

TIME TO ABANDON INTERNET ADDICTION?
PREDICTING PROBLEMATIC INTERNET, GAME, AND SOCIAL MEDIA USE FROM PSYCHOSOCIAL
WELL-BEING AND APPLICATION USE

Antonius J. van Rooij, Christopher J. Ferguson, Dike van de Mheen, Tim M. Schoenmakers

Abstract

Objective: There have long been indications that those with problems controlling their Internet use manifest those problems in relation to specific applications. The current study empirically explores the option of abandoning a unified approach to problematic 'Internet use', by splitting the concept into more specific application level measurement.

Method: The current study used self-report survey data, collected from Dutch adolescents (aged 12-15, N=3945). Two Structural Equation Models predicted either problematic Internet use (model 1) or both problematic game use and problematic social media use (model 2). Problematic use of the Internet/games/social media was assessed with three abbreviated 6-item versions of the CIUS. Predictors included computer-activity use type in hours per week, depressive mood, loneliness, social anxiety, negative self-esteem, and general life-satisfaction.

Results: Problematic Internet use was associated with both social and gaming activities, as well as depressive mood. In the split model, problematic social media use was associated with three types of social, Internet behavior (social networking, Twitter, and instant messenger) and depressive mood, while problematic gaming was associated with both online (Internet) and offline gaming, as well as by gender (male) and depressive mood.

Conclusions: The more specific problematic social media use and problematic game use measures provide a less ambiguous and clearer picture that also reveals the role of gender within problematic game use. This provides some evidence to support splitting up measures of problematic Internet use into more specific measures in the future.

Key words: problematic Internet use, problematic social media use, problematic game use, depression, addiction

Declaration of interest: none

Antonius J. van Rooij, Ph.D.^{1,2,3}, Christopher J. Ferguson, Ph.D.⁴, Dike van de Mheen, Ph.D.^{2,3,5}, Tim M. Schoenmakers, Ph.D.^{2,3,6}

¹ imec-mict-Ghent University Department of Communication Sciences, Belgium
Korte meer 7-9-11, 9000 Ghent, Belgium

² IVO Addiction Research Institute Rotterdam
Heemraadssingel 194, 3021 DM Rotterdam, The Netherlands

³ Erasmus MC, University Medical Center Rotterdam
P.O. Box 2040, 3000 CA, Rotterdam, The Netherlands

⁴ Stetson University, United States
421 N. Woodland Blvd. Unit 8358 DeLand, Florida 32723

⁵ Maastricht University, Department of Health Promotion
P.O. Box 616, 6200 MD Maastricht

⁶ NIVEL, Netherlands Institute for Health Services Research, P.O. box 1568, 3500 BN Utrecht, The Netherlands

Corresponding author

A.J. van Rooij, Ph.D.

imec-mict-Ghent University, Department of Communication Sciences, imec-mict
Korte meer 7-9-11, 9000 Ghent, Belgium

Telephone: +32 9 264 97 69

E-mail: Tony.vanRooij@UGent.be

Introduction

Internet addiction & terminology

Internet addiction has been defined as loss of control over Internet-use behavior, which leads to significant impairment in other areas of life (Sim et al. 2012). Unfortunately, it is becoming harder and harder to attribute problems to general use of the Internet, as opposed to

the use of specific applications. In line with other recent research (Király et al. 2014, Laconi et al. 2015, Schou Andreassen et al. 2016) and complementary to other research in the current special issue (Mérrelle et al. n.d., Starcevic and Billieux n.d.), the current study empirically explores the option of abandoning a unified approach to problematic 'Internet use', by splitting the concept into more specific application level measurement.

While the phenomenon of Internet addiction has been

studied for about 20 years (Goldberg 1995, Griffiths 1996, Young 1998), the research field does not employ coherent terminology in studying these addiction-like issues involving computer technology. The terms addiction, compulsive, problematic, and disorder are all regularly used. In the current study we will use self-reported survey data and employ the term *problematic use*, in line with earlier work and other recent studies (Caplan 2002, Király et al. 2014, Van Rooij et al. 2014). We prefer this term as self-reported symptoms covering addictive behavior, while indicative of problematic behavior, do not offer enough evidence of clinical level impairment to warrant terms like ‘disorder’ and ‘addiction’ (Van Rooij and Prause 2014).

Problematic Internet use: medium-level versus application-level conceptualization

There have long been indications that those with problems controlling their Internet use manifest those problems in relation to specific applications. For instance, it has been suggested that some people get ‘addicted’ to video games. Initially, before the age of online (multiplayer) games, these reports were mostly linked to offline games, played in the arcades or at home on console systems (Fisher 1994, Griffiths 1997, Griffiths and Dancaster 1995), but more recently these reports generally involve online games played with others (Van Rooij et al. 2014). Also, while she argued for a generalized approach to Internet addiction, Young (1998) also showed that problematic Internet users tended to use Multi-User-Dungeon games (28%) and Chat Rooms (35%) most often. Thus, there has always been some tension between conceptualizing problematic Internet use on the level of the medium (Internet) or on the level of the application.

This issue remains current within psychiatry, as the new *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) shows. Where the earlier (2012) drafts of the new condition spoke of Internet Use Disorder (American Psychiatric Association 2012), the DSM-5 finally included a proposal for Internet Gaming Disorder (American Psychiatric Association 2013). Curiously, this conceptualization appears to disqualify problematic Internet use that is not gaming, as well as problematic gaming that is not done on the Internet (Griffiths and Pontes 2014). The exclusion of offline games seems somewhat premature: online gaming problems might be viewed as either a subtype of problematic Internet use or as a separate issue with gaming in general, which might involve offline games as well (Dowling 2014). In fact, there is substantial debate about the necessity of creating a new disorder and for ‘addictive’ gaming: some researchers argue that current measurement approaches suggesting new disorders require more substantial empirical and theoretical work (Griffiths et al. 2016, Van Rooij and Prause 2014).

Empirical findings on problematic Internet use versus problematic game/social media use.

In the literature, we find further input for abandoning a unified concept of problematic Internet use in favor of specific measures. Firstly, some activities seem to be more problematic than others. For instance, games and social media use are regularly mentioned as problematic in early adolescence (Gross et al. 2002, Subrahmanyam et al. 2001). This fits with findings from a longitudinal study on a Dutch adolescent sample that looked at a wide set of Internet and computer behavior in relation to

problematic Internet use. Changes in online gaming were most strongly associated with changes in problematic Internet use over a 1-year period, while social network use and instant messenger use also predicted change (Van Rooij et al. 2010). More studies confirm the relationship between problematic Internet use and social media / video gaming (Rehbein and Möble 2013, Rumpf et al. 2011). The association with social media also highlight the potential new issue of problematic social media use (Kuss and Griffiths 2011). Extending this, a new scale for problematic social media use was associated with depressive mood, impulsivity/ADD, and negative self-esteem in a sample of adolescents, but not with loneliness. Decreased self-esteem was found in a comparable study among a general population sample well (Andreassen et al. 2016).

Secondly, empirical studies find divergent comorbid problems and heavily impacted populations when using application specific instead of generalized measures (Montag et al. 2015). For instance, an Australian study found that adolescents (12-18 years) with generalized problematic Internet use score in the clinical range for anxiety and depression (King et al. 2013). In contrast, the problematic video gaming group did not differ greatly from their normal counterparts in the same study, with regards to anxiety and depression. A study by Rehbein and Möble illustrates differences as well (although in the reverse direction): they found that subjective psychological strain was higher among those with problematic (online or offline) game use than among those with generalized problematic Internet use. In their study, problematic Internet use mostly related to social networks (Rehbein and Möble 2013).

A small number of other studies have included multiple measures, looking at problematic gaming, social media, and/or Internet use in the same sample. Király et al. looked at both problematic gaming and problematic Internet use and mainly found a gender difference: gamers were more likely to be male and played mainly online games, while generalized problematic Internet use was associated with both communication and online gaming (Király et al. 2014). One study on a (mostly) young adult sample included measures for problematic Internet use, gaming, and communication and found positive associations for all three measures with time online, depressive symptoms, decreased life satisfaction (females only), and self-esteem (Laconi et al. 2015). Unfortunately, this study provided associations, not controlling for the overlap between variables. However, another recent study compared two instruments that assess problematic gaming and social media use (Schou Andreassen et al. 2016). Two separate regression analyses were run to compare predictors for the two forms of problematic behavior, although the two problematic measures employed different terminology and phrasing. Findings show that problematic gaming is predicted by lower age, gender (male), ADHD, and depressive mood. Problematic social networking is predicted by lower age, gender (female), ADHD, and OCD (but not depressive mood). The authors report a low correlation between the problematic gaming and social media use measures. These findings provide some indication that problematic social media use and gaming are issues that cover slightly different demographic groups, but might both be associated with decreased psychosocial well-being.

Current study

Empirical findings so far seem to indicate problematic video gaming, social media use and Internet use diverge

in both demographic group (e.g. gender) and possibly on indicators of psychosocial well-being. However, studies so far have not incorporated identically phrased measures for the three issues. In the current study, we use measures derived from a single parent-instrument to address this. Additionally, we will employ structural equation modeling (SEM) to deal with the partial overlap between measures that necessitated separate regression models in some studies. Due to the ability that SEM has to consider multiple constructs simultaneously, a single model can be built that includes multiple problematic use measures.

To explore the characteristics of the three problematic use measures, as predictors we shall examine demographic characteristics, type of computer activity, and a set of psychosocial characteristics that are widely used in this area (Kuss and Griffiths 2011, 2012), including depressive mood (Ha et al. 2007, Han and Renshaw 2012, Young and Rogers 1998), loneliness (Amichai-Hamburger and Ben Artzi 2003, Caplan 2007, J. Kim et al. 2009), social anxiety (Caplan 2007, Lee and Stapinski 2012), negative self-esteem (H.-K. Kim and Davis 2009, Widianto and Griffiths 2011), and general life-satisfaction (Chen et al. 2008).

Method

Participants and procedure

The study used the 2012 sample of the paper-and-pencil survey study 'Internet and Youth' (N=4519, n=3945 returned questionnaires). The survey was distributed to young (ages 12-15) adolescents in the classroom setting in 19 secondary schools. Average response rate for participating classes was 92%. Schools were randomly selected, but representativeness for the country was not an aim within the current study.

Study procedures were carried out in accordance with the Declaration of Helsinki. Given the subject matter, no ethical external approval was required under Dutch law. Both children and parents receive the opportunity to refuse participation at any time without consequences: this rarely occurred. For further details on the procedure we refer to earlier publications on the parent study (Kuss et al. 2013, Van den Eijnden et al. 2014, Van Rooij et al. 2011, Van Rooij et al. 2014).

Sample

The sample contains 50% boys, distributed over the first grade (ages 12-13, 46%) and second grade (ages 13-14, 54%) of Dutch secondary schools. Pre-vocational training (low education level, 57%) was most prevalent, compared to pre-college/university training (high education level, 43%).

Measures

Problematic Internet use, problematic video game use and problematic social media use. The existing, validated 14-item adolescent CIUS scale was designed to measure problematic Internet use (Meerkerk 2007, Meerkerk et al. 2009). The scale was modified to refer to gaming and its validation was published as the VAT (Van Rooij et al. 2012). As noted in the introduction: the terminology (compulsive, addiction) has shifted over the years as understanding changed, the item content for CIUS/VAT covers what we now refer to as problematic use. In the current study, we used *three* six-item versions

of the CIUS to assess, respectively, problematic Internet use, problematic social media use, and problematic gaming.

The abbreviation was done for pragmatic reasons (questionnaire length), and to minimize repetition for respondents. The six items were selected based on the highest average factor loading items in original validation studies (Meerkerk 2007, Meerkerk et al. 2009), while maintaining coverage of the main behavioral addiction components: loss of control, pre-occupation, withdrawal symptoms, coping, and two types of conflict: social problems and problems fulfilling schoolwork responsibilities. There is some tension between the assumption of components and the assumption of a reflective measurement model, which we discuss in another paper (Van Rooij et al. 2016). For the current paper we focus on construct level issues and assume a reflective measurement model, as this is the current norm within the field. Appendix A contains the three lists, while **table 1** shows the fit characteristics (Confirmatory Factor Analysis, CFA) and reliability indicators for all included scales.

Application use. Weekly hours spent per application was obtained by multiplication of two questions measuring days per week of gaming with 8 answer options (never, 1 day per week, to 7 days per week) and average hours of gaming per day with 10 answer options (never, 1 hour or less, 2 hours, to 9+ hours). Social media activities included in the survey were: instant messaging, Twitter, social networking (e.g. Facebook), and YouTube. Three types of gaming were distinguished: (multiplayer) online games that are played with others, casual browser games / mobile games, and finally offline games.

Depressive mood. The 6-item Depressive Mood List (Engels et al. 2001; Kandel and Davies 1982, 1986) was included. An example item would be: "I feel too tired to do anything". Items are scored from 1 (never) to 5 (always). As these items reflect overlapping content, the error terms for items 1 and 3 (both dealing with sleep/exhaustion) and items 5 and 6 (both dealing with nervousness/worry) are correlated in the further latent variable analyses.

Loneliness & lack of connection. The UCLA 10-item Loneliness Scale (Russell et al. 1980) was included. Exploratory Factor Analyses (EFA) on 50% of the sample revealed two distinct five-item sub-constructs in the original 10-item list: five items deal with feelings of loneliness, while the other five items deal with feeling connected (which were reversed in our analyses to have the same direction as loneliness). Examples are: "I miss friendship" (loneliness), and "I feel strongly connected to people [reversed]". Items are scored from 1 (never) to 5 (always). The error terms for two item-pairs dealing with connectedness were correlated in latent variable analyses: the first pair deals with feelings of connection (items 2 and 3), while the second pair deals with relying on others (items 9 and 10).

Life satisfaction. The seven-item Students' Life Satisfaction Scale (SLSS) (Huebner 1991a, 1991b) was included in the study. An example item is "I have a good life". The error terms were correlated for three pairs of items: 1 and 2 (dealing with having a good/fine life), 4 and 3 (dealing with the wish for change in life, reversed), and 5 and 6 (dealing with feeling content and satisfied). Items are scored from 1 (fully disagree) to 6 (fully agree).

Social anxiety (new situations and generalized). Two subscales of a social anxiety scale were included, Dealing with Social Avoidance and Distress in New Situations (e.g. "I feel shy when I meet new people") and Generalized Social Avoidance and Distress (e.g. "I feel shy, even around friends of my own age that I

know well”) (La Greca and Stone 1993). The items are scored from 1 (not at all) to 5 (very much so). For new situations, the error terms are correlated for items 1 and 2 (dealing with nervousness/shyness around strangers). For generalized anxiety, the error terms are correlated for items 7 and 8 (requesting or inviting others to do something) and 9 and 10 (acting quiet or shy in groups).

Negative self-esteem. Rosenberg’s 10-item Negative Self-Esteem Scale (Rosenberg 1965) was included. EFA on 50% of the sample revealed two distinct constructs: the first dealing with lack of positive self-esteem, e.g. “I feel I have some good characteristics ” (reversed item) and a second dealing with feelings of negative self-esteem (“Sometimes I feel useless”). Two items were correlated in the lack of positive self-esteem scale: these items (3 and 4) deal with positive self-image and positive attributes.

Analytical strategy

Analyses were conducted using Mplus 7 (Muthén and Muthén 2012) and SPSS 20 (IBM 2012). Robust maximum likelihood estimation (MLR) was used and model fit was evaluated through Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), Comparative Fit Index (CFI), and χ^2 -indices (Marsh et al. 2004). Ideally, CFI should be above .95 and the values for RMSEA and SRMR should be .05 or lower, although minor deviations from these values (i.e., CFI > .90) are likely to still indicate good fit (Marsh et al. 2004).

As a first step, we evaluated reliability and factor structure (Confirmatory Factor Analyses, CFA) of our scales, as well as the overall fit of the measurement model. The full measurement model was obtained for three sets of variables: the first set involved problematic Internet use, the second set problematic social media and problematic gaming, and the third a total model involved both problematic Internet use and the split variables

for problematic social media use and problematic gaming. This final model is used to provide standardized correlations between the latent constructs (e.g. **table 2**). As the three main measures of problematic use are conceptually related, we checked discriminant validity through the Fornell-Lacker criterion, which states that for measures to be discriminant, the square root of the average variance extracted (AVE) must be higher than the construct’s correlation with other constructs in the model (Fornell and Larcker 1981).

In a second step, we computed two separate structural models, in which we predict either problematic Internet use or the set of both problematic game and social media use from the time spent on applications and/or games, the psychosocial variables such as depressive mood, and demographic characteristics. Given that large samples can result in statistical significance for trivial effects, we will employ a two-tiered system for interpretation of effect sizes. Effect sizes higher than .20 will be considered practically significant findings (Ferguson 2009), while .10 will be used as a minimum relevant effect size.

Results

Step 1. Scale analyses and measurement model

Table 1 provides an overview of the included scales and their means, item counts, and reliability (of observed variables). For each scale a CFA was done, and error terms between items were correlated for some of the psychosocial well-being scales (as discussed under Methods). No error term correlation was done for the three brief problematic use scales, as these scales contain questions that cover six different domains associated with behavioral addictions (see measures). Findings reveal good or adequate fit for all of the scales, with good reliability on all scales and sub-scales.

The overall measurement model including all three

Table 1. Scale reliability, confirmatory factor analysis model fit, Cronbach’s α and measurement invariance analyses for problematic internet/game/social media use scales and psychosocial wellbeing

	Items	M (Sd)	Cr. α	CFI	RMSEA	SRMR	χ^2 (df)
Problematic game use	6	1.62(.74)	.86	.95	.07	.035	166.914(9)***
Problematic social media use	6	1.70(.79)	.88	.96	.07	.028	181.392(9)***
Problematic internet use	6	1.79(.69)	.79	.97	.06	.026	122.919(9)***
Depressive mood	6	2.16(.75)	.83	.99	.04	.012	40.458 (7)***
Life satisfaction ^a	7	4.64(.91)	.85	.99	.00	.018	95.387 (11)***
Social anxiety				.98	.05	.030	348.466(31)***
SAD-New Social avoidance and distress (new situations)	6	2.26(.80)	.84				
SAD-O Social avoidance and distress general	4	1.65(.74)	.82				
Negative self-esteem				.98	.04	.023	222.994(33)***
Lack of positive self-esteem	5	1.79(.61)	.79				
Negative self-esteem	5	1.75(.73)	.86				
Loneliness scale				.986	.031	.023	155.630 (32)***
Loneliness	5	1.60(.60)	.78				
Lack of connection	5	1.74(.60)	.80				

** $p < .01$, *** $p < .001$; ^a all items scored 1-5 except for Life Satisfaction (1-6)

problematic use scales and the eight psychosocial scales demonstrates adequate fit (CFI=.90, RMSEA=.04, SRMR=.05, $\chi^2(df)=11010.83$ (1703), $p<.001$). **Table 2** contains an overview of the standardized correlations between the latent variables in this complete model. Fit of the measurement model is slightly improved by excluding the problematic Internet use scale (CFI=.94, RMSEA=.03, SRMR=.04, $\chi^2(df)=6401.83$ (1374), $p<.001$).

Table 2 provides standardized correlations between the latent constructs in the measurement model. The main relationships of interest are those between problematic use measures and psychosocial well-being measures. Broadly speaking, fairly similar patterns of association are found for the problematic use measures: self-reported problematic use of Internet/games/social media is associated with lower life satisfaction, and with higher loneliness, social anxiety, and negative self-esteem. Divergent results are found for the reversed scale dealing with connection to others: only problematic gaming was associated with a decrease of connection to others, while

problematic social media use and Internet use were not.

Evaluation of the Fornell-Lacker criterion for the three problematic use measures shows reveals no issue with discriminant validity for problematic social media use ($\sqrt{AVE}=.74$) or problematic Internet use ($\sqrt{AVE}=.72$). However, the standardized correlation of $r=.81$ between the latent construct of problematic social media use and problematic Internet ($\sqrt{AVE}=.62$) shows that problematic Internet use and problematic social media use might have an issue with discriminant validity. Thus, our structural models will be split: one model will include problematic game and social media use, and one model will include problematic Internet use.

Step 2. Structural models predicting problematic use of Internet/games/social media

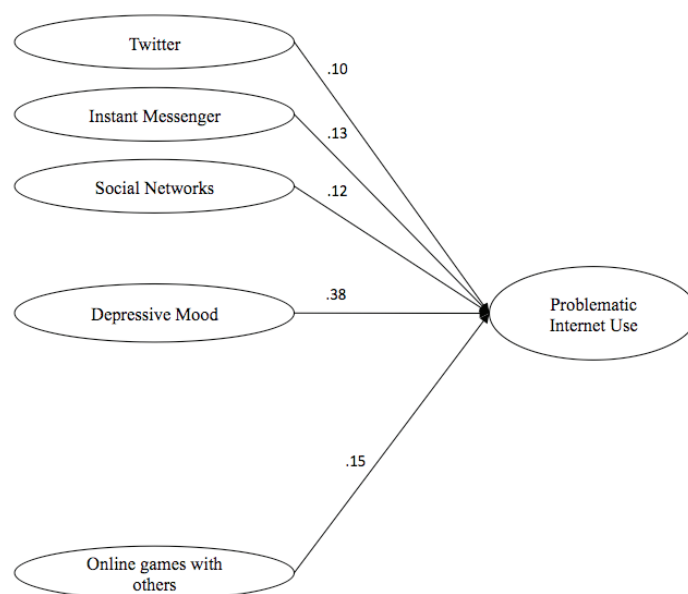
Two structural models were computed, predicting problematic Internet use (model 1, **figure 1**) or the split model for problematic social media and game use (model 2, **figure 2**), respectively. Predictors of interest

Table 2. Standardized correlations for latent variables in measurement model: problematic use measures and psychosocial wellbeing

	2	3	4	5	6	7	8	9	10	11
1 Problematic social media	.42	.81	.45	-.30	.32	.02 ^a	.22	.17	.27	.31
2 Problematic gaming		.58	.23	-.18	.22	.19	.14	.25	.15	.19
3 Problematic internet use			.52	-.34	.40	.07 ^b	.29	.23	.25	.34
4 Depressive mood				-.69	.73	.21	.49	.48	.53	.74
5 Life satisfaction					-.59	-.37	-.33	-.41	-.67	-.69
6 Loneliness						.34	.53	.67	.50	.71
7 Lack of connection							.14	.34	.46	.37
8 Social anxiety: new situations								.78	.36	.47
9 Social anxiety: general									.41	.55
10 Lack of positive self-esteem										.67
11 Negative self-esteem										

All correlations significant at $p<.001$, except ^a Not significant; ^b $p<.01$

Figure 1. Structural model, predicting problematic internet use from 11 measures of psychosocial well-being, 7 measures of media activity (hours per week), and demographic characteristics



Note. only significant associations ($p<.001$) shown, non-significant predictors not shown., standardized estimates reported.

include the 11 measures of psychosocial well-being, the control variables (gender, education level, and learning year), and the hours per week spend on seven activities (instant messaging, Twitter, social networking, YouTube, online games with others, casual browser games / mobile games, and offline games).

Adequate fit was established for the problematic Internet use model (CFI=.93, RMSEA=.03, SRMR=.05, $\chi^2(df)=6107.64(1560)$, $p<.001$), with an approximate explained variance of 38% ($R^2=.38$), see **figure 1**. Problematic Internet use is found to be predicted by both social media type activities (Twitter, instant messenger, social networks) and gaming behavior (online gaming with others). Depressive mood predicts changes in problematic Internet use ($\beta=.38$, $p<.001$), but none of the other measures of psychosocial well-being do.

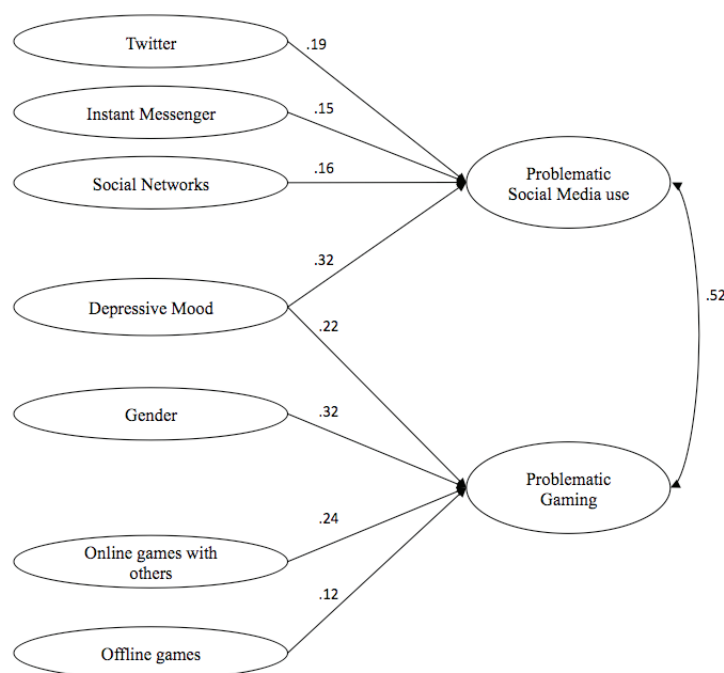
The split model also fit adequately (CFI=.92, RMSEA=.03, SRMR=.05, $\chi^2(df)=8093.25(1904)$, $p<.001$) with an explained variance of 32% for problematic social media use and 39% for problematic game use (**figure 2**). Again, depressive mood predicts changes in problematic use, for both social media ($\beta=.32$, $p<.001$) and gaming ($\beta=.22$, $p<.001$). Findings further show that the two problematic use measures split according to activity type. Problematic social media use is mainly predicted by three social media activities (Twitter, instant messenger, and social networks), while problematic gaming is mainly predicted by online games played with others and offline games. Additionally, male gender predicts problematic gaming ($\beta=.38$, $p<.001$), while a gender effect is not found for problematic social media use.

Discussion

The current study explored two approaches to operationalizing problematic (addictive) Internet use in an adolescent sample: either through a unified measure of problematic Internet use, or through two separate measures of problematic game use and problematic social media use. Findings reveal that problematic Internet use was associated with both social and gaming activities, as well as depressive mood. In the split model, problematic social media use was associated with three types of social Internet behavior (social networking, Twitter, and instant messenger) and depressive mood, while problematic gaming was associated with both online (Internet) and offline gaming, as well as by gender (male) and depressive mood. Thus, the more specific measures provide a less ambiguous and clearer picture that also reveals the role of gender within problematic game use. This provides some evidence to support splitting up measures of problematic Internet use into more specific measures in the future.

The use of three similarly phrased and brief instruments to assess problematic game/social media/Internet use (Appendix A) is both a strength and a weakness in the current study. It provides clear comparisons on the one hand, but this approach might be susceptible to issues with discriminant validity. To address this concern, we executed fairly rigorous scale analyses (**table 1**), and found good fit for all scales. Moreover, we explored an indicator of discriminant validity and found no issue between the problematic social media and game use scales, but some evidence of overlap between the problematic social media and

Figure 2. Structural model, predicting problematic social media use and problematic gaming from 11 measures of psychosocial well-being, 7 measures of media activity (hours per week), and demographic characteristics



Note. only significant associations ($p<.001$) shown, non-significant predictors not shown, standardized estimates reported.

Internet use scales. This fits with earlier research that also found fairly strong relationships between social media problems and ‘generalized Internet addiction’ (Montag et al. 2015, Rehbein and Mößle 2013). This finding also suggests that, for the adolescents in our sample, ‘Internet addiction’ covers problematic use of social media to a large extent. But it also indicates that there might not be much room left (in our data) for a non-social media use/non-game use concept of ‘generalized problematic Internet use’, that is not connected to any specific application as is sometimes suggested (Davis 2001).

Our correlational results fit with earlier research (Laconi et al. 2015), as we found associations for all Internet/game/social media problematic use scales with depressive mood, negative self-esteem, time online, and decreased life satisfaction. Moreover, we also found associations with loneliness and social anxiety. The only exception was the loneliness sub-scale connection with others, where we found a negative association for problematic game use, but no relationship for problematic use of Internet/social media. In a controlled structural equation model however, only depressive mood remained as a predictor of problematic use.

While similar studies also found an association for depressive mood (Laconi et al. 2015, Schou Andreassen et al. 2016), our findings indicate that depressive mood should be taken into account (and possibly controlled for) when studying the relationship with these other indicators of psychosocial wellbeing, as various associations disappeared in the structural model. Our gender and activity findings in the split game/social media model fit with the earlier research, confirming the role of gender and the specific association with online games for problematic gaming (Király et al. 2014). While our results also found a relationship for offline games in the split model, the effect size was half that of the online games. This indicates online games play a large role in problematic gaming behavior. With regards to problematic social media use, our models revealed no gender effect, but in contrast with Király et al. (2014), we did find an effect for depressive mood.

It is also notable that the correlations between problematic use of both social media and gaming are only partially explained by application use. This is an expected finding: Problems are not necessarily time-related in all cases, and spending a lot of time is not always cause for concern. In fact, a correlation that is too high might indicate issues with discriminant validity, and possibly measuring time spent on the Internet instead of problematic use (Meerkerk et al. 2009).

Thus, our empirical findings seem to indicate that splitting problematic Internet use might be warranted. There is a conceptual argument for splitting as well. The tension between the application level of thinking (games/chats) and medium-level thinking (Internet) about problematic use of Internet-based technology has grown as technology has continued to develop. Initially, the Internet was accessed via a desktop computer and a wired router. This meant that time spent on the Internet could be estimated reasonably well by logging hours behind the screen. Currently, people connect to the Internet through a large number of devices, often wirelessly. Internet use has now become fragmented over time and devices. Consequently, ‘Internet use’ is increasingly hard to define and assess.

The comparison of problematic game use and problematic social media use in the current study using phrasing derived from a single, unified parent scale (Meerkerk et al. 2009, Van Rooij et al. 2012) is a

strength of this study and a novel approach. However, while it allows for direct comparison of correlates, it might not take into account potential differences in behavior between social media and gaming. Thus, a refinement and expansion of these split scales might help in establishing future medium-specific criteria. We might compare this to the development of the Gambling Disorder criteria, which started out resembling substance abuse and later added gambling specific criteria (e.g. chasing of losses) (Sim et al. 2012).

The new scales also have a limited number of questions and exclude tolerance, like the parent scale, which might limit comparison with some other scales (Meerkerk et al. 2009). Our approach thus remains, essentially, a confirmatory approach and future research might benefit from taking a more qualitative and wider perspective (Billieux et al. 2015). New work focusing on problematic game/social media use might benefit from obtaining objective or external outcome measures, such as official school grades, and moving into the clinical setting to obtain information on the clinical profile of people that have problems controlling their game or social media use.

In conclusion:

We contrasted an established approach to measurement of ‘Internet addiction’, namely a measure of problematic Internet use, with an application-level, divergent approach that asked questions about problematic game use and problematic social media use. Findings showed that the divergent approach provided more clarity and a clear split by application level and gender, while still being associated with depressive mood.

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APPENDIX A

BRIEF QUESTIONNAIRE TO ASSESS PROBLEMATIC USE OF INTERNET/GAMES/SOCIAL MEDIA

How often ...

(1, never; 2, seldom; 3, sometimes; 4, often; and 5, very often)

1. do you find it difficult to stop *Internet use/gaming/use social media*?
2. do others (e.g., parents or friends) say you should spend less time on *the Internet/games/social media*?
3. do you prefer to *use the Internet/game/use social media* instead of spending time with others (e.g., friends or parents)?
4. do you feel restless, frustrated, or irritated when you cannot *use the Internet/game/use social media*?
5. do you rush through your homework to use *the Internet/play games/use social media*?
6. do you *use the Internet/game/use social media*

because you are feeling down?

* No examples are given for games or Internet use, but social media is described in the survey as the use of social networks (e.g. Facebook), Instant Messenger (e.g. MSN / Skype), chatting, Twitter, Blogging, and Forums.

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