

**EMPIRICAL STUDY**

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# Problematic online sexual activities in men: The role of self-esteem, loneliness, and social anxiety

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**Abstract**

Several studies have shown that problematic use of online sexual activities (OSAs) can constitute a dysfunctional coping strategy that reflects a compensatory usage of the Internet. Yet, some specific risk factors—widely investigated in the field of general problematic Internet use—have to date been scarcely studied within the context of OSA. Hence, the goal of this study was to test a theoretical model in which self-esteem, loneliness, and social anxiety are hypothesized to predict the type of OSAs favored and their potential addictive use. To this end, an online survey was conducted in a sample of self-selected men who used OSAs on a regular basis ( $N = 209$ ). Results showed that low self-esteem is positively associated with loneliness and high social anxiety, which were in turn positively related to involvement in two specific OSAs: use of pornography and the search for online sexual contacts. Higher engagement in these OSA activities was related to symptoms of addictive usage. These findings underline the importance in psychological interventions of taking into account the specific OSA practiced to improve self-esteem and to reduce loneliness and symptoms of social anxiety.

**KEYWORDS**

loneliness, pornography, problematic online sexual activities, self-esteem, social anxiety

## 1 | INTRODUCTION

Since the early 2000s, the Internet has become an essential medium in both personal and professional life. One of the most popular Internet-related activities is engagement in various online sexual activities (OSAs), for example, pornography (videos and/or pictures), searching information related to sexual behaviors, playing sexual video games, dating sex sites, and sex webcams (Ballester-Arnal, Castro-Calvo, Gil-Llario, & Giménez-García 2014; Ross, Månsson, & Daneback, 2012; Wéry & Billieux, 2016). For the vast majority of people, this use of OSAs is non-problematic. However, for a subgroup of individuals, involvement in OSAs can become excessive and associated with loss of control and functional impairment (Albright, 2008; Ballester-Arnal et al., 2014; Grov, Gillespie, Royce, & Lever, 2011).

It is thus essential to understand why, for a subgroup of people, the use of OSAs becomes problematic. Numerous studies have shown that problematic use of OSAs can constitute a dysfunctional coping strategy (Chawla & Ostafin, 2007; Ley, Prause, & Finn, 2014; Moser, 2011, 2013). In such cases, involvement in OSAs is likely to reflect an experiential avoidance strategy to cope with or dissociate from intolerable thoughts, bodily sensations, and emotional states (Chawla & Ostafin, 2007). Some studies have shown that between 85 and 100% of people who report excessive sexual behavior present with at least one co-occurring psychiatric disorder (Kafka & Hennen, 2002; Raymond, Coleman, & Miner, 2003; Wéry, Vogelaere, et al., 2016). In addition, several studies have suggested that the main reasons for engaging in problematic OSAs are as a coping mechanism (with anxiety, depression, and low self-esteem), as a distraction, or as a means of stress reduction (Castro-Calvo, Giménez-García,

Gil-Llario, & Ballester-Arnal, 2018; Cooper, Galbreath & Becker, 2004; Ross et al., 2012; Wéry & Billieux, 2016).

These findings are consistent with Kardefelt-Winther's (2014a) proposal to anchor Internet-related disorders (such as problematic use of OSAs) in a "compensatory" framework. According to this theory, Internet use can help to alleviate a problematic situation and fulfill needs that are unachieved in real life. However, this strategy can ultimately result in various negative outcomes (e.g., professional, social, health-related) and thus constitutes a maladaptive coping behavior. According to Kardefelt-Winther (2014a), substantial research performed in the field of excessive Internet-related behavior has largely focused on isolated factors (e.g., psychosocial variables) and has thus failed to test comprehensive models, including moderator and mediator effects. Such a trend has led to an overestimation of some isolated factors and an underestimation of other potentially relevant variables. For example, in a study that focused on excessive online gaming, Kardefelt-Winther (2014b) demonstrated that the associations of loneliness and social anxiety with excessive online gaming become nonsignificant when stress was controlled for. Taking into account interactions and/or mediations between variables seems essential to improve our understanding of the problematic use of OSAs.

It appears to be important, therefore, to focus on specific risk factors (especially those associated with emotional dysregulation and maladaptive coping behaviors) that may be involved in the development of problematic use of OSAs. In particular, the role of self-esteem, loneliness, and social anxiety—which are known to interact with each other (see below) and have been widely studied in the context of general (unspecific) problematic Internet use—has to date scarcely been studied in the field of OSAs use (or has been studied in an isolated manner, as suggested in a criticism made by Kardefelt-Winther (2014a, 2014b)).

Several studies have, however, investigated the three above-mentioned factors in the context of problematic online behaviors. These previous studies showed that low self-esteem (Aydin & San, 2011; Bozoglan, Demirer, & Sahin, 2013; Kim & Davis, 2009), a high level of loneliness (Bozoglan et al., 2013; Kim, LaRose, & Peng, 2009; Morahan-Martin & Schumacher, 2003; Odaci & Kalkan, 2010), and social anxiety (Caplan, 2007; Kim & Davis, 2009) are positively related to problematic and excessive general Internet use (these studies were not focused on specific online activities). These results suggest that for individuals characterized by loneliness, social anxiety, and poor self-esteem, a preference for online interaction progressively develops, supported by beliefs that the Internet is a safer and more reinforcing place than the offline world, which is likely to result in excessive and uncontrolled involvement (Caplan, 2007; Kim et al., 2009; Morahan-Martin & Schumacher, 2003; Tangney, Baumeister, & Boone, 2004). Caplan (2007) focused on the role of loneliness and social anxiety in the preference for online (rather than face-to-face) social interaction and showed that this preference is explained by social anxiety, but not loneliness.

In the context of OSAs, a few studies have analyzed the links between loneliness and use of pornography. For example, Yoder,

Viriden, and Amin (2005) found that the more time spent online consuming pornography, the greater the sense of loneliness. Other authors have also shown that problematic pornography users are lonelier than recreational users (Böthe et al., 2018; Butler, Pereyra, Draper, Leonhardt, & Skinner, 2018). Efrati and Gola (2018) found that adolescents who displayed compulsive sexual behavior also had higher levels of loneliness and more sex-related online activities. A recent study has also shown that a feeling of loneliness is associated with the frequency of using sexually explicit Internet material among men (Weber et al., 2018). Some studies reported a link between use of pornography and low self-esteem, and a few suggested that problematic use of pornography was positively correlated with lower levels of general self-esteem (Barrada, Ruiz-Gomez, Correa, & Castro, 2019; Brown, Durtschi, Carroll, & Willoughby, 2017; Kor et al., 2014) and sexual self-esteem (Noor, Rosser, & Erickson, 2014). Similarly, Borgogna, McDermott, Berry, and Browning (2020) demonstrated that men with low self-esteem were especially attracted to pornography (as a way of conforming to and performing masculine role norms) and have more problematic pornography viewing. Finally, although several studies reported a high rate of social anxiety in people with hypersexual behaviors (not especially online; Raymond et al., 2003; Wéry, Vogelaere, et al., 2016), few studies have been conducted specifically in relation to OSAs. Nonetheless, some studies showed the presence of social anxiety symptoms in problematic pornography users (Kor et al., 2014; Kraus, Potenza, Martino, & Grant, 2015). Furthermore, several studies investigated the role of social anxiety in a specific population: Internet child pornography offenders. These studies reported that social anxiety is higher in online offenders than in other sexual offenders (Armstrong & Mellor, 2016; Bates & Metcalf, 2007; Middleton, Elliott, Mandeville-Norden, & Beech, 2006), indicating that social anxiety may play a pivotal role in online offending (e.g., the Internet providing a way to explore sexuality for those who have difficulty with interpersonal interactions; Quayle & Taylor, 2003).

An important limitation of existing studies, however, is that they almost exclusively focused on online pornography, whereas a wide variety of OSAs exist (such as sex webcams, 3D sex games, searches for online/offline sexual contact, or searching for sexual information) for which these three psychological factors may not be involved in the same way. For example, it can be supposed that an individual with high social anxiety may be more comfortable with searching for online sexual partners (e.g., using specific applications). Yet, it is unlikely that all types of OSAs have the potential to become maladaptive copings, which is typically the case of an activity such as searching for sexual information. Hence, it is important to take into account the heterogeneity of OSAs when it comes to consider the psychological factors underlying problematic use.

Another important limitation of existing studies is that they do not take into account the complex interrelationships between loneliness, social anxiety, and self-esteem. First, some authors found that people with low self-esteem have low confidence and do not feel comfortable in social interactions, which is associated (and probably promotes) loneliness (Çivitci & Çivitci, 2009; Creemers, Scholte, Engels,

Prinstein, & Wiers, 2012; Kong & You, 2013; Olmstead, Guy, O'Malley, & Bentler, 1991; Vanhalst, Goossens, Luyckx, Scholte, & Engels, 2013). Second, previous studies showed that low self-esteem constitutes a risk factor for social anxiety (de Jong, Sportel, De Hullu, & Nauta, 2012; Kim & Davis, 2009; Obeid, Buchholz, Boerner, Henderson, & Norris, 2013). Third, some studies emphasized a link between social anxiety and loneliness (Anderson & Harvey, 1988; Johnson, LaVoie, Spenceri, & Mahoney-Wernli, 2001; Lim, Rodebaugh, Zyphur, & Gleeson, 2016). Finally, other studies suggested that (1) self-esteem and loneliness significantly predict social anxiety (Subasi, 2007), (2) self-esteem (but not social anxiety) predicts loneliness (Panayiotou, Panteli, & Theodorou, 2016), and (3) the relationship between self-esteem and loneliness is mediated by social anxiety (Ma, Liang, Zeng, Jiang, & Liu, 2014). Thus, although these variables seem to be closely related and present with complex interrelationships, they have to date never been conjointly investigated in the context of problematic use of OSAs.

The current study thus aimed to fill a gap in the literature by testing a model (see Figure 1) that links low self-esteem, social anxiety, and loneliness to OSA preferences (i.e., type of OSA performed) and ultimately to symptoms of addictive use. We hypothesized that (1) low self-esteem is positively associated with both social anxiety and loneliness, (2) social anxiety is positively related to loneliness (mediates the role of social anxiety in the relationship between low self-esteem and loneliness), and (3) these variables are positively associated with OSA preferences and its problematic use.

## 2 | METHOD

### 2.1 | Participants and procedure

Participants were males recruited through announcements sent on a university messaging service, social networks, and sexuality-related forums. The study was restricted to male participants, as men have been found to be 3 to 5 times more frequently engaged in

problematic use of OSAs than women are (Ballester-Arnal et al., 2014; Ballester-Arnal, Castro-Calvo, Gil-Llario, & Gil-Julia, 2017; Ross et al., 2012; Wéry & Billieux, 2017). The survey was accessible online via the Qualtrics website. All participants received information about the study and gave their online consent before starting the survey. Anonymity of the participants was guaranteed (no personal data or Internet Protocol address was collected). No compensation was given for participating in the study. The study protocol was approved by the ethical committee of the Psychological Sciences Research Institute (Université Catholique de Louvain).

Inclusion criteria were being male, over 18 years, and a native or fluent French speaker, as well as having used OSAs at least once during the last 6 months. The study investigated sociodemographic characteristics, consumption habits of OSAs, symptoms of problematic use of OSAs, loneliness, self-esteem, and social anxiety (see Measures section).

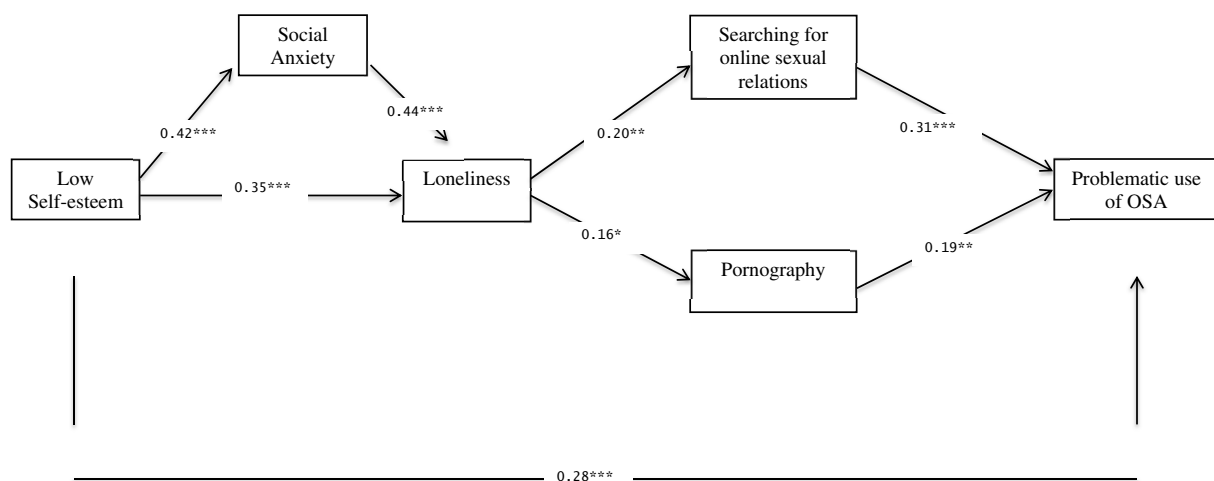
In total, 209 participants completed all measures used in the current study. The age of the final sample ranged from 18 to 70 years ( $M = 30.18$ ,  $SD = 10.65$ ; 77% 18–35 years old). Participants reported whether they predominantly had a university degree (55.5%), as well as whether they were in a relationship (48.3%) and were heterosexual (73.7%; see Table 1).

### 2.2 | Measures

Questionnaires included in the online survey were selected to prioritize instruments that have been validated and for which published versions exist in French.

*Sociodemographic information* was assessed regarding age, education degree, relationship status, and sexual orientation.

*Involvement in each type of OSA during the last 6 months.* Ten items were used to assess the frequency of OSAs use (e.g., pornography, sex webcam, 3D sex game) on a 6-point Likert scale ranging from “never” to “several times per day.” These items have been used in previous studies (Wéry & Billieux, 2016; Wéry, Burnay, Karila, & Billieux, 2016).



**FIGURE 1** Standardized parameters for the model. \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$

*Short Internet Addiction Test adapted to online sexual activities* (s-IAT-sex; Wéry, Burnay, et al., 2016). This scale measures problematic use of OSAs. The s-IAT-sex is a 12-item scale that assesses an addictive pattern of use, with six items evaluating loss of control and time management and the other six items measuring craving and social problems. All items are scored on a 5-point Likert scale ranging from “never” to “always.” Higher scores indicate higher levels of problematic use. The internal reliability (Cronbach's alpha) of the s-IAT-sex in the current sample was 0.85 (95% CI = 0.82–0.88).

*Liebowitz Social Anxiety Scale* (LSAS; Heeren et al., 2012). This scale assesses fear and avoidance in social and performance situations. The LSAS is a 24-item scale scored on a 4-point Likert scale ranging from “none” to “severe” for the intensity of fear, and from “never” to “usually” for avoidance of the situations. Higher scores indicate higher levels of fear and avoidance. The internal reliability (Cronbach's alpha) of the LSAS in the current sample was 0.96 (95% CI = 0.95–0.97).

*Rosenberg Self-Esteem scale* (RSE; Vallières & Vallerand, 1990). This 10-item scale assesses self-esteem on a 4-point Likert scale from “strongly disagree” to “strongly agree.” Higher scores indicate higher self-esteem. We decided to reverse items for the sake of the model's clarity. Thus, higher scores indicate lower levels of self-esteem. The internal reliability (Cronbach's alpha) of the RSE in the current sample was 0.89 (95% CI = 0.87–0.91).

*UCLA Loneliness Scale* (De Grâce, Joshi, & Pelletier, 1993). This 20-item scale measures feelings of loneliness and social isolation. All items are scored on a 4-point Likert scale ranging from “never” to “often.” Higher scores indicate a higher level of experienced loneliness in life. The internal reliability (Cronbach's alpha) of the

*UCLA Loneliness Scale* in the current sample was 0.91 (95% CI = 0.89–0.93).

## 2.3 | Data analytic strategy

The R (R Core Team, 2013) Package Lavaan (Rosseel, 2012) was used to compute the model and estimate parameters. The final structural model was determined through a stepwise approach. At the first step, direct associations of each OSA and problematic use of OSAs were considered in order to determine which activities were related to problematic use of OSAs and therefore constituted candidates for the subsequent multiple regression analyses to test the postulated model. The pattern of associations specified by the proposed model (Figure 1) was analyzed through path analysis by using a single observed score for each variable examined in the model. Standardized parameters were estimated by using the maximum likelihood method (Satorra & Bentler, 1988). To evaluate the overall goodness of the model, we considered the  $R^2$  of each endogenous variable and the total coefficient of determination (TCD; Bollen, 1989; Joreskog & Sorbom, 1996). The TCD indicates the overall effect of the independent variables on the dependent variables, with a higher TCD indicating more variance explained by the proposed model (for previous use of the TCD, see Canale et al., 2016, 2019).

## 3 | RESULTS

### 3.1 | Preliminary descriptive analysis

Reported in Table 2 are the mean scores, *SDs*, skewness, and kurtosis of the s-IAT-sex (assessing symptoms of problematic use of OSAs), the LSAS (assessing fear and avoidance in social and performance situations), the RSE (assessing self-esteem), and the UCLA Loneliness Scale (assessing sense of loneliness and social isolation).

Participants completed items related to the type of OSAs used (see Figure 2). Prevalence rates were determined on the basis of the OSAs in which the participant was involved at least once during the previous 6 months. The most ubiquitous OSA was “watch pornography” (96.7%) followed by “search for online sex advice” (59.3%) and “search for sexual information” (56.5%).

**TABLE 1** Sample characteristics (N = 209)

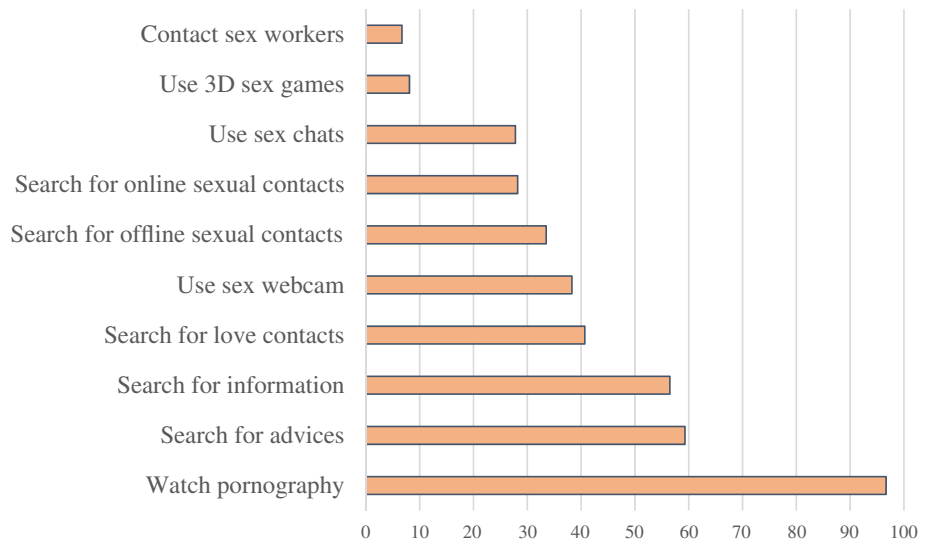
Characteristics	M (SD) or %
Age	30.18 (10.6)
Education	
No diploma	1.9
Primary school	0
High school	24.9
College	17.7
University	55.5
Relationship	
Single (without occasional sexual partner)	27.8
Single (with occasional sexual partner[s])	22.5
In a relationship living separately	31.6
In a relationship living together	16.7
Other	1.4
Sexual orientation	
Heterosexual	73.7
Homosexual	10.5
Bisexual	12
Do not know	3.8

**TABLE 2** Mean and range for the scales used in the online survey (N = 209)

Questionnaire	M (SD; range)	Skewness	Kurtosis
s-IAT-sex	2.02 (0.70; 1–5)	0.90	0.45
LSAS	1.89 (0.54; 1–4)	0.73	0.12
RSE	1.91 (0.63; 1–4)	0.67	−0.18
UCLA loneliness scale	2.09 (0.58; 1–4)	0.76	−0.11

Abbreviations: LSAS, Liebowitz Social Anxiety Scale; RSE, Rosenberg Self-Esteem scale; s-IAT-sex, short Internet Addiction Test adapted to online sexual activities.

**FIGURE 2** Percentage of OSAs use during the last 6 months ( $N = 206$ )



### 3.2 | Step 1: OSAs Associated with problematic use of OSAs

No multicollinearity issues were detected in the multivariate regression analysis. All independent variables had tolerance values of at least 0.54 and variance inflation factor (VIF) values below 2.27. Tolerance values of over 0.02 and under 2.5 for VIFs are generally considered reliable cutoff points for the absence of multicollinearity (Craney & Surlis, 2002). We also relied on Cook's distance to assess the influence of individual observations on the regression model for problematic use of OSAs. Cook's distance was less than 1 (Cook & Weisberg, 1982), so none of the participants fulfilled the criteria for outliers as assessed by Cook's distance. Results showed that higher use of pornography ( $\beta = 0.21$ ,  $p = .002$ ) and more frequent searching for online sexual relations ( $\beta = 0.24$ ,  $p = .01$ ) were positively associated with the severity of OSA. Given these results, pornography and searching for online sexual relations were retained as candidates to be implemented in the computed model.

### 3.3 | Step 2: Testing the hypothesized model

All bivariate correlations among model variables were in the expected direction (see Table S1). The results obtained from the path analyses validated the hypothesized model. Low self-esteem was associated with higher levels of loneliness and higher social anxiety. A higher level of social anxiety was associated with higher levels of loneliness, which in turn was linked to more engagement in the two OSAs considered (pornography and searching for online sexual relations). A higher level of these OSAs was associated with problematic OSAs use, which in turn was also linked to lower self-esteem. The squared multiple correlations indicated that the model accounts for an important part of the variance in study variables, that is, 18% of the variance in social anxiety, 45% in loneliness, 3% in pornography, 4% in searching for online sexual relations, and 24% in problematic use of OSAs. The total amount variance explained by the model

( $TCD = 0.36$ ) indicated a good fit to the observed data. In terms of effect size,  $TCD = 0.36$  corresponds to a correlation of  $r = .60$ . According to Cohen's (1988) traditional criteria, this is a very large effect size. In addition to the direct effects shown in Figure 2, self-esteem also had an indirect relationship with loneliness through its effect on social anxiety ( $\beta = 0.19$ ,  $p < .001$ ). A second version of the model was evaluated to consider the relationship status (see Figure S1). In this model, the only effect of relationships status on *searching for online sexual relations* was taken into account, because there was a difference in terms of *searching for online sexual relations* between groups (single vs. in a relationship; see Table S1).

## 4 | DISCUSSION

A better understanding of the psychological factors involved in the development and maintenance of problematic use of OSAs is required, given the ubiquity of OSAs use in the general population. Despite the efforts made in this direction and the numerous studies performed in recent years, the existing literature in this field has presented important limitations. Accordingly, the aim of the current study was to test a model that linked self-esteem, social anxiety, and loneliness to the type of OSAs performed and to the symptoms of problematic use of OSAs.

In support of our hypotheses, the present findings provided evidence for a mediational model in which low self-esteem is associated with loneliness and high social anxiety, and in which the relationship between self-esteem and loneliness was mediated by social anxiety. These factors are in turn associated with the use of pornography and the search for online sexual contacts, as well as with symptoms of problematic use. These findings are consistent with those of previous studies that showed that low self-esteem is associated with loneliness (Panayiotou et al., 2016) and with higher social anxiety (de Jong, 2002; Obeid et al., 2013), that the relationship between self-esteem and loneliness is mediated by social anxiety (Ma et al., 2014), and that problematic use of pornography is associated with low self-

esteem (Barrada et al., 2019; Brown et al., 2017; Kor et al., 2014), loneliness (Bóthe et al., 2018; Butler et al., 2018; Yoder et al., 2005), and social anxiety symptoms (Kor et al., 2014; Kraus et al., 2015). To date, these factors have been mainly studied separately and rarely in the context of OSAs. The results of the current study thus provide a better understanding of the complex relationships between these variables. Our findings, although cross-sectional, are compatible with the view that a lower self-esteem might constitute a risk factor for higher social anxiety and loneliness. Under such circumstances, and in accordance with the compensatory usage of the Internet model (Kardefelt-Winther, 2014a), individuals are susceptible to display a preference for online sexuality and experience addictive use.

Furthermore, among the OSAs assessed in the present study, only two appeared to be related to problematic use: watching pornography and searching for online sexual relations. These results are in accordance with those of previous studies that showed that pornography is the most problematic OSA in men (Ross et al., 2012; Wéry & Billieux, 2016). Moreover, several previous studies emphasized that online sexual contact with other users is also a frequent activity in males and that this OSA has the potential to become problematic and engender tangible negative consequences (Daneback, Cooper, & Månsson, 2005; Döring, Daneback, Shaughnessy, Grov, & Byers, 2017; Goodson, McCormick, & Evans, 2001; Wéry & Billieux, 2016). Moreover, the present results also suggest that relationship status play a role in the type of OSA use. Relationship status was not found to affect pornography use but appeared to impact the search for online sexual relations, which is consistent with the results obtained in a previous study by Ballester-Arnal et al. (2014). This result is likely due to the fact that some OSAs—typically searching for online sexual partners—are viewed as a proof of infidelity and thus less practiced by people being in a romantic relationship (Ballester-Arnal et al., 2014; Whitty, 2003). Our findings suggest that the use of the Internet for sexual purposes is multi-determined and that it is essential that further research systematically take into account the specific sexual activities practiced online (for similar arguments, see also Barrada et al., 2019; Shaughnessy, Fudge, & Byers, 2017). The present results also highlight the importance of conducting research on various OSAs beyond the mere consideration of online pornography, as is often the case in this research field.

Notably, the two activities retained in our model (watching pornography and searching for online sexual relations) further support the view that structural characteristics of OSAs are important in explaining their potential problematic usage. Indeed, the anonymity offered by the Internet makes it a privileged place to explore sexuality outside social judgment (Cooper, Scherer, Boies, & Gordon, 1999). Along the same lines, our results could be explained by the online disinhibition phenomenon, that is, the decrease in concerns about the presentation of oneself and the judgment of others (Suler, 2004). On the whole, the physical distance and anonymity offered by the Internet generates a sense of security that increases comfort during virtual intercourse with potential partners (Daneback, 2006). Indeed, several studies reported that individuals with these characteristics tend to prefer online over offline social interactions (Caplan, 2007; Lee &

Cheung, 2014; Steinfield, Ellisonthose, & Lampe, 2008; Valkenburg & Peter, 2007). These previous results are consistent with the social compensation hypothesis (Kardefelt-Winther, 2014a), which suggests that people with poor social skills are especially prone to developing a preference for online interactions; the current study suggests that this might also valid in matters of sexuality. It is thus possible to speculate that in the initial stages, the use of OSAs will efficiently increase self-esteem and mitigate social anxiety and loneliness. Such an effect has, for example, been suggested by Shaw and Gant (2002), who found that engagement in online chat leads to a decrease in loneliness and depressive symptoms and an increase in self-esteem and perceived social support. However, with time and potential maintenance of the behavior, it is possible to expect that the use of OSAs may become indispensable and cause negative consequences (Caplan, 2007), resulting in compromised self-esteem and increased isolation and social anxiety. Crucially, continuing to use the Internet for sexual behavior implies an avoidance of real-life mating situations, which is likely to further reinforce the phenomenon of sexual avoidance.

The current study presents some limitations. First, the sample was relatively small and self-selected, and its composition and representativeness limit the generalizability of the results. Nonetheless, the sample size ( $N = 209$ ) can be considered adequate for the path analyses used here, ensuring satisfactory statistical power (Bentler & Chou, 1987; Kline, 2005; Quintana & Maxwell, 1999). Second, we have not included measures of offline sexual behaviors, which implies that the interpretation of our findings based on the online disinhibition hypothesis remains speculative. Third, the present study was only conducted in males, while realizing future studies also involving women is required. Indeed, previous studies emphasized gender difference in OSAs use preferences (e.g., women tend to prefer interactive OSAs such as sexual chat whereas men tend to prefer OSAs including visual content such as pornography, see Green, Carnes, Carnes, & Weinman, 2012; Cooper et al., 2003; Schneider, 2000). Future studies involving both genders are thus required to extend the present findings. Fourth, it might be that some alternative explanations not addressed in the current paper explained the patterns of association found. For example, the moral incongruence theory (Grubbs & Perry, 2019) posits that some users think OSAs are wrong (e.g., at a religious or moral levels), but perform them anyway, which ultimately promote emotional symptoms and diminish self-esteem. Future studies should thus be conducted in order to test these alternative theoretical frameworks. Fifth, our study was based on self-reported measures and may be limited by response and recall bias. Finally, the study used a cross-sectional design that did not allow us to test the model in time. This latter point is of importance because it would also have been very conceivable to test the hypothesis that excessive OSAs use predicts loneliness and low self-esteem. Longitudinal studies are thus required to confirm the hypotheses developed in our discussion and to ascertain the role of the study factors in the development and maintenance of problematic use of OSAs.

Despite its limitations, this study contributes to knowledge on the relationships between self-esteem, loneliness, and social anxiety in problematic use of OSAs in men. Regarding these results, improved



self-esteem and reduced symptoms of loneliness and social anxiety would constitute sound targets for psychological interventions in people who are experiencing dysfunctional and impaired use of pornography or searches for online sexual contacts.

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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*, 175–186. <https://doi.org/10.1080/00224490801987481>
- Anderson, C. A., & Harvey, R. J. (1988). Brief report: Discriminating between problems in living: An examination of measures of depression, loneliness, shyness, and social anxiety. *Journal of Social and Clinical Psychology, 6*, 482–491. <https://doi.org/10.1521/jscp.1988.6.3-4.482>
- Armstrong, J., & Mellor, D. (2016). Internet child pornography offenders: An examination of attachment and intimacy deficits. *Legal and Criminological Psychology, 21*, 41–55.
- Aydin, B., & San, S. V. (2011). Internet addiction among adolescents: The role of self-esteem. *Procedia Social and Behavioral Sciences, 15*, 3500–3505. <https://doi.org/10.1016/j.sbspro.2011.04.325>
- 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 & Marital Therapy, 43*, 567–585. <https://doi.org/10.1080/0092623X.2016.1208700>
- Ballester-Arnal, R., Castro-Calvo, J., Gil-Llario, M. D., & Giménez-García, C. (2014). Relationship status as an influence on cybersex activity: Cybersex, youth, and steady partner. *Journal of Sex & Marital Therapy, 40*, 444–456. <https://doi.org/10.1080/0092623X.2013.772549>
- Barrada, J. R., Ruiz-Gomez, P., Correa, A. B., & Castro, A. (2019). Not all online sexual activities are the same. *Frontiers in Psychology, 10*, 339. <https://doi.org/10.3389/fpsyg.2019.00339>
- Bates, A., & Metcalf, C. (2007). Psychometric comparison of Internet and non-Internet sex offenders. *Journal of Sexual Aggression, 13*, 11–20. <https://doi.org/10.1080/13552600701365654>
- Bentler, P. M., & Chou, C. P. (1987). Practical issues in structural modeling. *Sociological Methods Research, 16*, 78–117. <https://doi.org/10.1177/0049124187016001004>
- Bollen, K. A. (1989). A new incremental fit index for general structural equation models. *Sociological Methods & Research, 17*, 303–316. <https://doi.org/10.1177/0049124189017003004>
- Borgogna, N. C., McDermott, E. C., Berry, A. T., & Browning, B. R. (2020). Masculinity and problematic pornography viewing: The moderating role of self-esteem. *Psychology of Men and Masculinities, 21*, 81–94. <https://doi.org/10.1037/men0000214>
- Böthe, B., Tóth-Király, I., Zsila, Á., Griffiths, M. D., Demetrovics, Z., & Orosz, G. (2018). The development of the problematic pornography consumption scale (PPCS). *The Journal of Sex Research, 55*, 395–406. <https://doi.org/10.1080/00224499.2017.1291798>
- Bozoglan, B., Demirer, V., & Sahin, I. (2013). Loneliness, self-esteem, and life satisfaction as predictors of Internet addiction: A cross-sectional study among Turkish university students. *Scandinavian Journal of Psychology, 54*, 313–319. <https://doi.org/10.1111/sjop.12049>
- Brown, C. C., Durtschi, J. A., Carroll, J. S., & Willoughby, B. J. (2017). Understanding and predicting classes of college students who use pornography. *Computers in Human Behavior, 66*, 114–121. <https://doi.org/10.1016/j.chb.2016.09.008>
- Butler, M. H., Pereyra, S. A., Draper, T. W., Leonhardt, N. D., & Skinner, K. B. (2018). Pornography use and loneliness: A bidirectional recursive model and pilot investigation. *Journal of Sex and Marital Therapy, 44*, 127–137. <https://doi.org/10.1080/0092623X.2017.1321601>
- Canale, N., Marino, C., Griffiths, M. D., Scacchi, L., Monaci, M. G., & Vieno, A. (2019). The association between problematic online gaming and perceived stress: The moderating effect of psychological resilience. *Journal of Behavioral Addictions, 8*, 174–180. <https://doi.org/10.1556/2006.8.2019.01>
- Canale, N., Vieno, A., Ter Bogt, T., Pastore, M., Siciliano, V., & Molinaro, S. (2016). Adolescent gambling-oriented attitudes mediate the relationship between perceived parental knowledge and adolescent gambling: Implications for prevention. *Prevention Science, 17*, 970–980. <https://doi.org/10.1007/s11121-016-0683-y>
- Caplan, S. E. (2007). Relations among loneliness, social anxiety, and problematic Internet use. *CyberPsychology and Behavior, 10*, 234–242. <https://doi.org/10.1089/cpb.2006.9963>
- Castro-Calvo, J., Giménez-García, 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*, 491–510. <https://doi.org/10.1007/s40429-018-0230-y>
- Chawla, N., & Ostafin, B. (2007). Experiential avoidance as a functional dimensional approach to psychopathology: An empirical review. *Journal of Clinical Psychology, 63*, 871–890. <https://doi.org/10.1002/jclp.20400>
- Çivitci, N., & Çivitci, A. (2009). Self-esteem as mediator and moderator of the relationship between loneliness and life satisfaction in adolescents. *Personality and Individual Differences, 47*, 954–958. <https://doi.org/10.1016/j.paid.2009.07.022>
- Cohen, J. (1988). *Statistical power analysis for behavioral science* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Cook, R. D., & Weisberg, S. (1982). *Residuals and influence in regression*. New York, NY: Chapman & Hall.
- Cooper, A., Galbreath, N., & Becker, M. A. (2004). Sex on the Internet: Furthering our understanding of men with online sexual problems. *Psychology of Addictive Behaviors: Journal of the Society of Psychologists in Addictive Behaviors, 18*, 223–230. <https://doi.org/10.1037/0893-164X.18.3.223>
- Cooper, A., 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*, 277–291. <https://doi.org/10.1080/1468199031000153919>
- Cooper, A., Scherer, C. R., Boies, S. C., & Gordon, B. L. (1999). Sexuality on the Internet: From sexual exploration to pathological expression. *Professional Psychology: Research and Practice, 30*, 154–164. <https://doi.org/10.1037/0735-7028.30.2.154>
- Craney, T. A., & Surlis, J. G. (2002). Model-dependent variance inflation factor cutoff values. *Quality Engineering, 14*, 391–403. <https://doi.org/10.1081/QEN-120001878>
- Creemers, D. H., Scholte, R. H., Engels, R. C., Prinstein, M. J., & Wiers, R. W. (2012). Implicit and explicit self-esteem as concurrent predictors of suicidal ideation, depressive symptoms, and loneliness. *Journal of Behavior Therapy and Experimental Psychiatry, 43*, 638–646. <https://doi.org/10.1016/j.jbtep.2011.09.006>
- Daneback, K. (2006). *Love and sexuality on the Internet* (Doctoral dissertation). Retrieved from <https://gupea.ub.gu.se/handle/2077/10169>
- Daneback, K., Cooper, A., & Månsson, S. A. (2005). An Internet study of cybersex participants. *Archives of Sexual Behavior, 34*, 321–328.
- De Grâce, G.-R., Joshi, P., & Pelletier, R. (1993). L'Échelle de solitude de l'Université Laval (ÉSUL): Validation canadienne-française du UCLA Loneliness Scale [The Laval University Loneliness Scale: French-

- Canadian validation of UCLA loneliness scale]. *Canadian Journal of Behavioural Science*, 25, 12–27. <https://doi.org/10.1037/h0078812>
- de Jong, P. J. (2002). Implicit self-esteem and social anxiety: Differential self-favouring effects in high and low anxious individuals. *Behaviour Research and Therapy*, 40, 501–508. [https://doi.org/10.1016/S0005-7967\(01\)00022-5](https://doi.org/10.1016/S0005-7967(01)00022-5)
- de Jong, P. J., Sportel, B., De Hullu, E., & Nauta, M. (2012). Co-occurrence of social anxiety and depression symptoms in adolescence: Differential links with implicit and explicit self-esteem? *Psychological Medicine*, 42, 475–484. <https://doi.org/10.1017/S0033291711001358>
- Döring, N. M., Daneback, K., Shaughnessy, K., Grov, C., & Byers, S. (2017). Online sexual activity experiences among college students: A four-country comparison. *Archives of Sexual Behavior*, 46, 1641–1652. <https://doi.org/10.1007/s10508-015-0656-4>
- Efrati, Y., & Gola, M. (2018). Compulsive sexual behavior: A twelve-step therapeutic approach. *Journal of Behavioral Addictions*, 7, 445–453. <https://doi.org/10.1556/2006.7.2018.26>
- Goodson, P., McCornick, 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, 101–118. <https://doi.org/10.1023/a:1002724116437>
- Green, B. A., Carnes, S., Carnes, P. J., & Weinman, E. A. (2012). Cybersex addiction patterns in a clinical sample of homosexual, heterosexual, and bisexual men and women. *Sexual Addiction & Compulsivity*, 19, 77–98. <https://doi.org/10.1080/10720162.2012.658343>
- Grov, C., Gillespie, B. J., Royce, T., & Lever, J. (2011). Perceived consequences of casual online sexual activities on heterosexual relationships: A U.S. online survey. *Archives of Sexual Behavior*, 40, 429–439. <https://doi.org/10.1007/s10508-010-9598-z>
- Grubbs, J. A., & Perry, S. L. (2019). Moral incongruence and pornography use: A critical review and integration. *The Journal of Sex Research*, 56, 29–37. <https://doi.org/10.1080/00224499.2018.1427204>
- Heeren, A., Maurage, P., Rossignol, M., Vanhaelen, M., Peschard, V., Eeckhout, C., & Philippot, P. (2012). Self-report version of the Liebowitz social anxiety scale: Psychometric properties of the French version. *Canadian Journal of Behavioural Science/Revue Canadienne Des Sciences du Comportement*, 44, 99–107. <https://doi.org/10.1037/a0026249>
- Johnson, H. D., LaVoie, J. C., Spenceri, M. C., & Mahoney-Wernli, M. A. (2001). Peer conflict avoidance: Associations with loneliness, social anxiety, and social avoidance. *Psychological Reports*, 88, 227–235. <https://doi.org/10.2466/pr0.2001.88.1.227>
- Jöreskog, K. G., & Sörbom, D. (1996). *LISREL 8: User's reference guide*. Chicago, IL: Scientific Software International.
- Kafka, M. P., & Hennen, J. (2002). A DSM-IV Axis I comorbidity study of males (n = 120) with paraphilias and paraphilia-related disorders. *Sexual Abuse: A Journal of Research and Treatment*, 14, 349–366. <https://doi.org/10.1177/107906320201400405>
- Kardefelt-Winther, D. (2014a). A conceptual and methodological critique of Internet addiction research: Towards a model of compensatory Internet use. *Computers in Human Behavior*, 31, 351–354. <https://doi.org/10.1016/j.chb.2013.10.059>
- Kardefelt-Winther, D. (2014b). Problematising excessive online gaming and its psychological predictors. *Computers in Human Behavior*, 31, 118–122. <https://doi.org/10.1016/j.chb.2013.10.017>
- Kim, H. K., & Davis, K. E. (2009). Toward a comprehensive theory of problematic Internet use: Evaluating the role of self-esteem, anxiety, flow, and the self-rated importance of Internet activities. *Computers in Human Behavior*, 25, 490–500. <https://doi.org/10.1016/j.chb.2008.11.001>
- Kim, J., LaRose, R., & Peng, W. (2009). Loneliness as the cause and the effect of problematic Internet use: The relationship between Internet use and psychological well-being. *Cyberpsychology & Behavior*, 12, 451–455.
- Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd ed.). New York, NY: Guilford Press.
- Kong, F., & You, X. (2013). Loneliness and self-esteem as mediators between social support and life satisfaction in late adolescence. *Social Indicators Research*, 110, 271–279. <https://doi.org/10.1007/s11205-011-9930-6>
- 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, 861–868. <https://doi.org/10.1016/j.addbeh.2014.01.027>
- Kraus, S. W., Potenza, M. N., Martino, S., & Grant, J. E. (2015). Examining the psychometric properties of the Yale–Brown obsessive–compulsive scale in a sample of compulsive pornography users. *Comprehensive Psychiatry*, 59, 117–122. <https://doi.org/10.1016/j.comppsy.2015.02.007>
- Lee, Z. W.-Y., & Cheung, C. M.-K. (2014). Problematic use of social networking sites: The role of self-esteem. *International Journal of Business and Information*, 9, 143–159.
- Ley, D., Prause, N., & Finn, P. (2014). The emperor has no clothes: A review of the “pornography addiction” model. *Current Sexual Health Reports*, 6, 94–105. <https://doi.org/10.1007/s11930-014-0016-8>
- Lim, M. H., Rodebaugh, T. L., Zyphur, M. J., & Gleeson, J. F. M. (2016). Loneliness over time: The crucial role of social anxiety. *Journal of Abnormal Psychology*, 125, 620–630. <https://doi.org/10.1037/abn0000162>
- Ma, Z.-W., Liang, J.-J., Zeng, W.-N., Jiang, S., & Liu, T. (2014). The relationship between self-esteem and loneliness: Does social anxiety matter? *International Journal of Psychological Studies*, 6, 151–165. <https://doi.org/10.5539/ijps.v6n2p151>
- Middleton, D., Elliott, I. A., Mandeville-Norden, R., & Beech, A. R. (2006). An investigation into the application of the Ward and Siebert pathways model of child sexual abuse with Internet offenders. *Psychology, Crime and Law*, 12, 589–603. <https://doi.org/10.1080/10683160600558352>
- Morahan-Martin, J., & Schumacher, P. (2003). Loneliness and social uses of the Internet. *Computers in Human Behavior*, 19, 659–671. [https://doi.org/10.1016/S0747-5632\(03\)00040-2](https://doi.org/10.1016/S0747-5632(03)00040-2)
- Moser, C. (2011). Hypersexual disorder: Just more muddled thinking. *Archives of Sexual Behavior*, 40, 227–229. <https://doi.org/10.1007/s10508-010-9690-4>
- Moser, C. (2013). Hypersexual disorder: Searching for clarity. *Sexual Addiction & Compulsivity*, 20, 48–58. <https://doi.org/10.1080/10720162.2013.775631>
- Noor, S. W. B., Rosser, B. R. S., & Erickson, D. J. (2014). A brief scale to measure problematic sexually explicit media consumption: Psychometric properties of the compulsive pornography consumption (CPC) scale among men who have sex with men. *Sexual Addiction & Compulsivity*, 21, 240–261. <https://doi.org/10.1080/10720162.2014.938849>
- Obeid, N., Buchholz, A., Boerner, K. E., Henderson, K. A., & Norris, M. (2013). Self-esteem and social anxiety in an adolescent female eating disorder population: Age and diagnostic effects. *Eating Disorders*, 21, 140–153. <https://doi.org/10.1080/10640266.2013.761088>
- Odaci, H., & Kalkan, M. (2010). Problematic Internet use, loneliness and dating anxiety among young adult university students. *Computers & Education*, 55, 1091–1097. <https://doi.org/10.1016/j.compedu.2010.05.006>
- Olmstead, R. E., Guy, S. M., O'Malley, P. M., & Bentler, P. M. (1991). Longitudinal assessment of the relationship between self-esteem, fatalism, loneliness, and substance use. *Journal of Social Behavior and Personality*, 6, 749–770.
- Panayiotou, G., Panteli, M., & Theodorou, M. (2016). Predictors of loneliness in a sample of college men and women in Cyprus: The role of



- anxiety and social skills. *Psychology, Community & Health*, 5, 16–30. <https://doi.org/10.5964/pch.v5i1.142>
- Quayle, E., & Taylor, M. (2003). Model of problematic Internet use in people with a sexual interest in children. *CyberPsychology and Behavior*, 6, 93–106. <https://doi.org/10.1089/109493103321168009>
- Quintana, S. M., & Maxwell, S. E. (1999). Implications of recent developments in structural equation modeling for counseling psychology. *The Counseling Psychologist*, 27, 485–527.
- R Development Core Team. (2013). *R: A language and environment for statistical computing [computer software manual]*, Vienna, Austria. Retrieved from <http://www.R-project.org/>
- Raymond, N. C., Coleman, E., & Miner, M. H. (2003). Psychiatric comorbidity and compulsive/impulsive traits in compulsive sexual behavior. *Comprehensive Psychiatry*, 44, 370–380. [https://doi.org/10.1016/S0010-440X\(03\)00110-X](https://doi.org/10.1016/S0010-440X(03)00110-X)
- 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, 459–466. <https://doi.org/10.1007/s10508-011-9762-0>
- Rosseel, Y. (2012). Lavaan: An R package for structural equation modeling. *Journal of Statistical Software*, 48, 1–36. <https://doi.org/10.18637/jss.v048.i02>
- Satorra, A., & Bentler, P. M. (1988). Scaling corrections for chi-square in covariance structure analysis. In *Proceedings of the American Statistical Association*, 1, 308–313.
- Schneider, J. P. (2000). A qualitative study of cybersex participants: Gender differences, recovery issues, and implications for therapists. *Sexual Addiction & Compulsivity*, 7, 249–278. <https://doi.org/10.1080/10720160008403700>
- Shaughnessy, K., Fudge, M., & Byers, E. S. (2017). An exploration of prevalence, variety, and frequency data to quantify online sexual activity experience. *The Canadian Journal of Human Sexuality*, 26, 60–75. <https://doi.org/10.3138/cjhs.261-A4>
- Shaw, L. H., & Gant, L. M. (2002). In defense of the Internet: The relationship between Internet communication and depression, loneliness, self-esteem, and perceived social support. *Cyberpsychology & Behavior*, 5, 157–171. <https://doi.org/10.1089/109493102753770552>
- Steinfeld, C., Ellisonthose, N. B., & Lampe, C. (2008). Social capital, self-esteem, and use of online social network sites: A longitudinal analysis. *Journal of Applied Developmental Psychology*, 29, 434–445. <https://doi.org/10.1016/j.appdev.2008.07.002>
- Subasi, G. (2007). Some variables for social anxiety prediction in college students. *Education and Science*, 32, 3–15.
- Suler, J. (2004). The online disinhibition effect. *Cyberpsychology & Behavior*, 7, 321–326. <https://doi.org/10.1089/1094931041291295>
- Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality*, 72, 271–324.
- Valkenburg, P. M., & Peter, J. (2007). Preadolescents' and adolescents' online communication and their closeness to friends. *Developmental Psychology*, 43, 267–277. <https://doi.org/10.1037/0012-1649.43.2.267>
- Vallieres, E. F., & Vallerand, R. J. (1990). Traduction et validation canadienne française de l'échelle de l'estime de soi de Rosenberg [French translation and validation of Rosenberg's self-esteem scale]. *International Journal of Psychology*, 25, 305–316.
- Vanhalst, J., Goossens, L., Luyckx, K., Scholte, R. H., & Engels, R. C. (2013). The development of loneliness from mid-to late adolescence: Trajectory classes, personality traits, and psychosocial functioning. *Journal of Adolescence*, 36, 1305–1312. <https://doi.org/10.1016/j.adolescence.2012.04.002>
- Weber, M., Aufenanger, S., Dreier, M., Quiring, O., Reinecke, L., Wölfling, K., ... Beutel, M. E. (2018). Gender differences in escapist uses of sexually explicit Internet material: Results from a German probability sample. *Sexuality & Culture*, 22, 1171–1188. <https://doi.org/10.1007/s12119-018-9518-2>
- Wéry, A., & Billieux, J. (2016). Online sexual activities: An exploratory study of problematic and non-problematic usage patterns in a sample of men. *Computers in Human Behavior*, 56, 257–266. <https://doi.org/10.1016/j.chb.2015.11.046>
- 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>
- Wéry, A., Burnay, J., Karila, L., & Billieux, J. (2016). The short French Internet addiction test adapted to online sexual activities: Validation and links with online sexual preferences and addiction symptoms. *The Journal of Sex Research*, 53, 701–710. <https://doi.org/10.1080/00224499.2015.1051213>
- Wéry, A., Vogelaere, K., Challet-Bouju, G., Poudat, F.-X., Caillon, J., Lever, D., ... Grall-Bronnec, M. (2016). Characteristics of self-identified sexual addicts in a behavioral addiction outpatient clinic. *Journal of Behavioral Addictions*, 5, 623–630. <https://doi.org/10.1556/2006.5.2016.071>
- Whitty, M. T. (2003). Pushing the wrong buttons: Men's and women's attitudes toward online and offline infidelity. *Cyberpsychology & Behavior*, 6, 569–579. <https://doi.org/10.1089/109493103322725342>
- Yoder, V. C., Virden, T. B., & Amin, K. (2005). Internet pornography and loneliness: An association? *Sexual Addiction & Compulsivity*, 12, 19–44. <https://doi.org/10.1080/10720160590933653>

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#### SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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