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**Investigating the associations of adult ADHD symptoms, hypersexuality, and problematic pornography use among men and women on a largescale, non-clinical sample**

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### Abstract

*Background:* Attention deficit hyperactivity disorder (ADHD) is one of the most prevalent comorbid disorders in hypersexuality; however, previous studies only examined the associations of ADHD and hypersexuality among treatment-seeking men. Despite problematic pornography use (PPU) might considered the most frequent manifestation of hypersexuality, no previous research examined its association with ADHD symptoms.

*Aim:* The aims of the present study were to (a) examine ADHD symptoms in relation to hypersexuality and PPU and to (b) identify possible similarities and differences in relationship with hypersexuality and PPU in a large, non-clinical sample among both genders.

*Methods:* Multi-group structural equation modeling was conducted to investigate the hypothesized associations between adult ADHD symptoms, hypersexuality and PPU among men and women (N = 14,043 participants; females = 4,237;  $M_{age} = 33.5$  years,  $SD_{age} = 10.9$ ).

*Outcomes:* Adult ADHD symptoms was assessed in relation to hypersexuality and PPU via self-reported measures.

*Results:* Results indicated that hypersexuality had positive and moderate association with problematic pornography use among women ( $r(14041) = .50, p < .01$ ) and positive and strong association among men ( $r(14041) = .70, p < .01$ ). ADHD symptoms had positive and moderate associations with hypersexuality among both men and women ( $\beta = .50, p < .01$ ;  $\beta = .43, p < .01$ ; respectively). Regarding men, ADHD symptoms had a positive, moderate association with PPU ( $\beta = .45, p < .01$ ), while ADHD symptoms had a positive, but weak association with PPU in the case of women ( $\beta = .26, p < .01$ ).

*Clinical Translation:* When men having high levels of hypersexuality or PPU, ADHD should be assessed as a potential comorbid disorder. Regarding women, ADHD should be assessed as a potential comorbid disorder only in the case of hypersexuality.

*Strengths & Limitations:* Applying self-report methods have possible biases that should be taken into account when interpreting the present findings. However, the present study was conducted on a large, community sample and examined the differentiated role of ADHD symptoms in hypersexuality and PPU not only among men but women as well that has never been addressed in the literature.

*Conclusion:* ADHD symptoms might play an important role in the severity of hypersexuality among both genders, while ADHD symptoms might only play a stronger role in PPU among men, but not among women. The findings corroborate previous results that PPU may not be unambiguously considered as a subcategory of hypersexuality. Also, potential background mechanisms behind problematic pornography use should be examined separately among men and women.

*Keywords:* ADHD symptoms, attention deficit hyperactivity disorder, gender differences, hypersexuality, problematic pornography use

## Introduction

Previously, Hypersexual Disorder (HD) was considered for inclusion in the *Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) [1], but it was ultimately rejected due to theoretical and practical issues [2–4]. As a result of thorough empirical examination and theoretical considerations in the past decade [5–9], hypersexuality is now included in the eleventh version of *International Statistical Classification of Diseases and Related Health Problems* (ICD-11) as Compulsive Sexual Behavior Disorder (CSBD) [10]. The main domains of the proposed diagnosis for HD [11] and the diagnosis of CSBD [10] highly overlap (i.e., failure to control sexual behavior; interference with goals, activities and obligations; unsuccessful efforts to control or reduce it; causing clinically significant distress or impairment), but some differences need to be noted. The proposed diagnosis of HD included criteria related to motivations (i.e., engaging in sexual activities to reduce stress or negative feelings), while these motivational domains were excluded from the CSBD diagnosis. Also, some additional criteria were added to the CSBD diagnosis (e.g., distress related to sexual activities deriving from moral judgement and disapproval is not sufficient to be diagnosed with CSBD) that were not considered in the proposed HD diagnosis. Despite the aforementioned dissimilarities between hypersexuality and CSBD, these two conceptualizations can be considered highly similar [12,13]. In the present study, the term “hypersexuality” is preferred as the study was conducted before the official CSBD diagnosis and it employed the Hypersexual Behavior Inventory [13] that was developed on the basis of the proposed HD diagnostic criteria [11].

Hypersexuality can appear in several forms with previous findings indicating that problematic pornography use can be considered as one of the most prominent manifestations, followed by masturbation, and sex with consenting adults [11,14–16]. However, according to recent results (e.g., [17,18]), it is not unambiguous whether problematic pornography use should be taken into account as a core element of hypersexuality or whether hypersexuality and problematic pornography use have similar antecedents [7], suggesting that further research is needed to decide whether problematic pornography use is indeed a subcategory of hypersexuality or not. Therefore, the aim of the present study was to examine the associations of hypersexuality, problematic pornography use and self-report adult ADHD symptoms among men and women focusing on the potential similarities and dissimilarities.

### ***The Associations of ADHD Symptoms, Hypersexuality, and Problematic Pornography Use***

Besides mood disorders and anxiety disorders [5,8,18–21], attention deficit hyperactivity disorder (ADHD) is a highly comorbid disorder with hypersexuality: 17%-67% of individuals with hypersexuality reported some patterns of ADHD [21]. Fewer studies examined the associations of problematic pornography use and psychiatric disorders [22–24], but similar relationship patterns can be observed as mood disorders and anxiety disorders showed highly comorbidity with problematic pornography use [23]. However, ADHD was present only in 3% of men seeking treatment for problematic pornography use [23]. Consequently, from the perspective of the examination of dissimilarities between hypersexuality and problematic pornography use, the level of ADHD symptoms may arguably be considered as a potential difference between hypersexuality and problematic pornography use.

In DSM-5, ADHD is defined as repeated patterns of hyperactivity and/or inattention causing problems in functioning or development with being present in two or more settings for at least six months [1]. The diagnostic criterion of ADHD is arranged in two categories, namely, inattention and hyperactivity-impulsivity related symptoms. The inattention related symptoms include such manifestations as reluctance to engage in tasks that require sustained attention or mental effort, easy distraction by external stimuli, losing things or forgetfulness.

The hyperactivity and impulsivity related symptoms includes such manifestations as excessive talking, interruption or intrusion of others, difficulties in waiting for own turns, or restlessness [1].

Although high comorbidity can be observed between hypersexuality and adult ADHD symptoms, a relatively low number of studies examined their associations and even fewer aimed to identify why individuals with ADHD may be more vulnerable to develop hypersexuality than general populations [21]. Formerly, it was hypothesized that the hyperactive-impulsive aspect of ADHD may be a key as to why hypersexuality showed high comorbidity with ADHD as studies shows moderate, positive associations between impulsivity and hypersexuality [5–7,25–27]. However, investigations including men with hypersexuality did not support this assumption as problems with self-concept, emotional lability, memory problems, and inattentive symptoms of ADHD showed stronger associations with the severity of hypersexuality than restlessness and hyperactive-impulsive symptoms [5].

Thus, the most frequently reported ADHD symptoms among individuals with ADHD were related to inattention, suggesting that inattentive symptoms may be more relevant in the case of hypersexual individuals than impulsivity related symptoms [19–21,28]. Children with ADHD can experience problems with social relationships, academic difficulties, failures in task completion that may not disappear in their adulthood potentially leading to relationship difficulties, loneliness and diminished work performance in the long run [21,29–31]. Supposedly, these negative experiences are accompanied by negative feelings and emotions, leading to the point when the given individual looks for activities that can reduce or alleviate these negative feeling and emotions. In these cases, sexual activities may serve as mood modifying “self-medication” methods such as drugs that were previously reported as “self-medication” methods among individuals with ADHD [5,21,32,33]. It is also possible that the aforementioned ADHD related negative experiences (e.g., academic or work difficulties) may lead to higher levels of stress, which in turn, may result in engagement of sexual activities as means of stress reduction strategies [5]. Hypothetically, it is also possible that stimulants used as ADHD medication may enhance sexual drive and sexual desire, which in turn, may have negative consequences on individuals with hypersexuality enhancing the symptoms of hypersexuality [21].

When turning to the topic of problematic pornography use, to the best of the authors’ knowledge, only one study reported on their comorbidity [23]. However, on the basis of previous findings on the associations of impulsivity and pornography use frequency/problematic pornography use (weak, positive or no associations at were reported) [7,34], it may be hypothesized that the hyperactivity and impulsivity related symptoms of ADHD may not have a role in problematic pornography use. However, inattention symptoms might have a more important role in the severity of problematic pornography use. Regarding problematic pornography use, boredom proneness or boredom reduction as a motivation (presumably deriving from difficulties in sustaining attention [35]) to use pornography was reported as potential risk factors to engage in pornography use in a problematic manner [36–39]. As individuals can have problems with sustaining attention during tasks and can be easily distracted by external stimuli [1], pornography may be considered as a potentially risky activity as it is easily accessible, convenient, affordable, anonym, using it has become more and more acceptable, and it can provide (almost) infinite novelty and excitement [40–44].

In the literature, little attention has been paid to hypersexuality and problematic pornography use among women [45–47], but the results suggest that fundamental differences may be observed between men and women (e.g., engaging in religious practices may play a direct role in treatment seeking for pornography use among women, but not among men

[45,48]). Thus, it can be considered as an important limitation in the aforementioned studies that they were conducted on relatively small samples of men seeking treatment for hypersexuality [5,19,20,49] or among men seeking treatment for problematic pornography use [23]. In sum, no empirical data is available on the associations of hypersexuality, problematic pornography use and ADHD symptoms among treatment-seeking women and non-treatment seeking populations.

To conclude, the prevalence of ADHD among individuals with hypersexuality showed high comorbidity and/or moderate, positive associations in previous studies [5,19–21], while in the case of problematic pornography users, only a low number of participants reported ADHD [23]. Based on these results, it can be assumed that ADHD symptoms are more strongly associated with the severity of hypersexuality than with the severity of problematic pornography use.

### ***Aims of the Present Study***

Given that the previous studies were carried out in small samples of treatment-seeking men, there is currently a lack of empirical evidence in this area regarding the associations of adult ADHD symptoms and the severity of hypersexuality in non-treatment seeking men and women; and treatment-seeking women. Moreover, to the best of the authors' knowledge, no previous research examined the associations between adult ADHD symptoms and the severity of problematic pornography use. Following recent studies [7,17,18,21], a subsequent step in the field is the examination of how self-reported adult ADHD symptoms may relate to the severity of hypersexuality and problematic pornography use among both males and females. Therefore, the aims of the present study were to (a) examine adult ADHD symptoms relative to hypersexuality and problematic pornography use, and to (b) identify possible similarities and differences in relationship with hypersexuality and problematic pornography use in a large, non-clinical sample with taking into consideration gender. Based on previous results [5,19,21,49], it might be hypothesized that the level of ADHD symptoms would have a positive, moderate association with the severity of hypersexuality. However, regarding the associations of problematic pornography use and ADHD symptoms, a weaker, but still positive association was expected as previous studies reported lower levels of comorbidity between these variables [23]. It has to be noted that the studies serving as basis for these hypotheses were carried out among men, thus, specific hypotheses for women or regarding potential gender differences could not be formulated.

## **Method**

### ***Participants and Procedure***

The present study was conducted in accordance with the Helsinki Declaration and was approved by the Institutional Ethical Review Board of the related university. Data collection occurred in January 2017 via an online questionnaire set among adults. The survey was advertised on a popular Hungarian news portal describing the study as a sexuality related investigation. Informed consent was obtained from all participants. Overall, 24,372 Hungarian individuals accepted to participate in the study. Four requirements were established to be included in the present study: (a) completing the Hypersexual Behavior Inventory (6262 individuals did not complete it), (b) completing the Problematic Pornography Consumption Scale (3317 individuals did not complete it), (c) completing the ADHD Self-Report Scale (564 individuals did not complete it), and (d) identifying oneself as man or woman (186 individuals indicated their gender as other than man or woman) as gender-based comparisons were conducted. Thus, 10,329 participants were excluded from the present analyses.

A total number of 14,043 participants met the aforementioned criteria (female = 4,237, 30.2%) who were aged between 18 and 76 years ( $M_{age} = 33.53$  years,  $SD_{age} = 10.94$ ). The detailed description of the demographic and socio-economic characteristics of the sample can be seen in Table 1. Respondents had 7 sex partners in their lifetime on average. Regarding the past year, those who were in a relationship had sexual intercourse with their partners weekly on average. Regarding the past year, on average, participants viewed online pornographic materials weekly and they masturbated two or three times a week.

### **Measures**

**ADHD Self-Report Scale (ASRS)** [50,51]. The six-item screener version of the ASRS were used to assess adult ADHD symptoms (e.g., “How often do you feel overly active and compelled to do things, like you were driven by a motor?”). Participants indicated their answers on a seven-point Likert scale (0 = never; 4 = very often) regarding the last six months. The internal consistency of the scale was rather low in the present study ( $\alpha = .66$ ), but it demonstrated excellent reliability in terms of specificity, sensitivity and accuracy in previous examinations [52]. Reliability may vary as a result of the number of items (i.e., having a small number of items may result in lower reliability; [53]), particularly when the items cover broad constructs which is the case for the ASRS. Therefore, composite reliability (CR) was calculated because it better represents the construct as it takes into account the factor loadings with their respective measurement errors [54,55] and it showed acceptable reliability (CR = .68).

**Problematic Pornography Consumption Scale (PPCS)** [56]. PPCS assesses problematic pornography use via six factors based on the six-component addiction model [57]. It includes three items relating to each factor: salience (e.g., “I felt that porn is an important part of my life.”;  $\alpha = .81$ ), tolerance (e.g., “I felt that I had to watch more and more porn for satisfaction.”;  $\alpha = .77$ ), mood modification (e.g., “I used porn to restore the tranquility of my feelings.”;  $\alpha = .85$ ), relapse (e.g., “I unsuccessfully tried to reduce the amount of porn I watch.”;  $\alpha = .92$ ), withdrawal (e.g., “I became agitated when I was unable to watch porn.”;  $\alpha = .84$ ), and conflict (e.g., “Watching porn prevented me from bringing out the best in me.”;  $\alpha = .78$ ). Participants indicated their answers on a seven-point Likert scale (1 = never; 7 = very often) regarding the last six months. A total of 76 points or more indicate possible problematic pornography use.

**Hypersexual Behavior Inventory (HBI)** [13,58]. HBI assesses hypersexual urges, fantasies and behaviors with 19 items via three factors based on the proposed criteria of Hypersexual Disorder [11]: coping (e.g., “Doing something sexual helps me feel less lonely.”; seven items,  $\alpha = .87$ ), control (e.g., “Even though my sexual behavior is irresponsible or reckless, I find it difficult to stop.”; eight items,  $\alpha = .82$ ), and consequences (e.g., “My sexual thoughts and fantasies distract me from accomplishing important tasks.”; four items,  $\alpha = .75$ ). Participants indicated their answers on a five-point Likert scale (1 = never; 5 = very often). Although a total of 53 points was suggested as a cutoff score based on preliminary results [59], a reliably cutoff score could not be established in a recent large-scale psychometric study [58].

**Sexuality and pornography related questions** [60]. Besides the aforementioned scales and standard demographic questions (e.g., gender, age, place of residence), additional questions were applied to assess the participants' number of sexual partners in their lifetime, the frequency of having sex with their partner (if they had a partner), the frequency of masturbation and the frequency of pornography use. Participants indicated the frequency of having sex with their partner, their frequency of masturbation and their frequency of pornography consumption over the past year on a 10-point scale (1 = “never”, 10 = “6 or 7

times a week”). Participants indicated their number of lifetime sexual partners on 16-point scale (1 = “0 partners”, 16 = “more than 50 partners”).

### **Statistical Analyses**

SPSS 21 and Mplus 7.3 were employed to conduct statistical analysis [61]. Normality was assessed by the examination of skewness and kurtosis values. Reliability was calculated using Cronbach’s alpha [62]. However, due to its potentially decreased appropriateness [63], one additional index was calculated when the Cronbach alpha coefficient was not acceptable (i.e., composite reliability - CR). The CR was applied because it may better represent the construct as it takes into account the factor loadings with their respective measurement errors, which was computed based on the formula of Raykov [64] ( $> .60$  acceptable,  $> .70$  good; [65]). Structural equation modeling (SEM) was performed to investigate the associations between self-reported ADHD symptoms, hypersexuality and problematic pornography use. Items were treated as categorical indicators, because they had significant floor effects (based on kurtosis and skewness). Consequently, the mean- and variance-adjusted weighted least-squares estimator (WLSMV) was applied [66]. Commonly used goodness-of-fit indices [9] were to assess the acceptability of the examined models: Comparative Fit Index (CFI;  $\geq .90$  for acceptable), Tucker–Lewis index (TLI;  $\geq .90$  for acceptable), and Root-Mean-Square Error of Approximation (RMSEA;  $\leq .08$  for acceptable) with a 90% confidence interval [67–73].

### **Results**

Descriptive statistics and correlations between self-reported ADHD symptoms, hypersexuality, problematic pornography use, and sexuality and pornography related questions can be seen in Table 2. According to the examined correlations, number of sexual partners, frequency of having sex with one’s partner, frequency of masturbation and frequency of pornography viewing had negligible associations with ADHD symptoms ( $r_s < .15$ ), thus, these variables were not included in the models for the sake of simplicity.

With the utilization of structural equation modeling, the associations between ADHD symptoms, hypersexuality and problematic pornography use were investigated on the total sample and separate male and female models. The models with standardized estimates are shown in Figure 1.

The fit indices were acceptable in all models and all pathways were significant at  $p < .01$ . In the *total sample model* (CFI = .928, TLI = .923, RMSEA = .058 [90% CI .058-.059]), the level of ADHD symptoms was related positively and moderately to both hypersexuality and problematic pornography use ( $\beta = .47$  [95% CI .447-.487] and  $\beta = .36$  [95% CI .338-.378], respectively). The proportion of explained variance was 22% for hypersexuality and 13% for problematic pornography use.

In the *male sample model* (CFI = .913, TLI = .908, RMSEA = .064 [90% CI .064-.065]), the level of ADHD symptoms was related positively and moderately to both hypersexuality and problematic pornography use ( $\beta = .50$  [95% CI .475-.520] and  $\beta = .45$  [95% CI .428-.472], respectively). The proportion of explained variance was 25% for hypersexuality and 20% for problematic pornography use.

In the *female sample model* (CFI = .928, TLI = .923, RMSEA = .045 [90% CI = .044-.046]), the level of ADHD symptoms was related positively and moderately to hypersexuality ( $\beta = .43$  [95% CI .388-.466]) and positively but weakly to problematic pornography use ( $\beta = .26$  [95% CI .216-.298]). The proportion of explained variance was 18% for hypersexuality and 7% for problematic pornography use.

When comparing the associations of ADHD symptoms and hypersexuality and the associations of ADHD symptoms and problematic pornography use from a statistical



perspective, all standardized regression coefficients were significantly different in all models. However, when we took into consideration the effect sizes and the explained variances, notable differences could be identified between genders. In the case of men, both hypersexuality and problematic pornography use had a positive, moderate association with ADHD symptoms explaining approximately 20-25% of the variance in each case. However, in the case of women, hypersexuality also had a positive, moderate association with ADHD symptoms explaining 18% of the variance, while problematic pornography use had a positive, but weak association with ADHD symptoms explaining only 7% of the variance. Thus, similar associations could be observed between ADHD symptoms, hypersexuality and problematic pornography use among men, while marked differences were identified among women.

### Discussion

Problematic pornography use is often considered as one of the most prevalent manifestations of hypersexuality [11,14–16], but recent findings suggest that pornography use may not be a core element of hypersexuality and essential differences may be observed in their psychological background as well [7,14,17,18]. Besides mood disorders and anxiety disorders, ADHD showed the highest psychiatric comorbidity with hypersexuality among treatment seeking men [8,21]; but in the case of problematic pornography use, the comorbidity rate of ADHD among treatment seeking men was 3% [23]. These results suggest that ADHD symptoms may potentially show differences in association with hypersexuality and problematic pornography use. Therefore, the aims of the present study were to, for the first time, simultaneously examine the severity of self-reported ADHD symptoms in relation to hypersexuality and problematic pornography use focusing on the potential dissimilarities among both genders.

Using a large-scale, non-clinical sample, the associations between ADHD symptoms and hypersexuality and problematic pornography use were positive and moderate. When taking into consideration gender, the association between ADHD symptoms and hypersexuality remained the same effect size regardless gender. At the same time, the association between ADHD symptoms and problematic pornography use was stronger in the case of men, while it was weaker in the case of women. In sum, ADHD symptom severity may play similar roles in hypersexuality and problematic pornography use in the case of men, while in the case of women, it is more likely that ADHD symptoms would rather contribute to hypersexuality than to problematic pornography use. Moreover, the present findings further corroborated previous results [17,18] that problematic pornography use may not be unequivocally considered as a manifestation of hypersexuality as different mechanisms may lead to the appearance of hypersexuality and problematic pornography use [7].

These results are in line with previous studies where the antecedents and consequences of problematic pornography use were investigated across gender [45,48]. For example, in the case of men, treatment seeking was directly associated with the amount of pornography use and indirectly via subjective religiosity and negative symptoms [48]. While in the case of women, treatment seeking was not directly associated with the amount of pornography use, it only had indirect associations with treatment seeking via religious practices and negatives symptoms [45]. But it has to be mentioned that other studies did not find gender differences in the associations of impulsivity and compulsivity with respect to hypersexuality and problematic pornography use [7]. In line with previous studies [45,48] and based on the results of the present study, different mechanisms could lead to problematic pornography use in the case of men and women, suggesting that the examination of problematic pornography use among both gender and the investigation of the possible differences between different excessive sexual behaviors might be fruitful.

***Potential Explanations of the Differentiated Relationship Patterns of ADHD Symptoms, Hypersexuality, and Problematic Pornography Use***

Previous studies that examined the associations of ADHD symptoms and hypersexuality were carried out among men seeking treatment for hypersexuality [5,19,20,49] supposedly because ADHD is twice as prevalent among men than women [1] and the estimated prevalence of hypersexuality is higher among men than women [4,9,74]. Thus, previous studies searching for the possible explanations of the associations of ADHD symptoms and hypersexuality did not take into consideration possible gender differences.

With respect to hypersexuality, negligible differences could be observed between men and women when in relation to the associations of ADHD symptoms and hypersexuality. In both cases, the severity of self-reported ADHD symptoms had a positive, moderate association with the level of hypersexuality. These results are in line with previous findings in which positive, weak-to-moderate associations were identified between hypersexuality severity and ADHD symptoms among treatment seeking men [5]. Individuals with high levels of ADHD symptoms may experience prolonged social rejection, loneliness and difficulties in completing tasks or obligations (e.g., education or work), which in turn may lead to higher levels of stress and negative emotions [21,29–31]. In these cases, hypersexuality may appear as an answer to these negative experiences because hypersexuality can be considered as a maladaptive coping strategy when individuals experience stress or negative emotions [11,13,37]. Along with previous studies, the present findings support the “self-medication” theory as individuals experiencing ADHD symptoms may turn to drugs or sexual behaviors to reduce or eliminate stress and negative feelings [5,21,32,33]. Based on the present results, this self-medication hypothesis may be true in the case of men and women as well.

As for problematic pornography use, a more differentiated pattern can be observed regarding the associations of self-reported ADHD symptom severity and the level of problematic pornography use. Among men, ADHD symptoms and problematic pornography use had a positive, moderate association with the strength being highly similar to the strength of the association of ADHD symptoms and hypersexuality. These results suggest that men may also engage in pornography use (in a problematic manner) to alleviate the symptoms of ADHD and the related stress and negative emotions [5,21,30,32]. However, in the case of women, other explanation may be taken into account why the association between ADHD symptoms and problematic pornography use was weak. It is possible that women may not choose pornography as a way to reduce their stress and negative feelings deriving from ADHD symptoms, but engage in other types of sexual behaviors (e.g., sex with romantic partner or casual partners). This explanation may be plausible as pornography use is more normative among men than women [75–77]. However, this hypothesis needs to be tested as no previous studies have investigated the prevalence of different excessive sexual behaviors among women.

It is also likely that the feeling of problematic pornography use may have different antecedents among men and women. As it was mentioned previously, among women, treatment seeking for problematic pornography use was directly related to religious practices, while in the case of men, it was not related when complex models were tested [45,48]. To summarize, notable differences may be identified regarding problematic pornography use among men and women not only in the case of frequency of use or prevalence of problematic use [75–77], but with respect to the psychological mechanisms that can lead to problematic pornography use [45,48].

### ***Clinical Implications of the Present Findings***

From the perspective of ADHD and its diagnosis, it is possible that if only ADHD symptoms are assessed, individuals with hypersexuality may report higher levels of ADHD-like symptoms. For example, they are often preoccupied with sexuality-related thoughts that may distract their attention from their tasks and obligations, thus, they report high levels of inattention or they report inattentiveness not as a result of sustained attention difficulties, but because of sleep deprivation [21]. Therefore, on the basis of previous findings [5,19,49] and the present results, in clinical practice and in future research, not only the level of ADHD symptoms should be assessed, but clinical interviews and/or assessments are needed to uncover whether the symptoms are only related to hypersexuality (i.e., symptoms are not generalized to other aspects of functioning) or whether they were present before the onset of hypersexuality [21].

From the perspective of hypersexuality, among individuals seeking treatment for hypersexuality, not only mood and anxiety disorders showed high comorbidity, but substance use was also highly comorbid [8]. Thus, ADHD may be considered as a mutual background for these problematic behaviors considering the “self-medication” hypothesis [5,21,30,32]. Thus, in clinical practice, when individuals seek treatment for hypersexuality with comorbid substance use, clinicians and therapists should also assess ADHD symptoms as hypersexuality and substance use may be only the symptoms of the “real” problem, ADHD. To summarize, in the case of individuals seeking treatment for hypersexuality (or men seeking treatment for problematic pornography use), it would be beneficial to examine not only the potentially comorbid mood disorders, anxiety disorders and substance use, but ADHD as well because these disorders may derive from ADHD.

### ***Limitations and Future Studies***

Some limitations of the present investigation have to be discussed. The present study applied self-report scales and cross-sectional methods that may lead to possible biases distorting the results. Despite it is suggested that ADHD symptoms develop in childhood and can maintain during adulthood, causality could not be inferred from the present findings. As self-report scales were applied without clinical diagnosis, only the associations of ADHD symptoms, hypersexuality and problematic pornography use could be examined without establishing comorbidity rates. The ASRS demonstrated slightly lower internal consistency than the suggested threshold in the present study presumably as a result of administering a wide range of symptoms with relatively low number of items [53]. However, along with previous clinical results [52], other indices of reliability and structural validity (i.e., composite reliability and confirmatory factor analysis) demonstrated that the ASRS can be considered as a reliable measure of ADHD symptoms in the present study. Therefore, the six-item ASRS may be used in future large-scale studies to assess the self-reported severity of ADHD symptoms. The dropout rate was high that may also affect the findings (e.g., religious individuals may quit the survey before answering to sexuality-related questions; however, religiosity-related questions were not included in the present study, thus, this assumption could not be tested). Although the sample covered a wide range of respondents, it was not representative in nature and only examined those who used the Internet. Also, the survey covered a wide range of topics leading to long response time which may contribute to the rather high dropout rate. Moreover, participating in the research was voluntary, thus, those individuals who were not interested in the topic of the survey might have declined participation. Future studies may apply various research methods to assess not only self-reported severity of ADHD symptoms, but clinical diagnosis as well.

As several hypotheses are suggested how ADHD symptoms may result in hypersexuality and/or in problematic pornography use [5,21], the examination of complex

models are necessary to test these assumptions. Moreover, the potential common biological background of ADHD and hypersexuality deserves more scientific attention [21]. Along with further cross-sectional studies, longitudinal methods might be applied to examine the natural course of the development of ADHD and investigate when and how hypersexuality and/or problematic pornography use may appear. The self-medication hypothesis should also be tested regarding hypersexuality and problematic pornography use simultaneously with other problematic behaviors that were previously associated with ADHD [32,33]. Also, diary studies [15] or cross-sectional studies may be fruitful to identify whether experiencing stronger or more severe ADHD symptoms results in more severe manifestations of hypersexuality or potential mediator and/or moderator variables has to be taken into account.

### Conclusions

Despite some limitations (e.g., using self-reported cross-sectional methods), the present findings suggest that ADHD symptoms may play a differentiated role in the severity of hypersexuality and problematic pornography use, especially in the case of women. A better understanding of the similarities and possible differences between the psychological background of problematic pornography use and hypersexuality considering potential gender differences may help to develop improved diagnosis and treatment for different types of excessive sexual behaviors.

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Table 1. *Detailed demographic and socio-economic characteristics of the sample*

Demographic and socio-economic characteristics	N = 14,043
Gender (females)	4,237 (30.2%)
Mean age in years (SD)	33.53 (10.9)
Residence	
Capital city	7,626 (54.3%)
County towns	2,181 (15.5%)
Towns	2,950 (21.0%)
Villages	1,286 (9.2%)
Highest level of education	
Primary school degrees or less	361 (2.6%)
Vocational degree	559 (4.0%)
High school degree	4,470 (31.8%)
Degree of higher education (e.g., bachelors, masters or doctorate degree)	8,653 (61.6%)
Current education	
Studied in high school	410 (2.9%)
Studied in higher education	3,687 (26.3%)
Studied in other educational institute	934 (6.7%)
Did not study in any form of education	9,012 (64.2%)
Work status	
Full-time job	9,217 (65.6%)
Part-time job	1,413 (10.1%)
Casual job	1,175 (8.4%)
Did not have a job	2,238 (15.9%)
Marital status	
Single	3,259 (23.2%)
In a relationship	6,049 (43.1%)
Engaged	569 (4.1%)
Married	3,496 (24.9%)
Divorced	392 (2.8%)
Widow/widower	67 (0.5%)
Other	211 (1.5%)
Children	
No child	9,564 (68.1%)
One child	1,431 (10.2%)
Two children	2,074 (14.8%)
Three children	728 (5.2%)
Four children	183 (1.3%)
Five children	37 (0.3%)
Six or more children	26 (0.1%)
Sexual orientation	
Heterosexual	11,626 (82.8%)
Heterosexual with homosexuality to some extent	1,419 (10.1%)
Bisexual	388 (2.8%)
Homosexual with heterosexuality to some extent	100 (0.7%)
Homosexual	389 (2.8%)
Asexual	16 (0.1%)
Unsure	70 (0.5%)
“Other”	35 (0.2%)

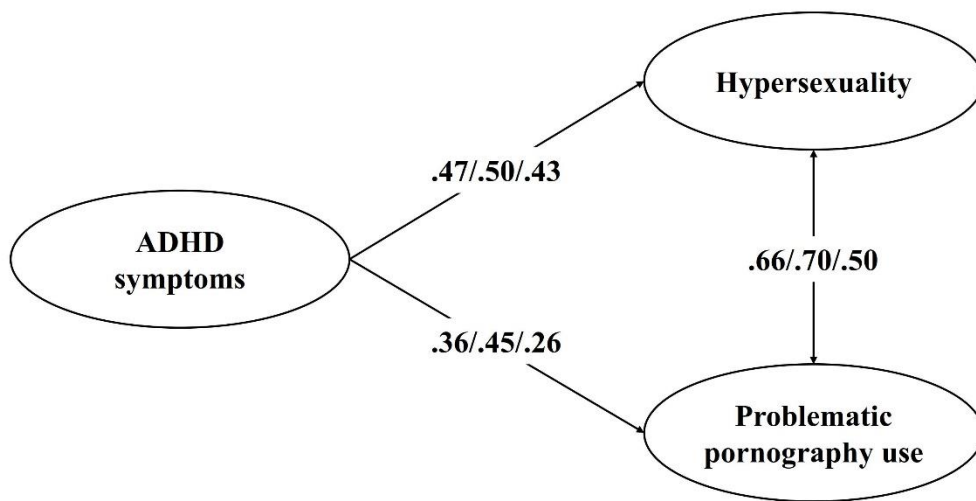
Note. SD = standard deviation.

Table 2. *Descriptive statistics and correlations between the self-reported ADHD symptoms, hypersexuality, problematic pornography use and sexuality-related questions*

Scales	Skewness (SE)	Kurtosis (SE)	Range	M (SD)	1	2	3	4	5	6
1. ADHD Self-Report Scale total	0.14 (0.02)	-0.16 (0.04)	0-4	1.65 (0.69)	—					
2. Hypersexual Behavior Inventory total	1.25 (0.02)	1.90 (0.04)	1-5	1.77 (0.57)	.33**	—				
3. Problematic Pornography Consumption Scale total	1.61 (0.02)	2.57 (0.04)	1-7	1.93 (1.01)	.26**	.58**	—			
4. Number of sexual partners	0.02 (0.02)	-1.31 (0.04)	1-16 <sup>a</sup>	8.40 (4.32)	-.05**	.11**	-.02*	—		
5. Frequency of having sex with one's partner	-1.06 (0.02)	1.28 (0.04)	1-10 <sup>b</sup>	7.04 (1.80)	.02*	-.06**	-.10**	.02	—	
6. Frequency of masturbation	-0.78 (0.02)	0.22 (0.04)	1-10 <sup>b</sup>	7.14 (2.12)	.13**	.29**	.41**	.04**	-.11**	—
7. Frequency of online pornography viewing	-0.51 (0.02)	-0.69 (0.04)	1-10 <sup>b</sup>	6.55 (2.47)	.09**	.26**	.51**	.05**	-.07**	.64**

*Note.* M = mean; SD = standard deviation; SE = standard error; <sup>a</sup> 1 = 0 partner; 2 = 1 partner; 3 = 2 partners; 4 = 3 partners; 5 = 4 partners; 6 = 5 partners; 7 = 6 partners; 8 = 7 partners; 9 = 8 partners; 10 = 9 partners; 11 = 10 partners; 12 = 11–20 partners; 13 = 21–30 partners; 14 = 31–40 partners; 15 = 41–50 partners; 16 = more than 50 partners; <sup>b</sup> 1 = never; 2 = once in the last year; 3 = 1–6 times in the last year; 4 = 7–11 times in the last year; 5 = monthly; 6 = two or three times a month; 7 = weekly; 8 = two or three times a week; 9 = four or five times a week; 10 = six or seven times a week; \* $p < .05$ ; \*\* $p < .001$

Figure 1. *The associations of ADHD symptoms with hypersexuality and problematic pornography use*



*Note.* All variables presented in ellipses are latent variables. For the sake of clarity, indicator variables related to them are not depicted in this figure. One-headed arrows represent standardized regression weights and two-headed arrows represent correlations. Numbers on the arrows indicate the path coefficients (total, male and female sample, respectively). Percentages in parentheses below the variables represent the proportion of explained variance (total, male and female sample, respectively). All pathways were significant at level  $p < .01$ .