use behavior. In the therapeutic context, the MINUS-X can be utilized to identify dysfunctional expectations in the context of problematic OG, SNS, or OP use that can subsequently be modified with expectation-focused interventions. This approach has already proven to be very promising for other mental disorders (Craske et al., 2014; Woods & Asmundson, 2008).

Conclusion

In conclusion, the MINUS-X instrument allows for a standardized, valid, reliable, and comprehensive assessment of expectations concerning the use of OG, SNS, and OP. This closes a gap with regard to a tool with which the expectations postulated to play an important role in the development and maintenance of problematic use of OG, SNS, and OP can be measured across all applications. In addition, the results of this study provide further evidence for the clinical relevance of expectations in the context of problematic use of OG, SNS, and OP, and MINUS-X offers most relevant information for treatment planning.

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Declarations

Ethics Approval All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5). Informed consent was obtained from all patients for being included in the study.

Conflict of Interest The authors declare no competing interests.

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References

- Albright, J. M. (2008). Sex in America online. An exploration of sex, marital status, and sexual identity in internet sex seeking and its impacts. *Journal of Sex Research, 45*(2), 175–186. <https://doi.org/10.1080/00224490801987481>
- Alimoradi, Z., Lin, C.-Y., Broström, A., Bülow, P. H., Bajalan, Z., Griffiths, M. D., & Pakpour, A. H. (2019). Internet addiction and sleep problems: A systematic review and meta-analysis. *Sleep Medicine Reviews, 47*, 51–61. <https://doi.org/10.1016/j.smrv.2019.06.004>
- American Psychiatric Association (Ed.). (2022). *Diagnostic and statistical manual of mental disorders: DSM-5-TR* (Fifth edition, text revision). American Psychiatric Association Publishing
- Andreassen, C. S. (2015). Online social network site addiction: A comprehensive review. *Current Addiction Reports, 2*(2), 175–184. <https://doi.org/10.1007/s40429-015-0056-9>
- Andreassen, C. S., & Pallesen, S. (2014). Social network site addiction - An overview. *Current Pharmaceutical Design, 20*(25), 4053–4061. <https://doi.org/10.2174/13816128113199990616>
- Arens, A. K., & Morin, A. J. S. (2016). Examination of the structure and grade-related differentiation of multidimensional self-concept instruments for children using ESEM. *The Journal of Experimental Education, 84*(2), 330–355. <https://doi.org/10.1080/00220973.2014.999187>
- Asparouhov, T., & Muthén, B. (2009). Exploratory structural equation modeling. *Structural Equation Modeling, 16*(3), 397–438. <https://doi.org/10.1080/10705510903008204>
- Assunção, R. S., & Matos, P. M. (2017). The Generalized Problematic Internet Use Scale 2: Validation and test of the model to Facebook use. *Journal of Adolescence, 54*, 51–59. <https://doi.org/10.1016/j.adolescence.2016.11.007>
- Ballester-Arnal, R., Castro Calvo, J., Gil-Llario, M. D., & Gil-Julia, B. (2017). Cybersex addiction: A study on Spanish college students. *Journal of Sex and Marital Therapy, 43*(6), 567–585. <https://doi.org/10.1080/0092623X.2016.1208700>
- Bandura, A. (1977). *Social learning theory* (6th ed.). *Prentice-Hall Series in Social Learning Theory*. Englewood Cliffs, NJ: Prentice-Hall
- Bányai, F., Zsila, Á., Király, O., Maraz, A., Elekes, Z., Griffiths, M. D.,... Demetrovics, Z. (2017). Problematic social media use: Results from a large-scale nationally representative adolescent sample. *PLoS One, 12*(1), e0169839. <https://doi.org/10.1371/journal.pone.0169839>
- Beck, A. T., & Haigh, E. A. P. (2014). Advances in cognitive theory and therapy: The generic cognitive model. *Annual Review of Clinical Psychology, 10*, 1–24. <https://doi.org/10.1146/annurev-clinpsy-032813-153734>
- Billieux, J., van der Linden, M., Achab, S., Khazaal, Y., Paraskevopoulos, L., Zullino, D., & Thorens, G. (2013). Why do you play World of Warcraft?: An in-depth exploration of self-reported motivations to play online and in-game behaviors in the virtual world of Azeroth. *Computers in Human Behavior, 29*(1), 103–109. <https://doi.org/10.1016/j.chb.2012.07.021>
- Boer, M., van den Eijnden, R. J. J. M., Finkenauer, C., Boniel-Nissim, M., Marino, C., Inchley, J., Cosma, A., Paakkari, L., & Stevens, G. W. (2022). Cross-national validation of the social media disorder scale: Findings from adolescents from 44 countries. *Addiction, 117*(3), 784–795.
- Bőthe, B., Tóth-Király, I., Zsila, Á., Griffiths, M. D., Demetrovics, Z., & Orosz, G. (2018). The development of the Problematic Pornography Consumption Scale (PPCS). *Journal of Sex Research, 55*(3), 395–406. <https://doi.org/10.1080/00224499.2017.1291798>
- Bőthe, B., Tóth-Király, I., Bella, N., Potenza, M. N., Demetrovics, Z., & Orosz, G. (2021). Why do people watch pornography? The motivational basis of pornography use. *Psychology of Addictive Behaviors, 35*(2), 172.

- Brand, M., Laier, C., Pawlikowski, M., Schächtle, U., Schöler, T., & Altstötter-Gleich, C. (2011). Watching pornographic pictures on the Internet: Role of sexual arousal ratings and psychological-psychiatric symptoms for using Internet sex sites excessively. *Cyberpsychology, Behavior and Social Networking*, *14*(6), 371–377. <https://doi.org/10.1089/cyber.2010.0222>
- Brand, M., Laier, C., & Young, K. S. (2014). Internet addiction: Coping styles, expectancies, and treatment implications. *Frontiers in Psychology*, *5*, 1–14. <https://doi.org/10.3389/fpsyg.2014.01256>
- Brand, M., Wegmann, E., Stark, R., Müller, A., Wölfling, K., Robbins, T. W., & Potenza, M. N. (2019). The Interaction of Person-Affect-Cognition-Execution (I-PACE) model for addictive behaviors: Update, generalization to addictive behaviors beyond internet-use disorders, and specification of the process character of addictive behaviors. *Neuroscience and Biobehavioral Reviews*, *104*, 1–10. <https://doi.org/10.1016/j.neubiorev.2019.06.032>
- Brand, M., Young, K. S., & Laier, C. (2014). Prefrontal control and Internet addiction: A theoretical model and review of neuropsychological and neuroimaging findings. *Frontiers in Human Neuroscience*, *8*, 375. <https://doi.org/10.3389/fnhum.2014.00375>
- Brand, M., Young, K. S., Laier, C., Wölfling, K., & Potenza, M. N. (2016). Integrating psychological and neurobiological considerations regarding the development and maintenance of specific Internet-use disorders: An Interaction of Person-Affect-Cognition-Execution (I-PACE) model. *Neuroscience and Biobehavioral Reviews*, *71*, 252–266. <https://doi.org/10.1016/j.neubiorev.2016.08.033>
- Brandtner, A., Antons, S., Liebherr, M., & Brand, M. (2022). How different gaming genres can be described by requires skills and motives for playing. *Cyberpsychology Behavior and Social Networking*, *25*(9), 613–619. <https://doi.org/10.1089/cyber.2022.0019>
- Bühner, M. (2011). *Einführung in die Test- und Fragebogenkonstruktion* (3rd ed.). Pearson Studium.
- Caplan, S. E. (2003). Preference for online social interaction. *Communication Research*, *30*(6), 625–648. <https://doi.org/10.1177/0093650203257842>
- Caplan, S. E. (2010). Theory and measurement of generalized problematic Internet use: A two-step approach. *Computers in Human Behavior*, *26*(5), 1089–1097. <https://doi.org/10.1016/j.chb.2010.03.012>
- Casale, S., Caplan, S. E., & Fioravanti, G. (2016). Positive metacognitions about Internet use: The mediating role in the relationship between emotional dysregulation and problematic use. *Addictive Behaviors*, *59*, 84–88. <https://doi.org/10.1016/j.addbeh.2016.03.014>
- Castro-Calvo, J., Gimenez-Garcia, C., Gil-Llario, M. D., & Ballester-Arnal, R. (2018). Motives to engage in online sexual activities and their links to excessive and problematic use: A systematic review. *Current Addiction Reports*, *5*(4), 491–510.
- Chen, F. F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance. *Structural Equation Modeling*, *14*(3), 464–504. <https://doi.org/10.1080/10705510701301834>
- Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling*, *9*(2), 233–255. https://doi.org/10.1207/S15328007SEM0902_5
- Cooper, A. L., Månsson, S.-A., Daneback, K., Tikkanen, R., & Ross, M. W. (2003). Predicting the future of Internet sex: Online sexual activities in Sweden. *Sexual and Relationship Therapy*, *18*(3), 277–291. <https://doi.org/10.1080/1468199031000153919>
- Craske, M. G., Treanor, M., Conway, C. C., Zbozinek, T., & Vervliet, B. (2014). Maximizing exposure therapy: An inhibitory learning approach. *Behaviour Research and Therapy*, *58*, 10–23. <https://doi.org/10.1016/j.brat.2014.04.006>
- Davis, R. A. (2001). A cognitive-behavioral model of pathological Internet use. *Computers in Human Behavior*, *17*(2), 187–195. [https://doi.org/10.1016/S0747-5632\(00\)00041-8](https://doi.org/10.1016/S0747-5632(00)00041-8)
- 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 and Behavior*, *5*(4), 331–345. <https://doi.org/10.1089/109493102760275581>
- Demetrovics, Z., Urbán, R., Nagygyörgy, K., Farkas, J., Zilahy, D., Mervó, B.,... Harmath, E. (2011). Why do you play? The development of the motives for online gaming questionnaire (MOGQ). *Behavior Research Methods*, *43*(3), 814–825. <https://doi.org/10.3758/s13428-011-0091-y>
- Duffy, A., Dawson, D. L., & das Nair, R. (2016). Pornography addiction in adults: A systematic review of definitions and reported impact. *The Journal of Sexual Medicine*, *13*(5), 760–777. <https://doi.org/10.1016/j.jsxm.2016.03.002>
- Eastin, M. S., & LaRose, R. (2000). Internet self-efficacy and the psychology of the digital divide. *Journal of Computer-Mediated Communication*, *6*(1). <https://doi.org/10.1111/j.1083-6101.2000.tb00110.x>
- Fioravanti, G., Dèttore, D., & Casale, S. (2012). Adolescent Internet addiction: Testing the association between self-esteem, the perception of Internet attributes, and preference for online social

- interactions. *Cyberpsychology Behavior and Social Networking*, 15(6), 318–323. <https://doi.org/10.1089/cyber.2011.0358>
- Gadermann, A., Guhn, M., & Zumbo, B. (2012). Estimating ordinal reliability for Likert-type and ordinal item response data: A conceptual, empirical, and practical guide. *Practical Assessment, Research and Evaluation*, 17, 1–13.
- Goodson, P., McCormick, D., & Evans, A. (2000). Sex and the internet: A survey instrument to assess college students' behavior and attitudes. *CyberPsychology and Behavior*, 3(2), 129–149. <https://doi.org/10.1089/109493100315987>
- Goodson, P., McCormick, D., & Evans, A. (2001). Searching for sexually explicit materials on the Internet: An exploratory study of college students' behavior and attitudes. *Archives of Sexual Behavior*, 30(2), 101–118. <https://doi.org/10.1023/a:1002724116437>
- Griffiths, M. D. (2000). Internet addiction - Time to be taken seriously? *Addiction Research*, 8(5), 413–418. <https://doi.org/10.3109/16066350009005587>
- Haagsma, M. C., Caplan, S. E., Peters, O., & Pieterse, M. E. (2013). A cognitive-behavioral model of problematic online gaming in adolescents aged 12–22years. *Computers in Human Behavior*, 29(1), 202–209. <https://doi.org/10.1016/j.chb.2012.08.006>
- Hald, G. M., & Malamuth, N. M. (2008). Self-perceived effects of pornography consumption. *Archives of Sexual Behavior*, 37(4), 614–625. <https://doi.org/10.1007/s10508-007-9212-1>
- Ho, S. S., Lwin, M. O., & Lee, E. W. J. (2017). Till logout do us part? Comparison of factors predicting excessive social network sites use and addiction between Singaporean adolescents and adults. *Computers in Human Behavior*, 75, 632–642. <https://doi.org/10.1016/j.chb.2017.06.002>
- Horn, J. L. (1965). A rationale and test for the number of factors in factor analysis. *Psychometrika*, 30, 179–185. <https://doi.org/10.1007/BF02289447>
- Hou, S., & Fang, X. (2014). The explicit and implicit outcome expectancies of Internet games and their relationships with Internet gaming behaviors among college students. *Computers in Human Behavior*, 39, 346–355. <https://doi.org/10.1016/j.chb.2014.07.028>
- Hu, L.-T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1), 1–55. <https://doi.org/10.1080/10705519909540118>
- JASP Team (2020). JASP (Version 0.14.1) [Computer software]
- Jeromin, F., Rief, W., & Barke, A. (2016). Validation of the internet gaming disorder questionnaire in a sample of adult German-speaking internet gamers. *Cyberpsychology Behavior and Social Networking*, 19(7), 453–459. <https://doi.org/10.1089/cyber.2016.0168>
- King, D. L., & Delfabbro, P. H. (2014). The cognitive psychology of Internet gaming disorder. *Clinical Psychology Review*, 34(4), 298–308. <https://doi.org/10.1016/j.cpr.2014.03.006>
- King, D. L., & Delfabbro, P. H. (2016). The cognitive psychopathology of Internet gaming disorder in adolescence. *Journal of Abnormal Child Psychology*, 44(8), 1635–1645. <https://doi.org/10.1007/s10802-016-0135-y>
- Király, O., Nagygyörgy, K., Griffiths, M. D., & Demetrovics, Z. (2014). Problematic online gaming. In *Behavioral Addictions* (pp. 61–97). Elsevier. <https://doi.org/10.1016/B978-0-12-407724-9.00004-5>
- Kirsch, I. (1997). Response expectancy theory and application: A decennial review. *Applied and Preventive Psychology*, 6(2), 69–79. [https://doi.org/10.1016/S0962-1849\(05\)80012-5](https://doi.org/10.1016/S0962-1849(05)80012-5)
- Komnenić, D., Filipović, S., & Vukosavljević-Gvozden, T. (2015). Assessing maladaptive cognitions related to online gaming: Proposing an adaptation of online cognitions scale. In *Computers in Human Behavior*, 51(A), 131–139. <https://doi.org/10.1016/j.chb.2015.04.051>
- Kor, A., Zilcha-Mano, S., Fogel, Y. A., Mikulincer, M., Reid, R. C., & Potenza, M. N. (2014). Psychometric development of the problematic pornography use scale. *Addictive Behaviors*, 39(5), 861–868. <https://doi.org/10.1016/j.addbeh.2014.01.027>
- Kube, T., D'Astolfo, L., Glombiewski, J. A., Doering, B. K., & Rief, W. (2016). Focusing on situation-specific expectations in major depression as basis for behavioral experiments - Development of the Depressive Expectations Scale. *Psychology and Psychotherapy*, 1-17. <https://doi.org/10.1111/papt.12114>
- 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. <https://doi.org/10.3390/ijerph8093528>
- Kuss, D. J., & Griffiths, M. D. (2017). Social networking sites and addiction: Ten lessons learned. *International Journal of Environmental Research and Public Health*, 14(3), 311. <https://doi.org/10.3390/ijerph14030311>

- Kuss, D. J., Griffiths, M. D., Karila, L., & Billieux, J. (2014). Internet addiction: A systematic review of epidemiological research for the last decade. *Current Pharmaceutical Design, 20*(25), 4026–4052. <https://doi.org/10.2174/13816128113199990617>
- Laier, C., Pawlikowski, M., Pekal, J., Schulte, F. P., & Brand, M. (2013). Cybersex addiction: Experienced sexual arousal when watching pornography and not real-life sexual contacts makes the difference. *Journal of Behavioral Addictions, 2*(2), 100–107. <https://doi.org/10.1556/JBA.2.2013.002>
- Laier, C., Wegmann, E., & Brand, M. (2018). Personality and cognition in gamers: Avoidance expectancies mediate the relationship between maladaptive personality traits and symptoms of internet-gaming disorder. *Frontiers in Psychiatry, 9*, 304. <https://doi.org/10.3389/fpsy.2018.00304>
- 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 and Behavior, 11*(4), 451–457. <https://doi.org/10.1089/cpb.2007.0121>
- 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*(6), 1306–1311. <https://doi.org/10.1016/j.chb.2009.06.002>
- Marino, C., Canale, N., Vieno, A., Caselli, G., Scacchi, L., & Spada, M. M. (2020). Social anxiety and Internet gaming disorder: The role of motives and metacognitions. *Journal of Behavioral Addictions, 9*(3), 617–628. <https://doi.org/10.1556/2006.2020.00044>
- Marsh, H. W., Morin, A. J. S., Parker, P. D., & Kaur, G. (2014). Exploratory structural equation modeling: An integration of the best features of exploratory and confirmatory factor analysis. *Annual Review of Clinical Psychology, 10*, 85–110. <https://doi.org/10.1146/annurev-clinpsy-032813-153700>
- Melodia, F., Canale, N., & Griffiths, M. D. (2022). The role of avoidance coping and escape motives in problematic online gaming: A systematic literature review. *International Journal of Mental Health and Addiction, 20*, 996–1022. <https://doi.org/10.1007/s11469-020-00422-w>
- Mennig, M., Tennie, S., & Barke, A. (2020). A psychometric approach to assessments of problematic use of online pornography and social networking sites based on the conceptualizations of internet gaming disorder. *BMC Psychiatry, 20*(1), 318. <https://doi.org/10.1186/s12888-020-02702-0>
- Montgomery, G. H., & Kirsch, I. (1997). Classical conditioning and the placebo effect. *Pain, 72*(1), 107–113. [https://doi.org/10.1016/S0304-3959\(97\)00016-X](https://doi.org/10.1016/S0304-3959(97)00016-X)
- Moretta, T., & Buodo, G. (2018). Modeling problematic Facebook use: Highlighting the role of mood regulation and preference for online social interaction. *Addictive Behaviors, 87*, 214–221. <https://doi.org/10.1016/j.addbeh.2018.07.014>
- Müller, S. M., Wegmann, E., Stolze, D., & Brand, M. (2020). Maximizing social outcomes? Social zapping and fear of missing out mediate the effects of maximization and procrastination on problematic social networks use. *Computers in Human Behavior, 107*, 106296. <https://doi.org/10.1016/j.chb.2020.106296>
- Najavits, L., Lung, J., Froias, A., Paull, N., & Bailey, G. (2014). A study of multiple behavioral addictions in a substance abuse sample. *Substance Use and Misuse, 49*(4), 479–484. <https://doi.org/10.3109/10826084.2013.858168>
- Pan, Y.-C., Chiu, Y.-C., & Lin, Y.-H. (2020). Systematic review and meta-analysis of epidemiology of internet addiction. *Neuroscience and Biobehavioral Reviews, 118*, 612–622. <https://doi.org/10.1016/j.neubiorev.2020.08.013>
- Papacharissi, Z., & Rubin, A. M. (2011). Predictors of Internet use. In S. Papathanassopoulos (Ed.), *Communication and society. Media perspectives for the 21st century* (pp. 212–230). New York: Routledge
- Park, N., Kee, K. F., & Valenzuela, S. (2009). Being immersed in social networking environment: Facebook groups, uses and gratifications, and social outcomes. *CyberPsychology and Behavior, 12*(6), 729–733. <https://doi.org/10.1089/cpb.2009.0003>
- Paul, B., & Shim, J. W. (2008). Gender, sexual affect, and motivations for internet pornography use. *International Journal of Sexual Health, 20*(3), 187–199. <https://doi.org/10.1080/19317610802240154>
- Pawlikowski, M., Altstötter-Gleich, C., & Brand, M. (2013). Validation and psychometric properties of a short version of Young's Internet Addiction Test. *Computers in Human Behavior, 29*(3), 1212–1223. <https://doi.org/10.1016/j.chb.2012.10.014>
- Pertegal, M. Á., Oliva, A., & Rodríguez-Meirinhos, A. (2019). Development and validation of the Scale of Motives for Using Social Networking Sites (SMU-SNS) for adolescents and youths. *PLoS ONE, 14*(12), e0225781.
- Peters, G. (2014). The alpha and the omega of scale reliability and validity: Why and how to abandon Cronbach's alpha and the route towards more comprehensive assessment of scale quality. *The European Health Psychologist, 16*, 56–69.

- Petry, N. M., Rehbein, F., Gentile, D. A., Lemmens, J. S., Rumpf, H.-J., Mossle, T.,... O'Brien, C. P. (2014). An international consensus for assessing Internet gaming disorder using the new DSM-5 approach. *Addiction*, 109(9), 1399–1406. <https://doi.org/10.1111/add.12457>
- Przybylski, A. K., Murayama, K., DeHaan, C. R., & Gladwell, V. (2013). Motivational, emotional, and behavioral correlates of fear of missing out. *Computers in Human Behavior*, 29(4), 1841–1848. <https://doi.org/10.1016/j.chb.2013.02.014>
- R Core Team (2020). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <https://www.R-project.org/>
- Ranzini, G., & Hoek, E. (2017). To you who (I think) are listening: Imaginary audience and impression management on Facebook. *Computers in Human Behavior*, 75, 228–235. <https://doi.org/10.1016/j.chb.2017.04.047>
- Reid, R. C., Li, D. S., Gilliland, R., Stein, J. A., & Fong, T. (2011). Reliability, validity, and psychometric development of the pornography consumption inventory in a sample of hypersexual men. *Journal of Sex and Marital Therapy*, 37(5), 359–385. <https://doi.org/10.1080/0092623X.2011.607047>
- Rief, W., & Glombiewski, J. A. (2016). Expectation-focused psychological interventions (EFPi). *Verhaltenstherapie*, 47–54. <https://doi.org/10.1159/000442374>
- Rief, W., Glombiewski, J. A., Gollwitzer, M., Schubö, A., Schwarting, R., & Thorwart, A. (2015). Expectancies as core features of mental disorders. *Current Opinion in Psychiatry*, 28(5), 378–385. <https://doi.org/10.1097/YCO.0000000000000184>
- Rissel, C., Richters, J., de Visser, R. O., McKee, A., Yeung, A., & Caruana, T. (2017). A profile of pornography users in Australia: Findings from the second Australian study of health and relationships. *Journal of Sex Research*, 54(2), 227–240. <https://doi.org/10.1080/00224499.2016.1191597>
- Ross, M. W., Månsson, S.-A., & Daneback, K. (2012). Prevalence, severity, and correlates of problematic sexual Internet use in Swedish men and women. *Archives of Sexual Behavior*, 41(2), 459–466. <https://doi.org/10.1007/s10508-011-9762-0>
- Sabina, C., Wolak, J., & Finkelhor, D. (2008). The nature and dynamics of internet pornography exposure for youth. *Cyberpsychology and Behavior: The Impact of the Internet, Multimedia and Virtual Reality on Behavior and Society*, 11(6), 691–693. <https://doi.org/10.1089/cpb.2007.0179>
- Seligman, M. E. P., Railton, P., Baumeister, R. F., & Sripada, C. (2013). Navigating into the future or driven by the past. *Perspectives on Psychological Science: A Journal of the Association for Psychological Science*, 8(2), 119–141. <https://doi.org/10.1177/1745691612474317>
- Shin, N. Y., & Lim, Y.-J. (2017). Development and validation of a social network site use motives scale for college students in South Korea. *Journal of Psychoeducational Assessment*, 2(4), 0734282917713499. <https://doi.org/10.1177/0734282917713499>
- Short, M. B., Black, L., Smith, A. H., Wetterneck, C. T., & Wells, D. E. (2012). A review of Internet pornography use research: Methodology and content from the past 10 years. *Cyberpsychology Behavior and Social Networking*, 15(1), 13–23. <https://doi.org/10.1089/cyber.2010.0477>
- Smock, A. D., Ellison, N. B., Lampe, C., & Wohn, D. Y. (2011). Facebook as a toolkit: A uses and gratification approach to unbundling feature use. *Computers in Human Behavior*, 27(6), 2322–2329. <https://doi.org/10.1016/j.chb.2011.07.011>
- Spada, M. M., & Caselli, G. (2015). The metacognitions about online gaming scale: Development and psychometric properties. *Addictive Behaviors*. Advance online publication. <https://doi.org/10.1016/j.addbeh.2015.07.007>
- Spada, M. M., Caselli, G., Nikčević, A. V., & Wells, A. (2015). Metacognition in addictive behaviors. *Addictive Behaviors*, 44, 9–15. <https://doi.org/10.1016/j.addbeh.2014.08.002>
- Statista (2021a, March 10). Number of gamers worldwide 2023 | Statista. Retrieved from <https://www.statista.com/statistics/748044/number-video-gamers-world/>
- Statista (2021b, March 10). Internet users in the world 2021b | Statista. Retrieved from <https://www.statista.com/statistics/617136/digital-population-worldwide/>
- Stevens, M. W., Dorstyn, D., Delfabbro, P. H., & King, D. L. (2021). Global prevalence of gaming disorder: A systematic review and meta-analysis. *The Australian and New Zealand journal of psychiatry*, 55(6), 553–568. <https://doi.org/10.1177/0004867420962851>
- Stewart-Williams, S., & Podd, J. (2004). The placebo effect: Dissolving the expectancy versus conditioning debate. *Psychological Bulletin*, 130(2), 324–340. <https://doi.org/10.1037/0033-2909.130.2.324>
- Thatcher, A., Wretschko, G., & Fridjhon, P. (2008). Online flow experiences, problematic Internet use and Internet procrastination. *Computers in Human Behavior*, 24(5), 2236–2254. <https://doi.org/10.1016/j.chb.2007.10.008>
- Torres-Rodríguez, A., Griffiths, M. D., Carbonell, X., & Oberst, U. (2018). Internet gaming disorder in adolescence: Psychological characteristics of a clinical sample. *Journal of Behavioral Addictions*, 7(3), 707–718. <https://doi.org/10.1556/2006.7.2018.75>

- Tosun, L. P. (2012). Motives for Facebook use and expressing “true self” on the Internet. *Computers in Human Behavior*, 28(4), 1510–1517. <https://doi.org/10.1016/j.chb.2012.03.018>
- Tóth-Király, I., Bőthe, B., Rigó, A., & Orosz, G. (2017). An illustration of the exploratory structural equation modeling (ESEM) framework on the passion scale. *Frontiers in Psychology*, 8, 1968. <https://doi.org/10.3389/fpsyg.2017.01968>
- Vandenberg, R. J., & Lance, C. E. (2000). A review and synthesis of the measurement invariance literature: Suggestions, practices, and recommendations for organizational research. *Organizational Research Methods*, 3(1), 4–70. <https://doi.org/10.1177/109442810031002>
- Wegmann, E., & Brand, M. (2016). Internet-communication disorder: It’s a matter of social aspects, coping, and internet-use expectancies. *Frontiers in Psychology*, 7, 1747. <https://doi.org/10.3389/fpsyg.2016.01747>
- Wegmann, E., Oberst, U., Stodt, B., & Brand, M. (2017). Online-specific fear of missing out and Internet-use expectancies contribute to symptoms of Internet-communication disorder. *Addictive Behaviors Reports*, 5, 33–42. <https://doi.org/10.1016/j.abrep.2017.04.001>
- Wegmann, E., Stodt, B., & Brand, M. (2015). Addictive use of social networking sites can be explained by the interaction of Internet use expectancies, Internet literacy, and psychopathological symptoms. *Journal of Behavioral Addictions*, 4(3), 155–162. <https://doi.org/10.1556/2006.4.2015.021>
- Wéry, A., & Billieux, J. (2017). Problematic cybersex: Conceptualization, assessment, and treatment. *Addictive Behaviors*, 64, 238–246. <https://doi.org/10.1016/j.addbeh.2015.11.007>
- Widyanto, L., & Griffiths, M. D. (2006). “Internet addiction”: A critical review. *International Journal of Mental Health and Addiction*, 4(1), 31–51. <https://doi.org/10.1007/s11469-006-9009-9>
- Woods, M. P., & Asmundson, G. J. G. (2008). Evaluating the efficacy of graded in vivo exposure for the treatment of fear in patients with chronic back pain: A randomized controlled clinical trial. *Pain*, 136(3), 271–280. <https://doi.org/10.1016/j.pain.2007.06.037>
- World Health Organization. (2019). *ICD-11: International classification of diseases* (11th revision). Retrieved from <https://icd.who.int/>
- Wu, J. Y.-W., Ko, H.-C., Wong, T.-Y., Wu, L.-A., & Oei, T. P. S. (2016). Positive outcome expectancy mediates the relationship between peer influence and Internet gaming addiction among adolescents in Taiwan. *Cyberpsychology, Behavior and Social Networking*, 19(1), 49–55. <https://doi.org/10.1089/cyber.2015.0345>
- Yee, N. (2006). Motivations for play in online games. *CyberPsychology and Behavior*, 9(6), 772–775. <https://doi.org/10.1089/cpb.2006.9.772>
- Yeh, Y.-C., Wang, P.-W., Huang, M.-F., Lin, P.-C., Chen, C.-S., & Ko, C.-H. (2017). The procrastination of Internet gaming disorder in young adults: The clinical severity. *Psychiatry Research*, 254, 258–262. <https://doi.org/10.1016/j.psychres.2017.04.055>
- Young, K. S. (1998). Internet addiction: The emergence of a new clinical disorder. *CyberPsychology and Behavior*, 1(3), 237–244. <https://doi.org/10.1089/cpb.1998.1.237>

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