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The Short French Internet Addiction Test Adapted to Online Sexual Activities: Validation and Links With Online Sexual Preferences and Addiction Symptoms

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The goal of this study was to investigate the psychometric properties of a French version of the short Internet Addiction Test adapted to online sexual activities (s-IAT-sex). The French version of the s-IAT-sex was administered to a sample of 401 men. The participants also completed a questionnaire that screened for sexual addiction (PATHOS). The relationships of s-IAT-sex scores with time spent online for online sexual activities (OSAs) and the types of OSAs favored were also considered. Confirmatory analyses supported a two-factor model of s-IAT-sex, corresponding to the factorial structure found in earlier studies that used the short IAT. The first factor regroups loss of control and time management, whereas the second factor regroups craving and social problems. Internal consistency for each factor was evaluated with Cronbach's α coefficient, resulting in .87 for Factor 1, .76 for Factor 2, and .88 for the global scale. Concurrent validity was supported by relationships with symptoms of sexual addiction, types of OSAs practiced, and time spent online for OSAs. The prevalence of sexual addiction (measured by PATHOS) was 28.1% in the current sample of self-selected male OSA users. The French version of the s-IAT-sex presents good psychometric properties and constitutes a useful tool for researchers and practitioners.

Nowadays, the Internet is an accessible medium that people find helpful in daily life (e.g., for information retrieval, contact with friends or family, or academic and professional activities). Many people are also using the Internet for online sexual activities (OSAs). OSAs are defined by Cooper, Griffin-Shelley, Delmonico, and Mathy (2001) as the use of the Internet (via text, audio, video, and graphic files) for any activity that involves human sexuality, including, but not limited to, having sexual chats, looking for or participating in sex webcams, watching pornography, or seeking offline sexual partners. Cooper (1998) postulated that the

accessibility (millions of sites accessible 24 hours a day, 7 days a week), affordability (free or low prices on adult sites), and perceived anonymity (the online user is not physically seen and may consider himself or herself to be undetectable to others) of the Internet provides a convenient medium for sexual behaviors.

In most cases, these OSAs have no negative impact on daily living (Albright, 2008; Ballester-Arnal, Castro-Calvo, Gil-Llario, & Giménez-García, 2014). Nevertheless, for a subgroup of individuals, OSAs can become excessive and affect several facets of their lives (Cooper, Delmonico, Griffin-Shelley, & Mathy, 2004; Grov, Gillespie, Royce, & Lever, 2011; Philaretou, Mahfouz, & Allen, 2005). Problematic OSA is characterized by repetition or excessive use of OSAs; loss of control; persistent desire or unsuccessful efforts to stop, reduce, or control online sexual behaviors; withdrawal

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(negative mood states when OSAs are unavailable); tolerance (need for more hours of use or more new sexual content); and negative consequences (Block, 2008; Carnes, 2000).

To date, evidence regarding the prevalence of problematic OSAs is scarce. Cooper, Morahan-Martin, Mathy, and Maheu (2002) found a 9.6% prevalence of problematic OSAs, whereas Daneback, Ross, and Månsson (2006) found a prevalence of 6%. More recently, a study conducted by Ross, Månsson, and Daneback (2012) reported a 5% prevalence of problematic OSA in women and 13% in men. Nonetheless, the diagnosis criteria and the instruments used have varied considerably in published studies, making a comparison of the results tentative (Karila et al., 2014; Wéry, Karila, De Sutter, & Billieux, 2014).

Indeed, despite the increase in studies on Internet-related disorders and, to a lesser extent, problematic OSAs, the diagnostic criteria are still under debate and assessment tools are highly heterogeneous (in terms of both symptom coverage and psychometric quality; Griffiths, King, & Demetrovics, 2014; Kuss, Griffiths, Karila, & Billieux, 2014). Several screening instruments have been developed to assess Internet-related disorders, but the Internet Addiction Test (IAT; Young, 1998) is one of the most frequently used. The IAT consists of 20 items that measure the symptoms associated with excessive use of the Internet (e.g., preoccupation with the Internet, increased anxiety when offline, impairment in real-life functioning; see Young, Pistner, O'Mara, & Buchanan, 1999).

Despite the wide adoption of the scale, however, its psychometric properties are still debated, particularly because the studies testing its factorial structure and validity are limited and have obtained mixed results (Faraci, Craparo, Messina, & Severino, 2013; Pawlikowski, Altstötter-Gleich, & Brand, 2013). On the whole, existing validation studies performed on the IAT showed a six-factor solution (Widyanto & McMurrin, 2004), a three-factor solution (Chang & Law, 2008), a two-factor solution (Barke, Nyenhuis, & Kröner-Herwig, 2012; Faraci et al., 2013; Jelenchick, Becker, & Moreno, 2012; Korkeila, Kaarlas, Jääskeläinen, Vahlberg, & Taiminen, 2010; Watters, Keefer, Kloosterman, Summerfeldt, & Parker, 2013), or a one-factor solution (Faraci et al., 2013; Khazaal et al., 2008; Korkeila et al., 2010). The heterogeneity of these results can be attributed to the fact that many studies use this scale in various settings with a diversity of participants (e.g., different ages, nationalities; Faraci et al., 2013). Moreover, some studies relied only on exploratory factor analysis (EFA), whereas others used a combination of EFA and confirmatory factor analysis (CFA). In addition, different researchers used different item-reduction techniques when conducting factor analyses, which influenced the number of factors extracted and had a negative impact on the generalization of these findings (Watters et al., 2013).

Faced with the “psychometrical chaos” and inconsistent results among existing studies, Pawlikowski and colleagues (2013) recently developed a short version of the IAT (s-IAT). Items with low factor loadings (<.50) and/or high loadings on more than one factor (>.20) were removed from the original scale (i.e., Items 4, 5, 7, 10, 11, and 12). Two supplementary items (Items 8 and 3) were excluded because of content overlap with items that had higher loadings. Pawlikowski and colleagues (2013) also justified the removal of several items because they were outdated and needed to be updated (e.g., Item 7 refers to checking e-mail, but communication has now extended to other applications such as Facebook or Skype). After excluding the aforementioned items, the researchers retained 12 items drawn from the 20-item version of the IAT. The factorial structure of the s-IAT was established by using a combination of EFA and CFA on two independent samples, which validated a two-factor model. The two factors were labeled loss of control/time management (six items) and craving/social problems (six items).

Another limitation of the original IAT is that it does not take into account the type of online activity practiced. Accordingly, encouragement has grown in recent years for the development of screening questionnaires that target specific forms of Internet usage (e.g., OSAs or online games) (Kuss et al., 2014; Pawlikowski et al., 2013; Starcevic, 2013). In this vein, the original, 20-item version of the IAT has recently been adapted to evaluate addiction to online role-playing games (Billieux et al., 2015; Chan & Rabinowitz, 2006; Pawlikowski & Brand, 2011) and to online sexual activities (Brand et al., 2011). Interestingly, Laier and colleagues conducted several studies using a German version of the s-IAT specifically adapted to assess problematic involvement in OSAs (s-IAT-sex; see Laier & Brand, 2014; Laier, Pawlikowski, Pekal, Schulte, & Brand, 2013; Laier, Pekal, & Brand, 2014). The German s-IAT-sex was found to have good overall internal consistency, with a Cronbach's α coefficient between .84 and .91 (Laier et al., 2013, 2014). However, the factorial structure of the s-IAT-sex remains unexplored, even though Laier and Brand (2014) relied on the two-factor model established for the s-IAT by Pawlikowski and colleagues (2013).

The goal of the present article was to investigate the psychometric properties of a French version of the s-IAT adapted to OSAs (s-IAT-sex; 12 items) in a sample of men. The study focused on men because the prevalence of sexual addiction is higher in men than in women, the estimated ratio of sexual addiction being between 3 and 5 men to each woman (Black, Kehrberg, Flumerfelt, & Schlosser, 1997; Carnes, 2000). More specifically, the aims of the current investigation were (a) to establish the factor structure of the s-IAT-sex by using CFA and (b) to test the concurrent validity of the scale through consideration of the relationship

between Internet sexual use and time spent online, the types of OSAs practiced, and symptoms of sexual addiction (not related to the Internet per se; Carnes et al., 2012).

Method

Participants and Procedure

The study consisted of a survey that was accessible online and was circulated via a university messaging service, social networks, research networks, and sexuality-related forums. Inclusion criteria were French-speaking men who were aged 18 years and older. All participants were informed about the study and gave online consent before starting the online survey. Anonymity of the participants was guaranteed (no personal data or Internet protocol [IP] addresses were collected). No compensation was given for participating in the study. The ethical committee of the Psychological Sciences Research Institute, Catholic University of Louvain, approved the study protocol. A total of 401 men who used OSAs participated in the study. Some questionnaires included in the survey did not relate to the current study and will be presented elsewhere. All participants included in the current study completed the French version of the s-IAT-sex in its entirety.

The participants answered sociodemographic questions about age, nationality, education, occupation, sexual orientation, and relationship status. The mean age of the participants was 28.74 years ($SD = 8.80$, range 18 to 72 years). Most respondents had a bachelor's or master's degree (82.8%), and most were active workers (43.5%) or students (49.3%). Of these participants, 60% were in a relationship, and most were heterosexual (88.5%). In addition, the participants estimated their weekly OSA time ($n = 394$ due to missing data). The mean frequency of weekly OSA use was 3 hours ($SD = 4.62$ hours, range 5 minutes to 33 hours; see Table 1).

They also evaluated their OSAs on a 5-point Likert scale ranging from 1 (*Never*) to 5 (*Very often*) ($n = 388$ due to missing data). The following sexual-related online activities were reported (i.e., if participants answered being at least "rarely" involved in a specific OSA during the past three months): 99.2% of the sample viewed pornographic pictures or films, 68% searched for sex-related information, 65.2% read online advice regarding sexual practices, 37.4% read pornographic literature, 31.7% looked for love contacts, 25.5% looked for offline sexual contacts, 24.7% watched live sex shows via webcam, 24.2% engaged in sex chats, 22.2% looked for online sexual contacts, 19.3% engaged in sex via webcam, 18% used online sex shops, and 4.1% contacted prostitutes/sex workers. In addition, the participants completed PATHOS (Carnes et al., 2012), a brief instrument that measures sexual addiction ($n = 363$ due to missing data).

Table 1. *Participants' Characteristics*

Characteristics	<i>N</i> valid	<i>M</i> (<i>SD</i>) or %
Age	401	28.74 (8.80)
Nationality	401	
Belgian		44.6%
French		34.7%
Canadian		17%
Swiss		1%
Other European country		1.2%
Other non-European country		1.5%
Level of education	401	
Primary school		1%
College		14.2%
High school		23.3%
University		59.9%
Other		1.5%
Sexual orientation	401	
Heterosexual		88.5%
Homosexual		9.3%
Bisexual		2.2%
Relationship status	401	
Never in a relationship		4%
Single (without occasional sexual partner)		19.2%
Single (with occasional sexual partner)		16.7%
In a stable relationship for less than a year		15.7%
In a stable relationship for more than a year		44.4%
Frequency of weekly OSAs use	394	3 hours (4.62 hours)

Instruments

s-IAT-sex. The s-IAT-sex is a 12-item scale used to assess subjective complaints in everyday life due to OSAs and potential symptoms of problematic OSA (see Appendix 1 for the French items and Appendix 2 for the corresponding English items). To create a French version of the s-IAT-sex, we applied a translation and back-translation procedure to 12 items of the modified version of the IAT (IAT-sex) by Brand and colleagues (2011) and Laier and colleagues (2013). The 12 items retained were based on the s-IAT developed by Pawlowski and colleagues (2013). The terms *online* or *Internet* were thus systematically replaced by the terms *online sexual activity* and *Internet sex sites*, respectively. All items were scored on a 5-point Likert scale (1 = *Never*, 2 = *Rarely*, 3 = *Occasionally*, 4 = *Often*, 5 = *Always*).

PATHOS. PATHOS (Carnes et al., 2012) is a brief instrument to screen for sexual addiction that consists of six dichotomous items. Each item assesses different criteria: (a) preoccupied with sexual thoughts, (b) feel ashamed, (c) treatment seeking, (d) hurt others because of the sexual behavior, (e) loss of control, and (f) feel depressed after engaging in sexual behaviors. All items are scored in a *Yes/No* format, the total score being 6 with a cutoff of 3 (Carnes et al., 2012). The French version of the scale was developed as follows: (a) The third

author of the article, with the help of an English–French bilingual translator, translated the six items of the original PATHOS into French; (b) another English–French bilingual translator translated the French version back into English; and (c) all discrepancies identified between the original PATHOS and the back-translation were discussed until a satisfactory solution was found. In the current study, the mean PATHOS score was 1.89 ($SD = 1.45$). Using the cutoff score of 3 proposed by Carnes et al. (2012), we categorized 71.6% of the sample ($n = 260$) as healthy subjects (score < 3), and 28.1% of the sample ($n = 103$) as having addictive sexual behaviors (score ≥ 3).

Statistical Analyses

To determine the factor structure of the French s-IAT-sex, we analyzed the covariance matrix with a confirmatory analysis computed with LISREL 8.8 (Jöreskog & Sörbom, 1996). Drawing on the existing literature, we computed two different models: a one-factor model, as the IAT was originally developed as a single-scale instrument (Watters et al., 2013), and a two-factor model inspired by the validation of the s-IAT (Pawlikowski et al., 2013). According to Pawlikowski and colleagues (2013), the two extracted factors correspond to loss of control/time management and craving/social problems. Goodness of fit was tested with χ^2 (a nonsignificant value corresponds to an acceptable fit). However, χ^2 is known to increase with sample size, and Byrne (1994) has noticed that it is unusual to obtain a nonsignificant χ^2 when performing CFAs on self-report questionnaires. We therefore performed the χ^2 test by examining other indices that depend on conventional cutoffs: root mean square error of approximation (RMSEA), comparative fit index (CFI), adjusted goodness of fit index (AGFI), normed fit index (NFI), and non-normed fit index (NNFI). A RMSEA $< .08$, a CFI $> .95$, an AGFI $> .85$, an NFI $> .90$, and an NNFI $> .95$ are generally interpreted as an acceptable fit. Moreover, the chi-square difference test was used to compare the models. Internal

consistency was calculated with Cronbach's α (Brown, 2006). Pearson's correlations were then conducted to evaluate the relationship between the score on the s-IAT-sex and time spent online per week for OSAs, as well as between the score on the s-IAT-sex and that on the PATHOS. Pearson's correlation was also used to evaluate the effect of OSAs on the score for the s-IAT-sex. According to Cohen (1988), a correlation between 0.10 and 0.30 corresponds to a small effect; between 0.30 and 0.50 to a medium effect; and above 0.50 to a large effect.

Results

Confirmatory Factor Analysis

A skewness and kurtosis test indicated that multivariate normality was not respected ($p < .001$). Consequently, all CFAs analyses were computed using a diagonally weighted least square method of estimation suited for nonnormal data.

CFA was computed on the 12 items of the s-IAT-sex. Two models were tested: a one-factor model and a two-factor model. The covariance matrix between all items is provided in Table 2. The one-factor model had a poor fit (Model 1, Table 3), $\chi^2(54) = 267.335$, $p < .001$; RMSEA = .0994; CFI = .955; AGFI = .968; NFI = .945; NNFI = .945. To define a model with two dimensions, we allowed the latent variables to correlate. The following causality relations were calculated: (a) The latent variable "loss of control/time management" is explained by Items 1, 2, 3, 6, 8, and 9; and (b) the latent variable "craving/social problems" is explained by Items 4, 5, 7, 10, 11, and 12. The two-factor model has an acceptable fit (Model 2, Table 3), $\chi^2(53) = 184.421$, $p < .001$; RMSEA = .0787; CFI = .972; AGFI = .976; NFI = .962; NNFI = .966.

In addition to the fit indices, the chi-square difference test for nested models (Brown, 2006) showed that the two-factor model (Model 2) is superior to the one-factor model (Model 1; $\chi^2_{\text{diff}} = 82.914$, $df_{\text{diff}} = 1$, $p < .001$) (Figure 1).

Table 2. Descriptive Statistics and Covariance Matrix of All Items

	<i>M</i>	<i>SD</i>	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
Q1	2.97	1.29	1.677	—	—	—	—	—	—	—	—	—	—	—
Q2	1.95	1.23	0.996	1.523	—	—	—	—	—	—	—	—	—	—
Q3	1.43	0.90	0.442	0.724	0.815	—	—	—	—	—	—	—	—	—
Q4	1.91	1.18	0.305	0.410	0.297	1.404	—	—	—	—	—	—	—	—
Q5	1.54	0.97	0.287	0.347	0.258	0.415	0.949	—	—	—	—	—	—	—
Q6	1.65	1.05	0.650	0.853	0.469	0.298	0.325	1.108	—	—	—	—	—	—
Q7	1.72	0.93	0.425	0.518	0.344	0.209	0.282	0.475	0.869	—	—	—	—	—
Q8	2.00	1.29	1.080	0.885	0.476	0.280	0.231	0.704	0.477	1.657	—	—	—	—
Q9	1.74	1.22	0.700	0.830	0.506	0.379	0.269	0.624	0.464	0.754	1.478	—	—	—
Q10	2.53	1.55	0.639	0.686	0.390	0.746	0.331	0.644	0.510	0.641	0.789	2.410	—	—
Q11	1.32	0.83	0.454	0.651	0.404	0.315	0.331	0.498	0.380	0.486	0.457	0.496	0.690	—
Q12	1.36	0.85	0.360	0.553	0.421	0.281	0.354	0.431	0.405	0.401	0.453	0.466	0.503	0.716

Table 3. Fit Indices of the Confirmatory Factor Analysis

Model	χ^2	df	N	RMSEA (90% CI)	CFI
1	267.335	54	401	.0994 [.0877, .111]	.955
2	184.421	53	401	.0787 [.0665, .0913]	.972

Note. RMSEA = root mean square error of approximation; CI = confidence interval; CFI = comparative fit index.

Descriptive Statistics, Internal Consistency, Reliability, and Correlation Among All Facets of the s-IAT-sex

Descriptive results and intercorrelations between the s-IAT-sex factors are reported in Table 4. Internal consistency for each factor was evaluated with Cronbach’s α coefficient, resulting in .87 for Factor 1, .76 for Factor 2, and .88 for the global scale. These values correspond to good internal consistency. The correlation between the two facets of the s-IAT-sex is equal to .66 ($p < .01$). In the current study, the mean s-IAT-sex score (12 items) was 22.11 ($SD = 8.95$, range 12 to 59).

Centiles for the Total Score and the Subscales of the s-IAT-sex

Table 5 presents the centiles (the values of a variable below which a certain percentage of observations fall) of

the overall and subscale scores of the s-IAT-sex. The results suggest that these score distributions are relatively symmetrical, supporting the idea that these scores correctly discriminate individuals.

Correlations Between the s-IAT-sex and Other Measures (Time Online, OSAs, and PATHOS)

Table 6 reports Pearson’s correlations between the s-IAT-sex scores and time spent online for OSAs and between the s-IAT-sex scores and PATHOS; Table 7 reports Pearson’s correlations between the s-IAT-sex scores and involvement in OSAs. Correlation analyses revealed positive significant relationships (a) between s-IAT-sex scores and time spent online for OSAs weekly, (b) between s-IAT-sex scores and PATHOS global scores, and (c) between s-IAT-sex scores and all OSAs (except for “using online sex shops” and “searching for sex-related information”). Nevertheless, using pornography, engaging in sex chats, and using a sex webcam were the activities that correlated most with a high s-IAT-sex score. Interestingly, Factor 1 (loss of control/time management) correlated more strongly with partner-arousal OSAs. This dissociation is more marked with OSAs related to searching for offline and online sexual contacts (see Table 7).

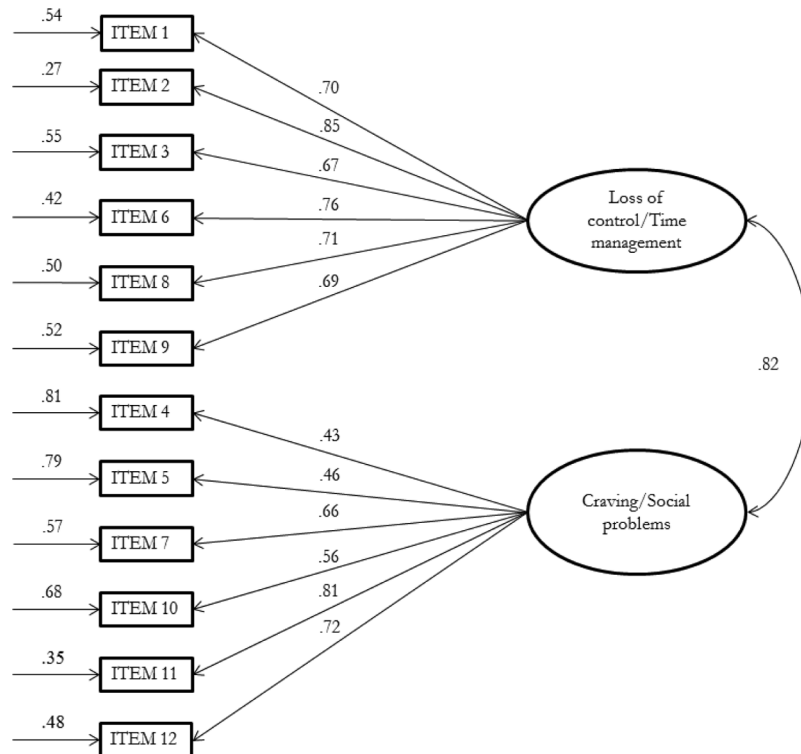


Figure 1. This figure represents a 12-item, two-factor model (Model 2) in which all latent variables are represented by ovals and all manifest variables are represented by rectangles. Single-headed arrows represent error variance and standardized factor loading (β); the double-headed arrow represents the correlation between the latent variables. The correlation of .82 between the two factors was calculated by LISREL, which took into account the covariance between each item.

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Table 4. *Unstandardized (ρ) and Standardized Coefficients (β)*

Coefficients	Factor 1						Factor 2					
	Q1	Q2	Q3	Q6	Q8	Q9	Q4	Q5	Q7	Q10	Q11	Q12
ρ	0.879	1.054	0.606	0.804	0.911	0.842	0.513	0.445	0.612	0.874	0.670	0.610
t	19.82***	18.90***	8.19***	12.06***	15.97***	11.52***	6.86***	6.28***	10.55***	12.51***	9.21***	8.34***
SD	0.90	0.41	0.45	0.46	0.83	0.77	1.14	0.75	0.49	1.65	0.24	0.34
β	.679	.854	.672	.764	.708	.693	.433	.457	.657	.563	.807	.721
SD	.54	.27	.55	.42	.50	.52	.81	.79	.57	.68	.35	.48

*** $p < .001$.**Table 5.** *Centiles of the Overall s-IAT-sex Scale and Subscale Score Distribution*

s-IAT-sex	Centiles						
	5th	10th	25th	50th	75th	90th	95th
Overall score	12	13	16	20	25	36	42
Loss of control/time management	6	6	7	10	14	21	24
Craving/social problems	6	6	7	9	12	16	19

Note. s-IAT-sex = short version of the Internet Addiction Test adapted to online sexual activities.

Table 6. *Pearson's Correlations Between External and Convergent Validity Measures and the s-IAT-sex*

	N valid	s-IAT-sex	Factors	
			Loss of Control/Time Management	Craving/Social Problems
Time spent online	394	.33**	.32**	.28**
PATHOS	363	.63**	.62**	.52**
Preoccupied with sexual thoughts		.30**	.41**	.29**
Feel ashamed		.29**	.23**	.30**
Treatment seeking		.32**	.31**	.27**
Hurt others		.32**	.35**	.23**
Loss of control		.46**	.48**	.35**
Feeling depressed		.49**	.46**	.44**

Note. s-IAT-sex = short version of the Internet Addiction Test adapted to online sexual activities.

** $p < .01$.**Table 7.** *Pearson's Correlations Between Concurrent Validity Measures and the s-IAT-sex*

Categories	N valid	s-IAT-sex	Factors	
			Loss of Control/Time Management	Craving/Social Problems
Online sexual activities	388			
Searching for sex-related information		.06	.06	.05
Reading online advices		.19**	.19**	.15**
Looking for love contacts		.18**	.19**	.12*
Looking for online sexual contacts		.31**	.35**	.20**
Looking for offline sexual contacts		.18**	.22**	.08
Contacting prostitutes/sex workers		.17**	.16**	.15**
Watching live sex shows via webcam		.27**	.29**	.20**
Engaging in sex via webcam		.29**	.30**	.22**
Engaging in sex chats		.28**	.31**	.19**
Using online sex shops		.06	.06	.04
Reading pornographic literature		.12*	.12*	.10
Viewing pornographic pictures or films		.35**	.34**	.30**

Note. s-IAT-sex = short version of the Internet Addiction Test adapted to online sexual activities.

** $p < .01$. * $p < .05$.

Discussion

The goal of the current study was to establish the factorial structure of the s-IAT adapted to OSAs and to explore its relations with sexual addiction and types of OSAs practiced in a sample of French-speaking men. The CFAs showed that a two-factor model fit the data well, resulting in psychometrically sound scales characterized by good internal reliability. The two-factor structure evidenced in the current study corresponds to that previously found by Pawlikowski and colleagues (2013) with the original German s-IAT. The first factor corresponds to loss of control/time management (Items 1, 2, 3, 6, 8, and 9). The items of this subscale assess symptoms involving the failure to control or reduce the amount of time spent online for OSAs. The second factor corresponds to craving/social problems (Items 4, 5, 7, 10, 11, 12). The items of this subscale measure functional impairment associated with OSA use (including irritation, craving and preoccupation, social impact, and mood regulation).

This study also tested how the various dimensions of the s-IAT-sex relate to actual online sexual behaviors and symptoms of sexual addiction. A significant positive correlation was found between s-IAT-sex scores and time spent online for OSAs. Similar results have been described in other studies (Cooper et al., 2001; Wetterneck, Burgess, Short, Smith, & Cervantes, 2012), although not consistently (Brand et al., 2011). In addition, we found a significant positive correlation between s-IAT-sex scores and almost every type of OSA (except for “using online sex shops” and “searching for sex-related information”) but especially between the s-IAT-sex score and watching pornography, using sex chats, and using a sex webcam. These findings are partly consistent with those from a Swedish study by Ross and colleagues (2012), in which the investigators reported pornography to be the OSA that correlated most with problematic OSA. Interestingly, we also found that partner-arousal OSAs (e.g., looking for offline/online sexual contacts) presented higher correlations with Factor 1 than did solitary-arousal OSAs (e.g., watching pornography). A possible explanation is that partner-arousal OSAs are interpersonal behaviors (e.g., sexual games or rituals, striptease) involving the commitment of two or more individuals, which generally last longer than the compulsive search for pleasure or relief that characterizes solitary-arousal OSAs. Finally, a significant positive correlation was found in our study between s-IAT-sex scores and sexual addiction (PATHOS). Moreover, the correlations between the six items of PATHOS and the two factors of the s-IAT-sex supported convergent validity.

The current study adds to the literature by providing a psychometrically sound scale to assess problematic involvement in OSAs in the French language. This is important, as an improvement in the screening instruments for Internet-related disorders is required.

For example, most previous studies have been conducted by relying only on EFAs, which brings into question the generalizability of the findings. Another strength of the current study is that it supports the validity of an instrument devoted to the assessment of a specific problematic OSA. This assessment is in accordance with a recent proposal stipulating that disentangling the various problematic behaviors incorporated in the umbrella construct of “Internet addiction” is a prerequisite for reducing the conceptual chaos that characterizes this research field (Kuss et al., 2014). It is worth noting that the s-IAT-sex is particularly adapted to screening for problematic OSAs in the clinical context in which time-consuming questionnaires are generally banned.

Nonetheless, several limitations exist in this study. First, all of the measures were self-report questionnaires that presume respondents are aware of and willing to report their sexual attitudes and sexual behaviors honestly. Second, the online survey method means that the sample is self-selected, which influences its representativeness (Khazaal et al., 2014). In our study, for example, we found a prevalence rate for sexual addiction of 28.1%, which is very high. However, it is likely that this elevated prevalence rate is at least partly explained by the fact that our study attracted individuals who felt concerned by OSAs. Third, to maintain the anonymity of the respondents, IP addresses were not recorded. Indeed, online studies allow the collection of more respondents through the anonymity offered by the Internet, and this is especially true when using a questionnaire for stigmatized behaviors such as sexual practices. In their free comments, several respondents indicated that the anonymity of the online method encouraged honest answers. Nevertheless, we cannot formally exclude the possibility that some participants filled out the questionnaire several times, although they would gain no advantage by doing so. Fourth, our sample was composed of men only; the psychometric properties of the s-IAT-sex must be confirmed in a sample that includes women. Indeed, the only previous study that used the s-IAT-sex for women (Lai et al., 2014) did not investigate its factorial structure, although previous studies found that women tend to be interested in interactive OSAs (e.g., sexual chat), whereas men tend to be interested in visual OSAs (e.g., pornography; Cooper, Månsson, Daneback, Tikkanen, & Ross, 2003; Green, Carnes, Carnes, & Weinman, 2012). Although we showed that the two-factor model is clearly superior to the one-factor model, the correlation between the factors is elevated and the two factors failed to clearly distinguish among the types of OSA practiced (except for partner-arousal activities, which correlated more with the loss of control/time management factor) or the presence of sexual addiction symptoms. Moreover, despite the fit indices of the CFA indicating an acceptable model, the chi-square test was significant, implying that the model does not fit the data to at least

some degree. Further studies are thus required to reinforce the validity of the factorial structure of the French s-IAT-sex. In particular, future studies should (a) refine the wording of some items to reduce content overlap and (b) test the specific association between the factors of the s-IAT-sex and other factors that have been associated with OSAs, such as personality traits (e.g., impulsivity) or the individual motives that support involvement in OSAs (Griffiths, 2012).

Despite these limitations, the current study showed that the French version of the s-IAT-sex is a promising instrument for assessing problematic OSAs in both research and clinical practice. Indeed, one of the most important aspects of short-form development is the trade-off between reduction of assessment time and loss of validity (Smith, McCarthy, & Anderson, 2000). In the current study, we found the French s-IAT-sex to have acceptable factorial structure. Moreover, concurrent validity of the scale was supported by relationships with symptoms of sexual addiction, types of OSAs practiced, and time spent online for OSAs. Finally, the internal reliability coefficient of the s-IAT-sex is close to those obtained with the original French IAT (Khazaal et al., 2008) and the original IAT-sex (Brand et al., 2011). Indeed, Cronbach's α coefficient for the whole scale was .88 for the French s-IAT-sex, .93 for the French IAT, and .84 for the IAT-sex. Taken together, these results support the use of the French s-IAT-sex for meaningful time-saving. Importantly, this study also confirms that disentangling online activities is required to improve the quality of Internet-disorders screening instruments.

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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. doi:10.1080/00224490801987481
- 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 and Marital Therapy, 40*, 444–456. doi:10.1080/0092623X.2013.772549
- Barke, A., Nyenhuis, N., & Kröner-Herwig, B. (2012). The German version of the Internet Addiction Test: A validation study. *CyberPsychology, Behavior, and Social Networking, 15*, 534–542. doi:10.1089/cyber.2011.0616
- Billieux, J., Thorens, G., Khazaal, Y., Zullino, D., Achab, S., & Van der Linden, M. (2015). Problematic involvement in online games: A cluster analytic approach. *Computers in Human Behavior, 43*, 242–250. doi:10.1016/j.chb.2014.10.055
- Black, D. W., Kehrberg, L. L., Flumerfelt, D. L., & Schlosser, S. S. (1997). Characteristics of 36 subjects reporting compulsive sexual behavior. *American Journal of Psychiatry, 154*, 243–249. doi:10.1176/ajp.154.2.243
- Block, J. J. (2008). Issues for DSM-V: Internet addiction. *American Journal of Psychiatry, 165*, 306–307. doi:10.1176/appi.ajp.2007.07101556
- 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*, 371–377. doi:10.1089/cyber.2010.0222
- Brown, T. (2006). *Confirmatory factor analysis for applied research*. New York, NY: Guilford Press.
- Byrne, B. M. (1994). *Structural equation modeling with EQS and EQS/Windows*. Thousand Oaks, CA: Sage.
- Carnes, P. (2000). Sexual addiction and compulsion: Recognition, treatment, and recovery. *CNS Spectrum, 5*, 1–16.
- Carnes, P. J., Green, B. A., Merlo, L. J., Polles, A., Carnes, S., & Gold, M. S. (2012). PATHOS: A brief screening application for assessing sexual addiction. *Journal of Addiction Medicine, 6*, 29–34. doi:10.1097/ADM.0b013e3182251a28
- Chan, P. A., & Rabinowitz, T. (2006). A cross-sectional analysis of video games and attention deficit hyperactivity disorder symptoms in adolescents. *Annals of General Psychiatry, 5*, 16–26. doi:10.1186/1744-859X-5-16
- Chang, M. K., & Law, S. P. M. (2008). Factor structure for Young's Internet Addiction Test: A confirmatory study. *Computers in Human Behavior, 24*, 2597–2619. doi:10.1016/j.chb.2008.03.001
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Erlbaum.
- Cooper, A. (1998). Sexuality and the Internet: Surfing into the new millennium. *CyberPsychology and Behavior, 1*, 187–193. doi:10.1089/cpb.1998.1.187
- Cooper, A., Delmonico, D. L., Griffin-Shelley, E., & Mathy, R. M. (2004). Online sexual activity: An examination of potentially problematic behaviors. *Sexual Addiction and Compulsivity, 11*, 129–143. doi:10.1080/10720160490882642
- Cooper, A., Griffin-Shelley, E., Delmonico, D., & Mathy, R. (2001). Online sexual problems: Assessment and predictive variables. *Sexual Addiction and Compulsivity, 8*, 267–285. doi:10.1080/107201601753459964
- 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. doi:10.1080/1468199031000153919
- Cooper, A., Morahan-Martin, J., Mathy, R. M., & Maheu, M. (2002). Toward an increased understanding of user demographics in online sexual activities. *Journal of Sex and Marital Therapy, 28*, 105–129. doi:10.1080/00926230252851861
- Daneback, K., Ross, M. W., & Månsson, S.-A. (2006). Characteristics and behaviors of sexual compulsives who use the Internet for sexual purposes. *Sexual Addiction and Compulsivity, 13*, 53–67. doi:10.1080/10720160500529276

- Faraci, P., Craparo, G., Messina, R., & Severino, S. (2013). Internet Addiction Test (IAT): Which is the best factorial solution? *Journal of Medical Internet Research*, *15*, e225. doi:10.2196/jmir.2935
- 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 and Compulsivity*, *19*, 77–98. doi:10.1080/10720162.2012.658343
- Griffiths, M. D. (2012). Internet sex addiction: A review of empirical research. *Addiction Research and Theory*, *20*, 111–124. doi:10.3109/16066359.2011.588351
- Griffiths, M. D., King, D. L., & Demetrovics, Z. (2014). DSM-5 Internet gaming disorder needs a unified approach to assessment. *Neuropsychiatry*, *4*, 1–4. doi:10.2217/npv.13.82
- 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. doi:10.1007/s10508-010-9598-z
- Jelenchick, L. A., Becker, T., & Moreno, M. A. (2012). Assessing the psychometric properties of the Internet Addiction Test (IAT) in U.S. college students. *Psychiatry Research*, *196*, 296–301. doi:10.1016/j.psychres.2011.09.007
- Jöreskog, K. G., & Sörbom, D. (1996). *LISREL 8 user's reference guide*. Uppsala, Sweden: Scientific Software International.
- Karila, L., Wéry, A., Weinstein, A., Cottencin, O., Petit, A., Reynaud, M., & Billieux, J. (2014). Sexual addiction or hypersexual disorder: Different terms for the same problem? A review of the literature. *Current Pharmaceutical Design*, *20*, 4012–4020. doi:10.2174/13816128113199990619
- Khazaal, Y., Billieux, J., Thorens, G., Khan, R., Louati, Y., Scarlatti, E., ... Zullino, D. (2008). French validation of the Internet Addiction Test. *CyberPsychology and Behavior*, *11*, 703–706. doi:10.1089/cpb.2007.0249
- Khazaal, Y., van Singer, M., Chatton, A., Achab, S., Zullino, D., Rothen, S., ... Thorens, G. (2014). Does self-selection affect sample's representativeness in online surveys? An investigation in online video games research. *Journal of Medical Internet Research*, *17*, e164. doi:10.2196/jmir.2759
- Korkeila, J., Kaarlas, S., Jääskeläinen, M., Vahlberg, T., & Taiminen, T. (2010). Attached to the Web: Harmful use of the Internet and its correlates. *European Psychiatry*, *25*, 236–241. doi:10.1016/j.eurpsy.2009.02.008
- 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*, 4026–4052. doi:10.2174/13816128113199990617
- Laier, C., & Brand, M. (2014). Empirical evidence and theoretical considerations on factors contributing to cybersex addiction from a cognitive-behavioral view. *Sexual Addiction and Compulsivity*, *21*, 305–321. doi:10.1080/10720162.2014.970722
- 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*, 100–107. doi:10.1556/JBA.2.2013.002
- Laier, C., Pekal, J., & Brand, M. (2014). Cybersex addiction in heterosexual female users of Internet pornography can be explained by gratification hypothesis. *CyberPsychology, Behavior, and Social Networking*, *17*, 505–511. doi:10.1089/cyber.2013.0396
- 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*, 1212–1223. doi:10.1016/j.chb.2012.10.014
- Pawlikowski, M., & Brand, M. (2011). Excessive Internet gaming and decision making: Do excessive World of Warcraft players have problems in decision making under risky conditions? *Psychiatry Research*, *188*, 428–433. doi:10.1016/j.psychres.2011.05.017
- Philaretou, A. G., Mahfouz, A. Y., & Allen, K. R. (2005). Use of Internet pornography and men's well-being. *International Journal of Men's Health*, *4*, 149–169. doi:10.3149/jmh.0402.149
- 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. doi:10.1007/s10508-011-9762-0
- Smith, G. T., McCarthy, D. M., & Anderson, K. G. (2000). On the sins of short-form development. *Psychological Assessment*, *12*, 102–111. doi:10.1037/1040-3590.12.1.102
- Starcevic, V. (2013). Is Internet addiction a useful concept? *Australian and New Zealand Journal of Psychiatry*, *47*, 16–19. doi:10.1177/0004867412461693
- Watters, C. A., Keefer, C. V., Kloosterman, P. H., Summerfeldt, L. J., & Parker, J. (2013). Examining the structure of the Internet Addiction Test in adolescents: A bifactor approach. *Computers in Human Behavior*, *29*, 2294–2302. doi:10.1016/j.chb.2013.05.020
- Wéry, A., Karila, L., De Sutter, P., & Billieux, J. (2014). Conceptualisation, évaluation et traitement de la dépendance cybersexuelle: Une revue de la littérature [Conceptualization, assessment, and treatment of cybersex addiction: A review]. *Canadian Psychology*, *55*, 266–281. doi:10.1037/a0038103
- Wetterneck, C., Burgess, A., Short, M., Smith, A., & Cervantes, M. (2012). The role of sexual compulsivity, impulsivity, and experiential avoidance in Internet pornography use. *The Psychological Record*, *62*, 3–18.
- Widyanto, L., & McMurrin, M. (2004). The psychometric properties of the Internet Addiction Test. *CyberPsychology and Behavior*, *7*, 443–450. doi:10.1089/cpb.2004.7.443
- Young, K. S. (1998). *Caught in the Net: How to recognize the signs of Internet addiction—And a winning strategy for recovery*. New York, NY: Wiley.
- Young, K. S., Pistner, M., O'Mara, J., & Buchanan, J. (1999). Cyber disorders: The mental health concern for the new millennium. *CyberPsychology and Behavior*, *2*, 475–479. doi:10.1089/cpb.1999.2.475

Appendix 1

French Version of the Short IAT-Sex (12 Items)

Vous trouverez ci-dessous une liste de questions. Veuillez lire attentivement chaque question et y répondre le plus précisément possible. Veuillez choisir une seule réponse et vous assurer de répondre à toutes les questions. Il n'y a pas de bonnes ou de mauvaises réponses ; il est donc important que vous y répondiez le plus honnêtement possible pour vous.

1	2	3	4	5	1	2	3	4	5
Jamais	Rarement	Occasionnellement	Souvent	Toujours					
1.	Vous arrive-t-il de rester sur des sites sexuels en ligne plus longtemps que vous en aviez l'intention au départ?								
2.	Vous arrive-t-il de négliger vos tâches quotidiennes afin de passer plus de temps sur des sites sexuels en ligne?								
3.	Arrive-t-il que vos notes/devoirs scolaires et/ou votre travail souffre(nt) du temps que vous passez sur des sites sexuels en ligne?								
4.	Vous arrive-t-il d'être sur la défensive ou de refuser de répondre si quelqu'un vous demande ce que vous faites sur des sites sexuels en ligne?								
5.	Vous arrive-t-il de répondre sur un ton brusque, de crier ou de vous montrer agacé si quelqu'un vous dérange pendant que vous êtes sur des sites sexuels en ligne?								
6.	Vous arrive-t-il de manquer de sommeil parce que vous êtes resté tard sur des sites sexuels en ligne?								
7.	Lorsque vous n'êtes pas sur des sites sexuels en ligne, vous arrive-t-il d'y penser activement ou de rêver d'y être ?								
8.	Vous arrive-t-il de vous dire "juste encore quelques minutes" lorsque vous êtes sur des sites sexuels en ligne?								
9.	Vous arrive-t-il d'essayer de diminuer le temps que vous passez sur des sites sexuels en ligne sans y arriver?								
10.	Vous arrive-t-il de cacher aux autres le temps que vous passez en ligne sur des sites sexuels?								
11.	Vous arrive-t-il de choisir de passer plus de temps sur des sites sexuels en ligne plutôt que de sortir avec vos proches?								
12.	Vous arrive-t-il de vous sentir déprimé, de mauvaise humeur, ou énervé lorsque vous n'êtes pas sur des sites sexuels en ligne, puis de vous sentir mieux lorsque vous y êtes?								

Appendix 2

English Version of the Short IAT-Sex (12 Items)

Below you will find a list of questions. Please read each question carefully and answer them to the best of your ability. Only choose one response and please be sure to answer every question. There are no right or wrong answers; it is important that you rate the questions as honestly as possible.

1	2	3	4	5	1	2	3	4	5
Never	Rarely	Sometimes	Often	Always					
1.	How often do you find that you stay on Internet sex sites longer than you intended?								
2.	How often do you neglect household chores to spend more time on Internet sex sites?								
3.	How often do your grades/school work and/or your work suffer because of the amount of time you spend on Internet sex sites?								
4.	How often do you become defensive or secretive when anyone asks you what you do on Internet sex sites?								
5.	How often do you snap, yell, or act annoyed if someone bothers you while you are on Internet sex sites?								
6.	How often do you lose sleep due to being on Internet sex sites late at night?								
7.	How often do you feel preoccupied with online sexual activities when offline or fantasize about being on Internet sex sites?								
8.	How often do you find yourself saying "just a few more minutes" when you are on Internet sex sites?								
9.	How often do you try to cut down the amount of time you spend on Internet sex sites and fail?								
10.	How often do you try to hide how long you have been on Internet sex sites?								
11.	How often do you choose to spend more time on Internet sex sites over going out with others?								
12.	How often do you feel depressed, moody, or nervous when you are offline, which goes away once you are back on Internet sex sites?								