



The contribution of ADHD and attachment difficulties to online pornography use among students

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ABSTRACT

Background: There is a high rate of ADHD among individuals with compulsive sexual behavior disorder (CSBD). There is also evidence for an association between compulsive sexual behavior disorder, sensation seeking and attachment difficulties. Problematic pornography use may be considered as a subtype of CSBD hence it merits investigation. The aim of the current study was to investigate the relationships between ADHD, attachment style, sensation seeking and problematic use of pornography online in the general population.

Methods: The sample was comprised of 85 participants [38 men (44.7%) and 47 women (55.3%)] with mean age 25.66 (SD = 4.63) and 26.42 (SD = 6.94) years, respectively. There were 30 participants (35%) with ADHD and 55 participants (65%) without ADHD. They were recruited on-line via social network sites. They filled in a demographic questionnaire, Zukerman's Sensation Seeking Scale, Experience in Close Relationship (ECR) questionnaire that assessed anxious and avoidant attachment and the Cyber Pornography Use Inventory (CPUI). **Results:** Individuals with self-reported ADHD had higher scores of avoidant attachment on the ECR and CPUI compared with individuals without ADHD. Multivariate linear regression analysis has indicated that male gender, ADHD and anxious attachment on the ECR contributed significantly to the variance of cyber pornography use, and explained 34% of the variance.

Conclusions: The results indicate that males with ADHD and anxious attachment show an extensive use of pornography online. Males with ADHD who have difficulties in close relationship may use online pornography excessively that in turn may exacerbate their difficulty in forming secure attachment at adult life, a finding that has major clinical implications.

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1. Introduction

Compulsive sexual behavior disorder (CSBD) is characterized by extensive sexual behavior and unsuccessful efforts to control excessive sexual behavior. It is a pathological behavior that has compulsive, cognitive and emotional consequences [1–2]. CSBD is harmful to the individual and it influences the interactions with friends and family members and life satisfaction [3]. In view of the current evidence for an association between compulsive sexual behavior, ADHD and anxious and avoidance attachment we have investigated the online use of pornography among a group of subjects, with or without ADHD, who were recruited on social networks online.

The fifth edition of the Diagnostic and Statistical Manual of Mental Disorder (DSM-5) [4] is using the term hyper-sexuality but this term 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 sex addiction is a result of a sexual drive or urge and not of exceptional sexual desire and finally, compulsive sexual behavior can be manifested in different ways that do not necessarily conform to this definition [5]. According to the ICD-11 [6] 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 individual's physical and mental health despite unsuccessful effort to reduce that repetitive sexual impulses and behaviors.

In our previous study, we have investigated the effects of gender, sexual orientation and attachment (avoidance and anxiety) on sexual compulsivity among 100 heterosexual and homosexual men and women [7]. We have found a positive correlation between anxious and avoidant attachment and sexual compulsivity in all participants. The results provide preliminary evidence for an association between difficulties in attachment and sexual compulsivity in both men and women.

There is previous evidence for a high rate of ADHD in men with hypersexual disorder. Kafka and Prentky [8] have found that among

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men with hypersexual disorder about 17% were diagnosed with ADHD and a following study by Kafka and Hennen's [9] has found a rate of 18.7% in those with ADHD in their sample. The association between compulsive sexual behavior and ADHD is intriguing due to possible common mechanisms such as impulsivity, sensation seeking and reward deficiency. A recent large survey reported by B  the et al. [10] of 14,043 participants has shown that ADHD symptoms had positive and moderate associations with hyper-sexuality in both men and women. Furthermore, hyper-sexuality had positive and moderate association with problematic pornography use among women and men [10].

The current literature describes gender differences in the use of online pornography and compulsive sexual behavior [2–3,11]. We consider problematic pornography use as a subtype of CSBD. In our previous study, men showed higher levels of craving for pornography, higher frequency of using cyber-sex and more difficulties in forming intimate relationship than women [2]. A recent study that has examined the motivations behind Internet pornography use has found four factors–relationship, mood management, habitual use, and fantasy. Males revealed far stronger motivations than females; and those with more erotophilic tendencies were more motivated to use Internet pornography for all four motivational factors [12]. Furthermore, there is anecdotal and clinical evidence that individuals with CSBD, similarly to drug-dependent individuals, are doing so for sensation seeking and in pursuit of thrill or excitement [13].

Regarding pornography use, sensation seeking is arguably the most prevalently examined impulsivity-related characteristic studied to date. Sensation seeking has been found to be positively related to the frequency of pornography consumption [14–15] (see B  the et al. [16] for review). For men, sensation seeking has also been found to be positively related to online pornography use [17–18]. The evidence so far suggests that individuals with higher levels of sensation seeking may spend more time using online pornography and may develop problematic online pornography use.

In the current study, based on previous research, we hypothesized that men with ADHD diagnosis together with attachment problems and high sensation seeking would show increased measures of quality of pornography use online. It should be clarified that problematic pornography use and pornography use frequency have weak-to-moderate positive associations indicating that these two aspects of pornography use are related, but they are not identical [19–22].

2. Materials and methods

2.1. Participants

Inclusion criteria were age 20–65 men and women. Eighty five participants aged 26.58 (SD = 7.14) years were recruited to the study. The sample included 38 men (44.7%) and 47 women (55.3%). The mean age of men was 25.66 (SD = 4.63) years and the mean age of women was 26.42 (SD = 6.94) years. A major part of the current sample had academic or equivalent educational background (75%) and the rest of the sample had at least 12 years of study. The mean education years was 13.33 (SD = 2.16). In addition, most participants worked full-time (74%) and only a minority was unemployed (20%) or students in full-time education (6%). The sample included 47 single (55%), 24 married (28%), 12 living with a partner without marriage (14%) and 2 (3%) divorced.

2.2. Questionnaires

2.2.1. Demographic questionnaire

A demographic questionnaire included items on sex, age, marital status, education, employment, presence or absence of ADHD diagnosis established by a psychiatrist or a neurologist.

Experience in Close Relationship Scale (ECR) [23] that was validated by Mikulnicer and Florian [24]. The questionnaire has 36

questions divided equally into avoidance of intimacy and attachment and anxious attachment that is related to abandonment and separation anxiety. There are 4 combinations of attachment: secure attachment is indicated by low avoidance measures and low anxiety measures, avoidant attachment which is indicated by low anxiety measures, anxious attachment which is indicated by low avoidance measures and avoidant-anxious attachment which is indicated by high anxiety and high avoidance measures. Ratings are from 1 “strongly disagree” to 7 “agree very much”. The study of Mikulnicer and Florian [24] has reported that the part of the questionnaire on avoidance attachment had Cronbach internal validity of $\alpha = 0.94$ and the part on anxious attachment had a Cronbach internal validity of $\alpha = 0.91$. In our study the part of the questionnaire on avoidance attachment had a Cronbach internal validity of $\alpha = 0.81$ and the part on anxious attachment had a Cronbach internal validity of $\alpha = 0.87$.

Cyber Pornography Use Inventory (CPUI) [25] The CPUI is a 31-item self-report inventory composed of 3 subscales that measures quality of pornography use. Most questions are Likert scales ranging from either strongly agree to strongly disagree (7 points). Factor analysis of the CPUI revealed a three factor structure: Addictive Patterns ($\alpha = 0.89$), Guilt Regarding Online Pornography Use ($\alpha = 0.83$), and Online Sexual Behavior-Social ($\alpha = 0.84$). In our study there was a Cronbach internal validity of $\alpha = 0.94$.

Sensation Seeking Scale (SSS) by Zuckerman [26] includes 40 items where participants had to choose between two opposite items. There were four personality traits including: Disinhibition, Boredom Susceptibility, Thrill and Adventure Seeking, Experience Seeking. The questionnaire was validated by Arnett [27] showing Cronbach's α reliability of 0.83–0.86. In our study, there was Cronbach's α of 0.71.

All questionnaires have been validated previously in the language of the study.

2.3. Procedure

The questionnaires were publicized online in social networks on the Internet. Participants answered questionnaires and sent them to the investigators using email. Participants were informed that the study investigates sex addiction and that the questionnaires will remain anonymous for research purpose. ADHD diagnosis was reported by the participants and it was not verified by medical records.

2.4. Ethics

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

2.5. Statistical and data analysis

The analysis of the results was performed on Statistical Package for Social Science (SPSS) (IBM Corp. Armonk, NY, USA). An initial analysis of demographic variables and questionnaires' validity was performed. Afterwards, descriptive statistics was done on the ECR, CPUI and the SSS scores. Secondly, a univariate comparison between participants with and without ADHD on all measures was done. Finally, the contribution of ADHD, gender, age, ECR anxiety and avoidance subscales and the SSS to the variance of CPUI scores was calculated using multivariate regression analysis. Results are expressed as Mean (SD).

3. Results

3.1. Sample characteristics

There were 30 subjects (35%) with ADHD and 55 subjects (65%) without ADHD. The prevalence of ADHD rates in this random sample (35%) was much higher than in those diagnosed by DSM-IV criteria,

Table 1
The psychometric ratings [Mean (SD)] of the participants without and with ADHD.

	Without ADHD (n = 55)	With ADHD (n = 30)	t-test
ECR anxiety	2.42 (0.76)	2.35 (0.82)	$t(1, 83) = -0.35$, $p = 0.73$
ECR avoidance	3.28 (0.61)	3.63 (0.57)	$t(1, 83) = -2.56$ $p < 0.05$
Sensation seeking scale (SSS)	16.53 (5.19)	16.93 (4.2)	$t(1, 83) = 0.36$, $p = 0.71$
Problematic Pornography Use Inventory (CPUI)	1.53 (0.63)	2.24 (1.21)	$t(1, 83) = -3.57$, $p < 0.001$

ECR = Experience in Close Relationship Scale.

which was 12.6% among 284,419 children enrolled at Healthcare Services in Israel (26) and 21% among 957 adolescents diagnosed by clinicians (27); however, the prevalence rates among adults with ADHD in Israel are not known.

Mean scores of 85 participants on anxious attachment on the ECR were 2.40 (SD = 0.77), avoidant attachment on the ECR were 3.40 (SD = 0.62), sensation seeking 16.67 (SD = 4.84) cyber pornography use 1.78 (SD = 0.94). As shown in Table 1, participants with ADHD scored significantly higher on avoidant attachment on the ECR and problematic pornography use than participants without ADHD.

Multivariate linear regression analysis (Table 2) indicated that a model which included male gender ($\beta = 0.33$, $p < 0.001$), anxious attachment ($\beta = 0.23$, $p < 0.05$) and ADHD diagnosis ($\beta = 0.28$, $p < 0.01$) contributed significantly to the variance of problematic pornography use and explained 34% of the variance of these ratings [$F(6, 84) = 6.7$, $p < 0.001$, $R^2 = 0.34$].

Table 3 shows the descriptive statistics of the questionnaires assessed in the present study.

Table 4 shows the correlations between the various questionnaires in the whole sample and in the sample divided into ADHD and non-ADHD. The participants with ADHD have shown a significant correlation between problematic pornography use, anxiety and sensation seeking.

4. Discussion

This study showed that participants with ADHD had scored higher on measures of quality of problematic pornography use and avoidant attachment than participants without ADHD. Furthermore, anxious attachment contributed to ratings of online pornography thus confirming that anxiety is associated with excessive use of pornography. Recently, several studies have examined the association between ADHD and compulsive sexual behavior. In an effort to find some estimate of the prevalence of adult ADHD symptoms in hypersexual patients, Blankenship and Laaser [28] have used a self-report measure to assess the clinical characteristics of ADHD in a treatment-seeking sample ($n = 70$) of men that they have categorized as sex addicts. Their study indicated that 67% of their sample reported

Table 2
Multivariate linear regression analysis of Cyber Pornography Use scores.

Variables	B	S.E	β
Gender	-0.62	0.19	0.33***
Age	-0.01	0.02	-0.04
ECR avoidance	0.01	0.15	0.06
ECR anxiety	-0.28	0.12	-0.23*
Sensation seeking SSS	-0.2	0.02	-0.12
ADHD	0.54	0.19	0.28**
	$F(6,84) = 6.7***$	$R^2 = 0.34$	

Experience in Close Relationship Scale (ECR), Cyber Pornography Use Inventory (CPUI) and the Sensation Seeking Scale (SSS).

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

Table 3
Descriptive statistics of all questionnaires.

	N	Minimum	Maximum	Mean	Std. deviation
ECR Avoidance	85	1.93	5.40	3.40	0.62
ECR anxiety	85	1.12	4.18	2.40	0.77
Problematic Pornography Use Inventory (CPUI)	85	1.00	4.61	1.78	0.94
Sensation seeking scale (SSS)	85	3.00	25.00	16.67	4.84

ECR = Experience in Close Relationship Scale.

some level of classic ADHD symptoms, with the majority of men classified as the subtype predominantly inattentive. A major limitation in their study is the use of a self-report measure. Nevertheless, the results indicated that adult ADHD may be common among hypersexual outpatients. A recent study has shown that ADHD symptoms might play an important role in the severity of hyper-sexuality in both men and women, whereas ADHD symptoms might play a significant role in problematic pornography use only among men but not in women. The findings imply that when men have high levels of CSBD or problematic pornography use, ADHD should be assessed as a potential comorbid disorder [10]. A further implication of the comorbidity of CSB with ADHD is that ADHD may be associated with ambivalence in the motivation to make changes. Reid [29] have shown that individuals with ADHD were more likely to be in the contemplation stage than subjects presenting with alternative diagnoses, indicating ambivalence about treatment. Reid et al. [30] have further reviewed the explanations for the observation that individuals with ADHD may be vulnerable to engaging in compulsive sexual behavior. In their view, many of the associated characteristics of ADHD, such as increased peer rejection, problems in romantic relationships and employment difficulties, may make them vulnerable to CSB as a way of 'escaping' or 'avoiding' emotional discomfort.

There are other explanations why individuals with ADHD engage with online pornography. It is plausible that this is due to possible mechanisms common to ADHD and excessive pornography use, such as impulsivity which is a major symptom of ADHD. Bóthe et al. [10] have found that ADHD symptoms had positive and

Table 4
Correlations of all questionnaires ($n = 85$).

Pearson correlation	ECR avoidance	ECR anxiety	Problematic Pornography Use Inventory (CPUI)	Sensation seeking scale (SSS)
ECR avoidance	1	0.18	0.11	-0.08
ECR anxiety	0.18	1	-0.31**	-0.17
Problematic Pornography Use Inventory (CPUI)	0.11	-0.31**	1	-0.07
Sensation seeking scale (SSS)	-0.08	-0.17	-0.07	1
<i>Correlations of all questionnaires among participants without ADHD</i>				
ECR avoidance	1	0.27*	-0.28	-0.19
ECR anxiety	0.27*	1	0.13	-0.29
Problematic Pornography Use Inventory (CPUI)	-0.28	0.13	1	0.14
Sensation seeking scale (SSS)	-0.19	-0.29*	0.14	1
<i>Correlations of all questionnaires among participants with ADHD</i>				
ECR avoidance	1	0.06	0.06	0.14
ECR anxiety	0.06	1	-0.73**	0.08
Problematic Pornography Use Inventory (CPUI)	0.06	-0.73**	1	-0.38*
Sensation seeking scale (SSS)	0.14	0.08	-0.38*	1

ECR = Experience in Close Relationship Scale.

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

moderate associations with hyper-sexuality in both men and women. They have interpreted their findings as implying that when men have high levels of hyper-sexuality or problematic pornography use ADHD should be assessed as a potential comorbid disorder. With regard to women, ADHD should be assessed as a potential comorbid disorder only in the case of hyper-sexuality.

Another possible common mechanism is reward deficiency which is typical for ADHD [31]. Blum et al. [31] have suggested that ADHD is a subtype of reward deficiency syndrome (RDS). According to his theory, RDS refers to a breakdown of several neurotransmitters in the brain in which one reaction triggers the “reward cascade” and eventually leads to an aberrant conduct. The theory, that is yet to be substantiated, argues that reward deficiency may predispose individuals to addictive, impulsive and compulsive behaviors. It is likely that watching pornographic material online is pleasurable or rewarding and it therefore becomes addictive to individuals with ADHD. Pornography online is similar to another behavioral addiction that is frequently comorbid with ADHD such as Internet and Gaming Disorder [32–33]. However, there is still a debate whether problematic pornography use is an addiction or not [34]. Finally, using pornography online may be a mean of dealing with the burden of daily life. Brand [35] have found that in heterosexual males, self-reported problems in daily life were linked to online sexual activities and these were predicted by subjective sexual arousal ratings of the pornographic material, global severity of psychological symptoms, and the number of sex applications used when being on Internet sex sites in daily life.

The higher measure of avoidant attachment in the participants with ADHD observed in our study is supported by previous evidence for an association of ADHD with attachment difficulties [36–37]. Furthermore, gender, ADHD and anxious attachment have contributed to the variance of online pornography. This evidence is compatible with the attachment theory that postulates that difficulties in forming secure attachment with others are associated with problems in intimacy [38–39]. According to Freeburg and van Winkle [40] real persons cannot live up to the idealistic imaginings in virtual reality that a sexually compulsive person is seeking. The sexually compulsive persons yearn for close attachments, but their expectant models prevent any form of sustained intimacy [41–46]. Individuals with compulsive sexual behavior compensate for their inability to form close attachments by fantasizing about unattainable and unrealistic surrogates [42,45,46,3]. Accordingly, individuals with anxious insecure attachment tend to be more vulnerable and seek sex as a source for comfort without a need for emotional intimacy [3]. It is plausible that sexual activity without commitment may also ease fears of separation and abandonment and therefore are favorable to the anxious types. The clinical evidence shows that those with avoidant attachment also seek sexual relationships without emotional commitment. This interpretation is highly compatible with the established data on high rates of anxiety disorders (over 33%) as comorbid conditions of ADHD [47–49].

Sensation seeking has been found to be positively related to the frequency of pornography consumption [14–15] and to online pornography use among men [17–18]. The evidence so far suggests that individuals with higher levels of sensation seeking may spend more time using online pornography and may develop problematic online pornography use. Although there was a small sample of participants with ADHD in our study, they have shown a significant correlation between problematic pornography use and sensation seeking. However, we have not found a significant contribution of sensation seeking to ratings of problematic pornography use in our study.

This assumption might have been tested with a mediational model including a larger number of participants. It is possible that the major drive in our participants was to have sexual activity without an aggravation of anxiety rather than increase excitement

or sensation seeking, similar to the results of our previous study with dating online [11].

5. Limitations

The study has used self-rating questionnaires on the Internet hence there is a possibility of inaccuracies in responses. Secondly, ADHD status was determined by self-report without validated medical records or examination and the severity of ADHD was not measured in the study.

Hence there was a lack of control over variables such as psychological and drug treatments, enrichment and intelligence, and family background. The prevalence of ADHD rates in this random sample (35%) is much higher than in children and adolescents diagnosed in previous studies in Israel (12%–22% respectively), although prevalence rates among adults with ADHD in Israel are not known. We also acknowledge that there are better questionnaires with higher reliability and validity that could have been used in this study [50–52]. Finally, this was a relatively small sample size, cross-sectional study, in a non-representative sample, and ADHD diagnosis was only measured by one, self-reported question, hence the generalizability of the results is questionable and no causality can be inferred. A recruitment of more participants for this study would enable to examine our hypotheses with more sophisticated analyses (e.g., a mediational model with SEM).

6. Conclusions

This study has shown that participants with ADHD had scored higher on measures of cyber pornography use and avoidant attachment than participants without ADHD. Furthermore, the variables of being male with ADHD and anxious attachment have been significantly associated with online pornography. Males with ADHD who have difficulties in close relationship may use online pornography excessively that in turn may exacerbate their difficulty in forming secure attachment, a finding that has major clinical implications. Individuals with problematic pornography use should also be screened for ADHD in the diagnostic process.

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Authors' contribution

All individuals included as authors of the paper have contributed substantially to the scientific process leading up to the writing of the paper. The authors have contributed to the conception and design of the project, performance of the experiments, analysis and interpretation of the results and preparing the manuscript for publication.

Declaration of Competing Interest

The authors have no interests or activities that might be seen as influencing the research (e.g., financial interests in a test or procedure, funding by pharmaceutical companies for research).

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