Sexual addiction, compulsivity, and impulsivity among a predominantly female sample of adults who use the internet for sex

FULL-LENGTH REPORT

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ABSTRACT

Background and aims: Compulsive sexual behavior is characterized by extensive sexual behavior and unsuccessful efforts to control excessive sexual behavior. The aim of the studies was to investigate compulsivity, anxiety and depression and impulsivity and problematic online sexual activities among adult males and females who use the Internet for finding sexual partners and using online pornography. *Methods:* Study 1- 177 participants including 143 women M = 32.79 years (SD = 9.52), and 32 men M = 30.18 years (SD = 10.79). The Sexual Addiction Screening Test (SAST), the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS), Spielberger Trait-State Anxiety Inventory (STAI-T STAI-S) and Beck Depression Inventory (BDI). Study 2- 139 participants including 98 women M = 24 years (SD = 5) and 41 men M = 25 years (SD = 4). The impulsivity questionnaire (BIS/BAS), Problematic online sexual activities (s-IAT-sex) and Sexual Addiction Screening Test (SAST). *Results:* Study 1- Multiple regression analysis has indicated that a model which included BDI, Y-BOCS, and STAI scores contributed to the variance of sexual addiction rates, and explained 33.3% of the variance. Study 2- Multiple regression analysis indicated that BIS/BAS and s-IAT scores contributed to the variance of sexual addiction rates, and explained 33% of the variance. *Discussion and conclusions:* Obsessive-compulsive symptoms contributed to sexual addiction among individuals who use the Internet for finding sexual partners. Impulsivity and problematic online sexual activity contributed to ratings of sex addiction. These studies support the argument that sex addiction lies on the impulsive-compulsive scale and could be classified as a behavioral addiction.

INTRODUCTION

Sex addiction otherwise known as compulsive sexual behavior disorder (CSBD) is characterized by extensive sexual behavior and unsuccessful efforts to control excessive sexual behavior. It is a pathological condition that has compulsive, cognitive and emotional consequences (Karila et al., 2014; Weinstein, Zolek, Babkin, Cohen, & Lejoyeux, 2015).

There are several definitions of sex addiction. Goodman (1992) has defined sexual addiction as a failure to resist sex urges. At least one of the following is typical of such behavior: regular occupation with sexual activity that is preferred to other activities, restlessness when it is not possible to perform sexual activity and tolerance to this behavior. The symptoms should last for a month or repeat themselves after a long while (Zapf, Greiner, & Carroll, 2008). Mick and Hollander (2006) have defined sex addiction as a compulsive and impulsive sexual behavior whereas Kafka (2010) has defined sex addiction as hyper-sexuality which is sexual behavior above average that is characterized by failure to stop the sexual

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behavior despite of dire social and occupational consequences. In view of the several definitions of sex addiction one of the challenges is to determine what constitutes sex addiction. The term hypersexuality is problematic since most of the patients do not feel that their activity or sexual urges are above average. Secondly, the term is misleading since compulsive sexual behavior is a result of a sexual drive or urge and not of exceptional sexual desire and finally, compulsive sexual behavior can manifest in different ways that do not necessarily conform to this definition (Hall, 2011).

The fifth edition of the Diagnostic and Statistical Manual of Mental Disorder (DSM-IV) has considered the inclusion of compulsive sexual disorder but it has ultimately rejected it (APA, 2013). Currently, it is still a controversial whether compulsive sexual behavior is an obsessive-compulsive disorder or an addiction.

According to the ICD-11 by the World Health Organization (2018) compulsive sexual behavior disorder is characterized by a persistent pattern of failure to control intense, repetitive sexual impulses resulting in repetitive sexual behavior. Accordingly, the symptoms of this disorder include repetitive sexual activities that induce significant mental distress and eventually harm the individual's physical and mental health despite unsuccessful effort to reduce that repetitive sexual impulses and behaviors.

Sex addiction is harmful to the individual in many ways and it influences friends, family and life satisfaction (Zapf, Greiner, & Carroll, 2008). Individuals with compulsive sexual behavior disorder (CSBD) use a variety of sexual behaviors including excessive use of pornography, chat rooms and cybersex on the Internet (Rosenberg, Carnes & O'Connor, 2014; Weinstein, et al., 2015). CSBD is a pathological behavior with compulsive, cognitive and emotional characteristics (Fattore, Melis, Fadda, & Fratta, 2014). The compulsive element includes looking for new sexual partners, high frequency of sexual encounters, compulsive masturbation, regular use of pornography, unprotected sex, low self-efficacy, and use of drugs. The cognitive-emotional component includes obsessive thoughts about sex, guilt feelings, a need to avoid unpleasant thoughts, loneliness, low self-esteem, shame and secrecy about sexual activity, rationalizations about continuation of sexual activity, preference for anonymous sex, and lack of control over several aspects of life (Weinstein, et al., 2015).

The co-occurrence of CSBD and other addictions suggests that these disorders share etiological mechanisms, such as neurobiological and psycho-social factors (e.g., personality traits, cognitive deficits, or bias) (Goodman, 2008). Carnes, Murray, and Charpentier (2005) have reported that the majority of a sample of 1,603 with CSBD reported a lifetime prevalence of other addictive and abusive behaviors such as substance abuse, gambling, or eating disorders. A study of pathological gamblers has found that 19.6% of their sample also met the criteria for compulsive sexual behavior (CSB) (Grant & Steinberg, 2005). The majority of those who met the criteria for both disorders have reported that CSBD had preceded their gambling problems.

CSBD like other behavioral addictions falls on the spectrum of obsessive-compulsive and impulsive behavior (Grant, Potenza, Weinstein, & Gorelick, 2010; Raymond et al. 2003) have suggested the concept of compulsive sexual behavior (CSB) and they have argued that it is similar to OCD. Mick and Hollander (2006) have emphasized the importance of co-morbidity between CSBD and OCD and have recommended treatment with Selective Serotonin Reuptake Inhibitors (SSRIs) together with cognitive-behavior for this disorder. There is further evidence that CSBD has comorbidity with anxiety and depression (Bancroft & Vukadinovic, 2004; Klontz, Garos, & Klontz, 2005; Weiss, 2004). A recent study has investigated the roles of impulsivity and compulsivity in CSBD in a large community sample (Bőthe, Koós, Tóth-Király, Orosz, & Demetrovics 2019a,b). They have found that impulsivity and compulsivity were weakly related to problematic pornography use among men and women, respectively. Furthermore, impulsivity had a stronger relationship with hypersexuality than did compulsivity among men and women, respectively. The authors have argued based on their results that impulsivity and compulsivity may not contribute as substantially to problematic pornography use, but that impulsivity might play a more prominent role in hypersexuality than in problematic pornography use. A further study has estimated and prevalence of CSBD in a large cohort of patients with OCD (Fuss, Briken, Stein, & Lochner, 2019). The study has shown that lifetime prevalence of CSBD was 5.6% in patients with current OCD and significantly higher in men than women. CSBD in OCD was more likely comorbid with other mood, obsessive-compulsive, and impulse-control disorders, but not with disorders due to substance use or addictive behaviors. This finding supports conceptualization of CSBD as a compulsive-impulsive disorder.

In view of the controversy over the classification of CSBD as a behavioral addiction or an obsessive-compulsive disorder it has become important to study the comorbidity of CSBD with OCD, depression and anxiety in individuals with CSBD who use the popular media of the Internet to obtain sexual partners. Recently, there is an increasing use of Internet-dating applications on smart phones for sexual purpose, namely as a platform for getting sexual partners (Zlot, Goldstein, Cohen, & Weinstein, 2018). We have shown in a previous study that among those who use dating applications to get sexual partners, social anxiety rather than sensation seeking or gender is a major factor affecting the use of Internet dating applications for obtaining sexual partners (Zlot et al., 2018). Furthermore, we have investigated impulsivity and problematic online-pornography that are characteristics of addictive behavior, among this population in order to assess whether CSBD can be considered a behavioral addiction.

The aims of the first study were to examine whether compulsivity, depression and general anxiety (state or trait) contribute to the variance of CSBD ratings among those who use the Internet for finding sex partners. Based on previous studies (Bancroft & Vukadinovic, 2004; Bőthe et al., 2019a,b; Mick & Hollander, 2006; Klontz, Garos, & Klontz, 2005;

Weiss, 2004) it was hypothesized that compulsivity anxiety and depression would positively correlate with measures of CSBD and that the effect size would be large. The aim of the second study were to examine whether impulsivity, Problematic online use of pornography contribute to the variance of CSBD. Based on previous studies (Bőthe et al., 2019a,b; Fattore, Melis, Fadda, & Fratta, 2014; Kraus, Martino, & Potenza 2016; Rosenberg, Carnes, & O'Connor, 2014; Weinstein et al., 2015) it was hypothesized that impulsivity and problematic online sexual activities would positively correlate with measures of CSBD and that the effect size would be large. Finally, a key hypothesis investigated by Stack, Wasserman, and Kern (2004) is that persons with the strongest ties to conventional society will be less likely than others to use problematic online sexual activity. Single individuals are therefore expected to be more involved in problematic online sexual activity and compulsive sexual behavior than married couples. It was therefore hypothesized that single participants would score higher than married participants on measures of problematic online sexual activities and CSBD.

STUDY 1

METHODS

Participants

A hundred and seventy five participants mean age 33.3 years (SD = 9.78) were recruited to the study. Inclusion criteria were age 20–65 men and women who regularly use the Internet specifically for finding sexual partners. There were 143 women (82%) and 32 men (18%) in the sample. The mean age of women was 33.89 years (SD = 9.52) and of men it was 30.52 years (SD = 10.79). A major part of the current sample had academic or equivalent educational background (70.2%) and the rest of the sample had at least 12 years of study. In addition, a minor part of the participants were unemployed (9%), most of participants either worked in part-time positions (65%) or in full-time jobs (26%). Most of the sample were married (45%), some were single (25%) or in a relationship (20%). Most of the sample lived in the city (82%) and a minority lived in the countryside (18%). Participants have not received financial compensation for their participation in the study.

Measures

Demographic questionnaire. The demographic questionnaire has included items on sex, age, marital status, type of living, religion, education, employment.

The Spielberger Trait and State Anxiety Inventory (STAI). The STAI (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs 1983) has 40 items, 20 trait anxiety, and 20 state anxiety items. Scores on a Likert scale range from 1 "not at all" to 4 "agree very much." The questionnaire had been validated with mean Cronbach internal consistency of $\alpha = 0.83$ for Spielberger State and $\alpha = 0.88$ for Spielberger Trait (Spielberger et al., 1983). In our study the STAI-s questionnaire had a Cronbach internal consistency of $\alpha = 0.95$ and the STAI-t questionnaire had an internal reliability of Cronbach's $\alpha = 0.93$.

The Beck Depression Inventory (BDI). The BDI (Beck et al., 1988) is a self-reported inventory measuring characteristic attitudes and symptoms of depression (Beck, Ward, & Mendelson, 1961). The inventory includes 21 items, each item is rated on a scale from 0 to 4 and a total score is computed by summing the items. The BDI demonstrates high internal consistency, with Cronbach internal consistency of $\alpha = 0.86$ and 0.81 for psychiatric and non-psychiatric populations respectively (Beck et al., 1988). In this study, the BDI had a Cronbach internal consistency of $\alpha = 0.87$.

Yale-Brown Obsessive Compulsive Scale (YBOCS-). The YBOCS (Goodman et al., 1989) has 10 items on a Likert scale range from 1 "full control" to 5 "no control." The questionnaire had been validated with mean Cronbach internal consistency of $\alpha = 0.89$ (Goodman et al., 1989). In our study, the questionnaire had a Cronbach internal consistency of $\alpha = 0.9$.

Sexual Addiction Screening Test (SAST) (Carnes, 1991). The SAST (Carnes, 1991) is 25 items measures of sexual addiction. The items on the SAST are dichotomous with an endorsement of an item resulting in an increase by one in total score. Score above six indicates on hypersexual behavior, and a total score of 13 or more on the SAST results in a 95% true positive rate for sexual addiction (i.e., a 5% or less chance of incorrectly identifying a person as a sexual addict) (Carnes, 1991). The questionnaire was validated by Hook, Hook, Davis, Worthington, and Penberthy (2010) showing Cronbach's α consistency of 0.85–0.95. In our study there was Cronbach's α of 0.80. The SAST is not validated to present any categorical data, and it has been used as a continuous variable but not for categorization of sexually addicted individuals. The questionnaires were in the Hebrew language and they were validated in previous studies.

Procedure

The questionnaires were advertised online in social networks and forums that were dedicated for dating and sex ("Tinder," "okcupid," "gdate," "gflix," and others). Participants answered questionnaires on the Internet. Participants were informed that the study investigates sex addiction and that the questionnaires will remain anonymous for research purpose.

Statistical and data analysis

The analysis of the results was performed on Statistical Package for Social Science (SPSS) (IBM Corp. Armonk, NY, USA).

In order to explore sample characteristics an initial analysis of sex-addiction rates was performed. Sex addiction measures are not normally distributed within the general population; therefore a LAN transformation was computed to sex-addiction variables, values of skewness ($S = 0.04$, $SE = 0.18$) and kurtosis ($K = -0.41$, $SE = 0.37$) have indicated normal distribution. Since the results were the same in either transformed and original measures, the results of the original data were reported. Afterward, a further analysis of simple correlations was analyzed between obsessive-compulsive, depression, and anxiety measures in the whole sample and in males and females separately. Finally, the contribution of obsessive-compulsive, depression, and anxiety measures to the variance of sex addiction ratings was measured using multivariate regression analysis. Significant results of the regression models are reported following Bonferroni's correction ($P < 0.0125$). Bonneferoni corrections were calculated using the formula $\alpha critical = 1 - (1 - \alpha altered)k$. Effect size F was calculated using the formula Cohen's F squared of effect size $= R$ squared/$1 - R$ squared.

Ethics

The study was approved by the Institutional Review Board (IRB, Helsinki committee) of the University. All participants signed an informed consent form.

RESULTS

Sample characteristics

Scores on the sex addiction questionnaires indicated that 49 participants (11 men and 38 women) could be classified with sex addiction and 126 as non-sex addicted following criteria defined by Carnes (1991) (SAST score > 6). Men had greater scores of sex-addiction than women [$t (1,171) = 2.71$, $P = 0.007$, Cohen's $d = 0.53$; indicating a large effect of gender on sex-addiction according to the Cohen's criterions (small, moderate, large)]. Moreover, men showed more OCD symptoms than women [$t (1,171) = 4.49$, $P < 0.001$, Cohen's $d = 0.85$; indicating a large effect of gender on OCD symptoms according to the Cohen's criterions]. Men showed no higher state anxiety measures than women $t(1, 171) = 1.26$, $P = 0.22$. Men also showed no higher trait anxiety measures than women $t(1, 171) = -0.79$, $P = 0.43$ and there were no differences in depression between men and women $t(1, 171) = 1.12$, $P = 0.26$ (see Table 1).

The association between depression, anxiety and obsessive-compulsive symptoms, and sex addiction. An initial Pearson's correlation test has indicated a positive correlation between depression, trait and state anxiety, obsessive-compulsive symptoms and sex-addiction score (see Table 2) and these correlations were observed either in males or females separately.

A multiple regression analysis has indicated that a model which included gender ($\beta = -0.06$, $P = 0.34$), Y-BOCS ($\beta = 0.42$, $P < 0.001$), BDI ($\beta = -0.06$; $P = 0.7$), and STAI trait ($\beta = 0.18$, $P = 0.22$) and STAI state ($\beta = 0.07$, $P = 0.6$) scores has contributed significantly to the variance of sexual addiction ratings [$F (4,174) = 21.43$, $P < 0.001$, $R^2 = 0.33$, Cohen's $f = 0.42$] and it has explained 33.3% of the variance of these ratings. However, only Y-BOCS scores significantly predicted sexual addiction. The statistical parameter of tolerance ranged between 0.3 and 0.89, and VIF measurers ranged between 1.1 and 3 and they have indicated on appropriate collinearity. See Table 3 for regression analysis. Further analysis was performed in order to explore the moderating effect of gender on the association between OCD and sexual addiction ratings and it has indicated no

Table 1. Study 1–Questionnaire ratings in male and female participants M (SD)

	Males ($n = 30$)	Females ($n = 145$)	Total ($n = 175$)
SAST	31.53(5.64)	29.45(3.4)	4.93(3.94)
YBOCS	20.6(10)	14.69(5.55)	15.70(6.87)
BDI	33.8(13.68)	31.56(9.24)	31.76(10.39)
STAI-S	35.2(12.93)	37.36(14.93)	36.18(13.36)
STAI-T	35.8(15.21)	38.53(14)	36.63(14.56)

Abbreviations: SAST- Sexual Addiction Screening Test; YBOCS-Yale-Brown Obsessive-Compulsive Scale; BDI- Beck Depression Inventory; STAI-S/T- Spielberger Trait and State Anxiety Inventory.

Table 2. Study 1–Pearson r correlations on all questionnaires in all participants ($n = 175$)

Factor	M (SD)	SAST	YBOCS	BDI	STAI-S	STAI-T
1. SAST	4.93 (3.94)					
2. YBOCS	15.70 (6.87)	0.54***				
3. BDI	31.76 (10.39)	0.39***	0.52***			
4. STAI-S	36.18 (13.36)	0.45***	0.57***	0.83***		
5. STAI-T	36.63 (14.56)	0.42***	0.52***	0.80***	0.88***	

Abbreviations: SAST- Sexual Addiction Screening Test; YBOCS- Yale-Brown Obsessive-Compulsive Scale; BDI- Beck Depression Inventory; STAI-S/T- Spielberger Trait and State Anxiety Inventory.
***$P < 0.01$.

Table 3. Study 1–Linear regression of the effects of obsessive-compulsive, depression and anxiety ratings on sex addiction scores in all participants ($n = 175$)

Variables	B	S.E	Partial Correlations	β
YBOCS	0.24	0.04	0.36	0.42***
BDI	−0.23	0.04	−0.03	−0.06
STAI-S	0.05	0.04	0.04	0.194
STAI-T	0.02	0.03	0.1	0.08
$F(4,174) = 21.43***$; $R^2 = 0.33$				

Abbreviations: SAST- Sexual Addiction Screening Test; YBOCS- Yale-Brown Obsessive-Compulsive Scale; BDI- Beck Depression Inventory; STAI-S/T- Spielberger Trait and State Anxiety Inventory.
$P < 0.001***$.

moderating effect of gender on the association between OCD and sexual addiction ($\beta = 0.12$, $P = 0.41$; $\beta = 0.17$, $P = 0.25$).

In conclusion, the results have indicated a positive correlation between depression, trait and state anxiety, obsessive-compulsive symptoms and sex-addiction scores in males and females. Secondly, regression analysis has shown that compulsivity scores have contributed to the variance of sexual addiction rates and they have explained 33.3% of the variance.

STUDY 2

METHODS

Participants

A hundred and thirty-nine participants mean age 24.75 years (SD = 0.33) were recruited to the study. Inclusion criteria were age 20–65 men and women who regularly use the Internet for sexual activity. There were 98 women (71%) and 41 men (29%). The mean age of women was 24 years (SD = 5) and of men it was 25 years (SD = 4). A major part of the current sample had academic or equivalent educational background (29%) and the rest of the sample (71%) had at least 12 years of study. In addition, a minor part of the participants were unemployed (2%), students (11%) and most of participants either worked in part-time positions (16%) or in full-time jobs (71%). Most of the sample were single (73.7%) or were married or in a relationship (26.3%).

Measures

Demographic questionnaire. A demographic questionnaire included items on sex, age, marital status, type of living, religion, education, employment. The questionnaires were in the Hebrew language and they were validated in previous studies.

Barratt Impulsiveness Scale (BIS/BAS). The BIS/BAS is a questionnaire that measures impulsivity that has been developed by Patton, Stanford, and Baratt (1995). The questionnaire has 30 items. Scores on a Likert scale range from 1 "seldom/rarely" to 4 "almost always/always." The questionnaire had been validated with mean Cronbach

internal consistency of $\alpha = 0.83$. In our study the questionnaire had a Cronbach internal consistency of $\alpha = 0.83$.

Short Internet Addiction Test (s-IAT-sex). The s-IAT-sex is a questionnaire that measures problematic online sexual activity that has been developed by Wéry, Burnay, Karila, and Billieux (2015). It is based on an internet addiction test developed by Pawlikowski, Altstötter-Gleich, and Brand (2013) where items on "Internet" or "online" were replaced with "sexual activity online" and "sex sites." The questionnaire has 12 items, each item is rated on a scale from 1 to 5 from 1 "never" to 5 "always" and a total score is computed by summing the items. The questionnaire had been validated by Wéry et al. (2015) with mean Cronbach internal consistency of $\alpha = 0.90$. In our study the questionnaire had a Cronbach internal consistency of $\alpha = 0.89$.

Sexual Addiction Screening Test (SAST) (Carnes, 1991) which was validated by Hook et al. (2010) showing Cronbach's α of 0.85–0.95. In our study there was Cronbach's α of 0.79. The SAST is not validated to present any categorical data, and it has been used as a continuous variable but not for categorization of sexually addicted individuals.

Procedure

The questionnaires were advertised online in social networks and forums of individuals who use problematic online sexual activity. Participants have answered the questionnaires on the Internet. Participants were also informed that the study investigates sex addiction and that the questionnaires will remain anonymous for research purpose.

Statistical and data analysis

The analysis of the results was performed on Statistical Package for Social Science (SPSS) for windows v.21 (IBM Corp. Armonk, NY, USA). In order to test normal distribution a LAN transformation to sex-addiction measurer was performed. Values of skewness (S = −0.2, SE = 0.2) and kurtosis (K = −0.81, SE = 0.41) have indicated a normal distribution. Since the results were the same in either transformed and original measures, the results of original data were reported.

Data referring to sex, age, marital status, type of living, education, employment and use of the internet were analyzed using a Pearson's chi-squared test. The

contribution of impulsivity, and problematic online sexual activity measures to the variance of sex addiction ratings was measured using multivariate regression analysis. Significant results of the regression models are reported following Bonferroni's correction ($P < 0.0125$). Bonneferoni corrections were calculated using the formula αcritical $= 1-(1-\alpha$altered$)k$. Effect size F was calculated using the formula Cohen's F squared of effect size $= R$ squared$/1-R$ squared.

Ethics

The study was approved by the Institutional Review Board (IRB, Helsinki committee) of the University. All participants have signed an informed consent form.

RESULTS

Sample Characteristics

Scores on the sex addiction questionnaires indicated that 45 participants (18 men and 27 women) could be classified with sex addiction and 92 as non-sex addicted following criteria defined by Carnes (1991) (SAST score > 6). Men had greater scores of sex-addiction than women [t (1,135) $= 2.17$, $P = 0.01$, Cohen's $d = 0.41$]. Men had also greater scores on the Short Internet Addiction Test (s-IAT-sex) than women [t (1, 58) $= 2.17$, $P < 0.001$ Cohen's $d = 0.95$; indicating a large effect of gender on Internet sex-addiction according to the Cohen's criterions]. There were no differences in impulsivity (BIS/BAS) scores between men and women t (1, 99) $= -0.87$; $P = 0.16$]. See Table 4 for questionnaire measures in all participants.

The Association between s-IAT-sex, BIS/BAS and SAST. A Pearson's correlation test has indicated a positive correlation between impulsivity (BIS/BAS), problematic online sexual activity (s-IAT-sex), and sex-addiction scores (SAST) (see Table 5).

A multiple regression analysis for both males and females has indicated that a model which has included gender ($\beta = -0.01$, $P = 0.84$) s-IAT-sex ($\beta = 0.47$, $P < 0.001$), BIS/BAS ($\beta = 0.24$, $P = 0.001$) scores has contributed significantly to the variance of sexual addiction ratings [F (2,134) $= 34.16$, $P < 0.001$, $R^2 = 0.33$, Cohen's $f = 0.42$] and it has explained 33% of the variance of these ratings. Index of tolerance ranged between 0.7 and 0.9, and VIF measurers ranged between 1 to 1.24 and they have indicated appropriate collinearity. Table 6 shows regression analysis for men and women of sex addiction scores. Further analysis was performed in order to explore the moderation effect of gender and other variables on sexual addiction ratings the interaction terms of s-IAT-sex × gender ($\beta = 0.06$, $P =$

Table 4. Study 2–Questionnaire ratings in male and female participants M (SD)

	Males ($n = 41$)	Females ($n = 98$)	Total ($n = 139$)
SAST	5.47(3.41)	4.14(3.2)	4.53(3.3)
s-IAT-sex	1.78(0.67)	1.25(0.51)	1.4(0.6)
BIS/BAS	2(0.28)	2.07(0.39)	2.05(0.36)

Abbreviations: "s-IAT-sex"- Short Internet Addiction Test that was adapted to measure sexual activities; BIS/BAS- Barratt Impulsiveness Scale; SAST- Sexual Addiction Screening Test.

Table 5. Study 2- Pearson's correlations on all questionnaires in all participants ($n = 139$)

Factor	M (SD)	SAST	s-IAT-sex	BIS/BAS
SAST	4.53(3.3)	1		
s-IAT-sex	1.4(0.6)	0.53***		
BIS/BAS	2.05(0.36)	0.35**	0.22*	–

Abbreviations: "s-IAT-sex"- Short Internet Addiction Test that was adapted to measure sexual activities; "BIS/BAS"- Barratt Impulsiveness Scale; "SAST"- Sexual Addiction Screening Test.
*$P < 0.05$; **$P < 0.01$.

Table 6. Study 2- Linear regression of the effects of gender and impulsivity ratings on problematic online sexual activity scores in all participants ($n = 139$)

Variables	B	S.E	Partial Correlations	β
Gender	−0.11	0.57	−0.17	−0.1
s-IAT-sex	2.61	0.4	0.45	0.47***
BIS/BAS	2.17	0.65	0.28	0.24***
$F(3,133) = 22.64$; $R^2 = 0.33$***				

Abbreviations: "s-IAT-sex"- Short Internet Addiction Test that was adapted to measure sexual activities; "BIS/BAS"- Barratt Impulsiveness Scale; "SAST"- Sexual Addiction Screening Test.
***$P < 0.001$.

0.77), and BIS/BAS × gender ($\beta = 0.5$, $P = 0.46$) were not significant in predicting sexual addiction.

Marital status. Single participants scored higher ($M = 1.50$, SD = 0.66) than married participants ($M = 1.16$, SD = 0.30) on the s-IAT-sex questionnaire ($t (1,128) = 4.06$, $P < 0.001$). Single participants also scored higher ($M = 4.97$, SD = 3.38 (than married participants ($M = 3.31$, SD = 2.78) on the SAST questionnaire ($t (1,135) = 2.65$, $P < 0.01$). Finally, single female participants scored higher ($M = 1.33$, SD = 0.58 (than married female participants ($M = 1.08$, SD = 0.21) on the s-IAT-sex questionnaire ($t (1, 92) = 4.06$, $P = 0.003$).

In conclusion, the results have indicated a positive correlation between impulsivity, problematic online sexual activity and sex-addiction scores. Secondly, regression analysis has shown that impulsivity and problematic online sexual activity scores have contributed to the variance of sexual addiction ratings and it has explained 33% of the variance.

DISCUSSION

There is a growing interest in research on CSBD and its possible inclusion in the Diagnostic and Statistical 5th Manual (DSM-5) (American Psychiatric Association, 2013) or the ICD 11 where it is now included as an impulse control disorder (Kraus et al., 2018). Since the topic is important and clinically relevant, more studies are required until it can be recognized as a clinical disorder in the next revision of the DSM. The present study supports previous findings of co-morbidity of CSBD with obsessive-compulsive, anxiety and depressive symptoms (Klontz, Garos, & Klontz, 2005) although only a minority are diagnosed with OCD in this group of patients (15% in Black, 2000; and in Shapira, Goldsmith, Keck, Khosla, & McElroy, 2000). A further study on a large cohort of patients with OCD (Fuss et al., 2019) has shown a high lifetime prevalence of CSBD in patients with current OCD and comorbidity with other mood, obsessive-compulsive, and impulse-control disorders.

CSBD like other behavioral addictions falls on the spectrum of obsessive-compulsive and impulsive behavior (Grant et al., 2010). In the general population the prevalence of obsessive-compulsive disorder (OCD) is between 1 and 3% (Leckman et al., 2010). OCD symptoms are often associated with compulsive sexual behavior (Klontz et al., 2005). Raymond et al. (2003) were the first to suggest the concept of compulsive sexual behavior (CSB) that is phenomenologically similar to OCD. CSB is characterized by repeated and intense sexual fantasies, urges and sexual behaviors that lead to significant impairment. The obsessive thoughts are intrusive and they are often associated with tension or anxiety, hence compulsive sexual behavior is aimed at reducing such tension and anxiety. Mick and Hollander (2006) have emphasized the importance of co-morbidity between CSB and OCD and they have recommended treatment with Selective Serotonin Reuptake Inhibitors (SSRIs) together with cognitive-behavior treatment for this disorder. The DSM-IV has criticized this approach since the

person with compulsive sexual behavior often finds pleasure in this behavior and he will try to resist such behavior only when such behavior is harmful (American Psychiatric Association, 2000, p. 422). Although patients with OCD may have obsessive thoughts with sexual content these are often followed by a negative mood without sexual arousal. Hence we expect that these patients will experience reduced sexual desire during this mood.

There is further evidence that CSBD has comorbidity with anxiety and depression (Klontz, Garos, & Klontz, 2005). A study has found that among males with CSBD the rate was 28% whereas in the general population it was 12% (Weiss, 2004). There is further evidence that individuals with CSBD have excessive interest in sex while being depressed or anxious (Bancroft & Vukadinovic, 2004). Most homosexual and heterosexual men have reported a decrease in sexual drive during depression or anxiety but a minority (between 15 and 25%) has reported an increase in the sexual drive, more in anxiety than depression. The rise in sexual drive during depression can be a result of a need for a personal touch or appreciation by another person. Those who experience reduced interest in sex during depression may do that due to lower self-esteem (Bancroft & Vukadinovic, 2004). A further study has shown that among those with CSBD 42–46% suffer from anxiety and 33–80% from mood disorder (Mick & Hollander, 2006). A group of patients who were treated for CSBD in a group therapy have shown a reduction in psychological stress, depression, obsessive-compulsive symptoms, preoccupation with sex and sexual arousal, depression and anxiety and these changes have remained at 6 months follow-up (Klontz, Garos, & Klontz, 2005).

In this study, depression ratings have not significantly contributed to the ratings of sex addiction. Since in some cases depression reduces sexual drive and in some cases it increases the sexual drive (Bancroft & Vukadinovic, 2004) the relationship between depression and compulsive sexual behavior may be mediated by other factors. Since anxiety has contributed significantly to ratings of sex addiction, it is possible that depression is a mediating factor between anxiety and CSBD.

Although this study has a unique ratio of women to men with a large majority of women participants, results of separate regression analysis for men and women has shown that the contribution of OCD, depression and anxiety ratings to the variance of sex addiction ratings was much higher in men, and it has explained 40% of the variance compared to 20% in women, although as a general factor, sex did not contribute to the regression when both men and women were analyzed together, presumably due to a small number of men. This finding supports previous studies showing sex differences in CSBD in particular with regard to using pornography sites and engaging in cybersex (Weinstein et al., 2015). On the other hand, our previous study of using dating applications has not shown sex differences (Zlot et al., 2018). So, the issue of sex differences among individuals who use the Internet for online sex activity requires further examination.

Compulsive sexual behavior has also psychiatric comorbidities with social anxiety, dysthymia, attention deficit hyperactivity disorder (Bijlenga et al., 2018; Bőthe

et al., 2019a,b; Garcia & Thibaut, 2010; Mick & Hollander, 2006; Semaille, 2009) affect dysregulation (Samenow, 2010) and post-traumatic stress disorder (Carnes, 1991). Some studies find that sexual addiction is associated with or in response to dysphoric affects or stressful life events (Raymond, Coleman, & Miner, 2003; Reid, 2007; Reid & Carpenter, 2009; Reid, Carpenter, Spackman, & Willes, 2008).

The chronic use of online pornography is explained by the concepts of impulsive sexuality, compulsive sexuality and CSBD (Wetterneck, Burgess, Short, Smith, & Cervantes, 2012). The Internet has made pornography more accessible and in abundance and that has contributed to levels of sexual arousal that have not existed before (Mass, 2010; Wetterneck et al., 2012). It has been suggested that CSBD lies on the impulsive-compulsive scale (Grant et al., 2010). Impulsivity, which refers to an act without planning or forethought, is associated with pleasure, arousal and satisfaction and it starts the addiction cycle whereas the compulsivity maintains the persistent CSBD (Karila et al., 2014; Wetterneck et al., 2012).

The purpose of the second study was to investigate the association between impulsivity, problematic online use of sexual activity and CSBD. Impulsivity and problematic online use of sexual activity can be indicators of sex addiction and it is therefore important to assess them in a population that is using the Internet to obtain sexual partners. It is already established that impulsivity is associated with problematic use of online pornography (Wetterneck et al., 2012) and CSBD (Karila et al., 2014; Weinstein, 2014; Weinstein, et al., 2015). Despite the rise in use of online pornography (Carroll et al., 2008; Kingston et al., 2009; Mass, 2010; Stack et al., 2004; Wetterneck et al., 2012) very few studies have investigated this association (Wetterneck et al., 2012). The results of this study suggest that impulsivity and problematic use of online pornography are associated with CSBD in a sample that is predominantly female. Since most studies on CSBD have a majority of male participants that makes the finding particularly novel since it implies that females with CSBD are also impulsive. It is generally expected by evolutionary theories that females should have evolved a greater ability to inhibit impulsive or pre-potent responses. There is supportive evidence showing that female individuals have better performance on cognitive tasks measuring impulsivity such as delay in gratification and delayed discounting mainly in childhood (see Weinstein & Dannon, 2015 for review). It is plausible that many use online pornography as means of avoiding personal experience and such avoidance maintains this compulsive and addictive behavior (Wetterneck et al., 2012). There are however contradictory results reported by Bőthe et al. (2019a,b) showing that impulsivity and compulsivity were weakly related to problematic pornography use among men and women, respectively. Impulsivity had a stronger relationship with hypersexuality than did compulsivity among men and women, respectively. Consequently, the authors have argued that impulsivity and compulsivity may not contribute as substantially to problematic pornography use as some scholars have proposed. On the other hand, impulsivity might have a more prominent role in hypersexuality than in problematic pornography use.

The current literature describes sex differences in the use of online pornography, impulsivity and CSBD (Carroll et al., 2008; Poulsen et al., 2013; Weinstein et al., 2015; Zlot et al., 2018). This study has indicated such differences in the use of online pornography and CSBD ratings but not in impulsivity (unlike the results described by Wetterneck et al. (2012)) that has found higher impulsivity in men. It is possible that in the modern world and the growing strength of the feminist movement, women adopt strategies that were traditionally considered masculine traits such as being assertive, risk-taking and impulsivity.

As expected there was higher use of online pornography and higher rates of CSBD in single women compared with married women. Over the past few years there is an increase in the use of online pornography among women although there are sex differences with regards to this media. In a major couple study, male pornography use was negatively associated with both male and female sexual quality, whereas female pornography use was positively associated with female sexual quality (Poulsen et al., 2013). It seems that women regard the use of this media as positive if it is associated with improved quality of mutual sexual activity (Tokunaga et al., 2017; Vaillancourt-Morel et al., 2019).

Finally, problematic online sexual activities are often done in secret and as a solitary activity that is hidden from family members. Weak ties to family, friends and the society in general may therefore lead to problematic online sexual activities among men and women. Also, there is clinical evidence that individuals engaging in problematic online sexual activities experience damage to their romantic relationships as a result of this problematic engagement, thus, single individuals will have higher scores on the CSBD scale.

LIMITATIONS

Both studies have used self-rating questionnaires on the Internet hence there is a possibility of inaccuracies in responses. Since the data collection for the study better scales have been found in the literature (Montgomery-Graham, 2017). Secondly, they have included small sample sizes and there were potential biases of the samples. In both studies there were more women than men. In study 1, more were married or in a relationship than single whereas in Study 2 the majority were single (73.7%) and the minority were married or in a relationship (26.3%). There were also differences in the proportions of part-time jobs in Study 1 most of the sample had a part-time job (65%) whereas in Study 2 only 16%. Third, they were cross-sectional studies hence no causality can be inferred. Finally, in both studies there was a majority of females which may have affected the ratings of impulsivity.

CONCLUSION

The first study showed that obsessive compulsive symptoms contribute to ratings of CSB scores among those who use the Internet for finding sexual partners. The second study has

shown that impulsivity and problematic use of online sexual activity contributed to CSB scores among those who use the Internet for sexual activity. The use of the Internet and its applications for finding partners for sex and for watching pornography is highly popular among males but we now show that it is also popular among women. Future studies should examine the social and situational factors associated with the use of the Internet to find sexual partners. Furthermore, they should examine compulsivity and impulsivity with regard to sexual orientation by investigating homosexual men and women. They could also compare particular populations with compulsive sexual behavior for example those who use problematic online sexual activity with those who seek compulsive sexual activity off-line in real-life situations.

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