Compulsive sexual behavior disorder in an inpatient sample with substance use disorder

Sarah Golder, MSc[1,*] , Bertram Walter, PhD[1,2], Isabel Bengesser, Diploma[3],

Dietmar Kramer, PhD[3], Christian Muhl, Diploma[4], Nadja Tahmassebi, Diploma[3],

Florian Storz, MSc[1], Charlotte Markert, PhD[1,2,5], Rudolf Stark, Prof[1,2,5]

[1]Department for Psychotherapy and Systems Neuroscience, University of Giessen, Giessen 35394, Germany
[2]Center for Mind, Brain and Behavior, Phillips-University Marburg and Justus-Liebig-University Giessen, Marburg/Giessen 35032, Germany
[3]Salus Klinik, Friedrichsdorf 61381, Germany
[4]Salus Klinik, Friedberg 61169, Germany
[5]Bender Institute of Neuroimaging, University of Giessen, Giessen 35394, Germany

*Corresponding author: Department for Psychotherapy and Systems Neuroscience, University of Giessen, Otto-Behaghel-Str. 10 H, 35394 Giessen, Germany.
Email: Sarah.Golder@psychol.uni-giessen.de

Abstract

Background: Several studies indicate that compulsive sexual behavior disorder (CSBD) shares core elements with substance use disorder (SUD). These findings support the assumption of common mechanisms in addiction, which may lead to a higher tendency in patients with SUD to have comorbid CSBD. Nevertheless, this relationship between CSBD and SUD is poorly understood to date.
Aim: This study aimed to compare the prevalence of CSBD and its subtype pornography use disorder (PUD) between a SUD group and a matched control group. Herein, we aimed to test whether patients with SUD are more likely to have a comorbid CSBD/PUD. We further hypothesized that a higher CSBD/PUD prevalence in patients with SUD is accompanied by more pronounced CSBD- and PUD-related personal characteristics.
Methods: We assessed CSBD, PUD, and related personal characteristics in an inpatient SUD sample ($N = 92$) and a healthy control sample matched by age, gender, and educational level.
Outcomes: Primary outcomes were the diagnoses of CSBD/PUD as assessed by questionnaires. CSBD/PUD-related personal characteristics were the early onset of problematic pornography consumption, relationship status as a single person, a high sexual motivation, a high level of time spent watching pornography, and a high degree of problematic pornography consumption (Problematic Pornography Consumption Scale, short version).
Results: There was no significant difference between groups regarding CSBD prevalence (SUD sample, 3.3%; control sample, 7.6%) and PUD prevalence (SUD sample, 2.2%; control sample, 6.5%). We found relationship status as a single person and the sexual motivation dimension of importance of sex to be the only CSBD-related personal characteristics that were more pronounced in the SUD sample than the matched control group.
Clinical Implications: Results indicate no higher tendency for patients with SUD to develop comorbid CSBD/PUD, yet important vulnerabilities (eg, emotional dysregulation) should be considered when treating addictive disorder to prevent possible symptom displacement.
Strengths and Limitations: A strength of the study is that we compared a sample of patients with SUD with a matched control sample and used an instrument based on *ICD-11* criteria for CSBD. Possible limitations are significant differences between the groups because of the restrictions in an inpatient clinic that may have influenced responses (eg, roommates) and that the control group was not screened for SUD. Therefore, the results should be interpreted with some caution.
Conclusion: We found no evidence of an overcomorbidity of SUD and CSBD/PUD. However, a higher rate of vulnerability factors for CSBD/PUD in the SUD sample might suggest some similarities between SUD and CSBD/PUD.

Keywords: compulsive sexual behavior; substance use disorder; comorbidity; inpatients; prevalence; pornography use disorder.

Introduction

In 2019, compulsive sexual behavior disorder (CSBD) was recognized by the World Health Organization as an impulse control disorder in the upcoming 11th revision of the *International Classification of Diseases* (*ICD-11*).[1] Before, different labels were used to refer to this clinically relevant problematic sexual behavior, such as compulsive sexual behavior,[2] hypersexuality,[3] and sexual addiction.[4] CSBD has an estimated prevalence of 2.0% to 10.5% in the general population.[5-14] Men are affected 1.5 to 4.1 times more often than women.[7-9,11,12,14-16] Differences in the definitions and measurements of problematic sexual behavior may have contributed to the varying prevalence estimates.

In the *ICD-11*, CSBD is defined as the repeated loss of control over intense sexual impulses or urges, resulting in recurring problematic sexual behavior. The criteria include sexual behavior as the central focus in a person's life, repetitive relapses, and engaging in sexual activity repeatedly despite negative effects or receiving little to no satisfaction from it.[1] Pornography use (81.1%) is the most common form of CSBD, followed by masturbation (78.3%) and promiscuity (44.9%).[17] Therefore, pornography use disorder (PUD) seems to be the major subtype of CSBD.

After the inclusion of CSBD in the *ICD-11* under the section of impulse control disorders, the debate on the categorization of CSBD as a compulsive, impulsive, or addictive disorder

is ongoing.[18-23] In a recent discussion, Sassover and Weinstein[18] reported the opposing views on the categorization of CSBD and concluded that there is not yet enough data available on the conceptualization of CSBD as a behavioral addiction. Although data may not yet be sufficient, some evidence for categorization as a behavioral addiction emerged on the basis of significant correlations between CSBD and substance use disorder (SUD)[24-27] and similarities with regard to various psychological and biological characteristics: CSBD and SUD share similarities concerning desire thinking,[28,29] craving,[30,31] attentional bias,[31,32] cue-reactivity,[33,34] personality,[35] and structural and functional brain characteristics.[36]

In our view, an increased prevalence of CSBD in a sample of patients with SUDs would substantiate the claim of CSBD as a behavioral addiction. If there is such an overcomorbidity with CSBD in a SUD sample, one might assume that similar vulnerabilities and mechanisms underlie SUD and CSBD. However, the existing research to date shows contradictory results in this regard,[9,37-44] which might be due to covariates that confound prevalence estimates, such as age, sex, and education level. Aging effects on sexuality, such as decreases in sexual functioning,[45] sexual activity,[46] and use of pornography,[47] should affect the likelihood of CSBD manifestation. Hence, assessing only young people could lead to an overestimation of CSBD. Since CSBD and SUD mostly affect men,[7-9,48] differences in gender proportions might have biased the estimates for the prevalence of CSBD and SUD. Regarding educational level, a low educational level is associated with a high risk for SUD,[49] whereas patients with CSBD show a higher educational level than patients with SUD.[50] Matching the SUD sample with a control group by those covariates helps to eliminate possible confounding.

Several studies that investigated the prevalence of SUD in general or student samples reporting CSBD revealed varying prevalence rates of SUD between 2.8% and 29.0%.[9,37,38] Two of those studies compared the SUD prevalence between participants who met the criteria for CSBD and those who did not.[9,38] These studies did not account for gender differences in their groups, nor did they consider the influence of education on CSBD and SUD. Therefore, the reported comorbidity between CSBD and SUD is sample specific due to its unique characteristics and thus cannot be generalized. Furthermore, the findings of these studies are contradictory. Odlaug et al[9] found no significant difference in the prevalence of self-reported SUD diagnoses between their CSBD group (2.8%) and non-CSBD group (1.8%). The high dropout rate (64.1%) warrants caution in interpreting this finding. On the contrary, Ballester-Arnal et al[38] used standardized clinical interviews to assess SUD and a self-conducted index of CSBD symptoms, combining criteria of hypersexuality, sexual compulsivity, and sexual addiction to assess CSBD. They found a significant difference in the lifetime prevalence of alcohol dependence and abuse or dependence on other substances between CSBD and non-CSBD samples (CSBD, 16.2% and 22.1%; non-CSBD, 1.9% and 12.7%, respectively). However, their samples included only students aged 18 to 27 years.[38] Therefore, their results are limited to young populations due to the effects of aging on sexuality.[45-47] The high dropout rate of 75.8% and the sample selection with higher symptom severity of CSBD[38] warrant further caution.

Comparable to studies by Ballester-Arnal et al[38] and Raymond et al,[37] studies on clinical samples revealed high comorbidity between SUD and CSBD. Studies examining comorbidity in outpatient samples searching help for CSBD reported varying prevalence rates of SUD between 22.0% and 41.0%,[39-41] and most studies examining the comorbidity of CSBD in SUD inpatient samples identified comparable comorbidity between 25.0% and 29.0%.[42,43] One of the inpatient studies compared SUD prevalence rates for specific substances in patients with and without CSBD. They found significant differences only in cocaine dependence (CSBD, 32.0%; non-CSBD, 18.0%).[43] However, as in the aforementioned studies of the general population, they did not account for gender differences in their groups, which might have biased the estimates of the comorbidity between CSBD and SUD. Additionally, they did not compare their data with a non-SUD control group. However, this comparison may be important to estimate prevalence numbers as compared with the general population. In summary, prior research supports the assumption of an overcomorbidity between SUD and CSBD, but the comparison with the prevalence of CSBD in a control sample is lacking. Another issue with existing studies is the use of instruments not based on the *ICD-11* criteria for assessing CSBD. Previous studies assessed CSBD via instruments based on the criteria of hypersexuality,[44] obsessive-compulsive disorders,[39] sexual addiction,[41-43] impulse-control disorders,[9,40] clinical experience,[37] or a combination of several definitions.[38] Thus, the aforementioned variability in prevalence rates could reflect different diagnostic approaches.

To our knowledge, no study to date has compared the prevalence of CSBD between a SUD sample and a matched control sample. Additionally, no study to date has used the *ICD-11* criteria for CSBD to assess the comorbidity between SUD and CSBD. Thus, it is unclear if patients with SUD are more likely to have a comorbid CSBD. Therefore, we compared 2 samples matched by age, gender, and educational level and used an instrument based on the *ICD-11* criteria for CSBD. From a clinical point of view, it is important to investigate the possible higher tendency of patients with SUD to develop CSBD. A higher tendency may indicate that the development of CSBD or SUD might be more likely if one of the others occurred beforehand. As a result, treating SUD without treating CSBD may cause problem shifting and increase the risk of relapse.

Furthermore, we are interested in not only the prevalence rates of CSBD and PUD in our SUD sample in comparison with our control group but also in the differences between the SUD group and the control group in personal characteristics, which are known to be correlated with CSBD and PUD. This approach allows us to identify differences on the manifest disorder level as well as on a subclinical level. The CSBD-related personal characteristics of interest in our study were the early onset of the symptoms in adolescence,[17,51] fewer steady relationships,[10] and high sexual motivation.[52] Further personal characteristics concerning PUD were time watching pornography[8,53] and problematic pornography use.[8]

Aims

This study aimed to compare the prevalence of CSBD/PUD between a SUD group and a matched control group to test the hypothesis that patients with SUD are more likely to have a comorbid CSBD/PUD. We further assume that CSBD/PUD-related personal characteristics are more pronounced in the SUD group than the control group.

Methods
Procedure
We conducted 2 surveys to assess CSBD, PUD, and CSBD/PUD-related personal characteristics: 1 with a SUD inpatient sample (study 1) and 1 with a sample from the general population (study 2).

For study 1, all patients aged ≥18 years in 2 inpatient addiction and psychosomatic clinics (Salus Kliniken, Friedberg and Friedrichsdorf, Germany) were informed about the study in April/May 2022. To participate, patients had to fill out a paper-pencil questionnaire. An overall 173 patients voluntarily participated in the study (52.3% of all inpatients during the survey period). Completion of the questionnaire took 30 to 45 minutes, and responders were compensated with €10. We excluded data from participants for the following reasons: they gave false responses on 2 careless response items, on an instructed response item to assess attentiveness, and on a self-report item ("In your honest opinion, did you fill out this survey conscientiously so that we should include your responses in our analysis?"); they had >20% missing responses in the Compulsive Sexual Behavior Disorder Scale (CSBD-19)[8]; and they were in treatment due to other mental illnesses than SUD. As a result, we excluded 81 data sets, resulting in a final sample of 92 participants.

For study 2, an overall 2200 participants, with an equal number of male and female individuals (stratified sample), were recruited in March/April 2022 via a commercial internet-based panel provider (bilendi & respondi, https://www.bilendi.de). To participate, respondents had to be aged ≥18 years. Survey completion took approximately 25 minutes, and participants received €1.25 from the panel provider for completing the survey. We excluded the data of participants who gave false responses on the 2 careless response items mentioned in study 1 and the data of "rushers"—that is, those with an average item response time <2 seconds on closed-ended questions presented to everyone. As a result, we excluded 130 data sets, resulting in a final sample of 2070 participants.

Ethical considerations
Both studies were conducted according to the Declaration of Helsinki and its later amendments and were approved by the local ethics committee of the Department of Psychology, University of Giessen, Germany. All participants gave written informed consent for anonymous use of their data for research.

SUD sample
The SUD sample comprised 92 patients. Sociodemographic sample descriptions are given in Tables 1 and 2. At the time of data collection, patients stayed at the clinic between 3 and 306 days (mean ± SD, 53.6 ± 42.4; *n* = 90). During clinical treatment, patients were basically allowed to leave the clinic, meet sexual partners, and have internet access with limited bandwidth, but the living conditions certainly differed from those of the control group. Reasons for treatment were addictions to alcohol (*n* = 73, 79.3%), cannabis (*n* = 21, 22.9%), cocaine (*n* = 19, 20.7%), amphetamine (*n* = 13, 14.1%), opioids (*n* = 8, 8.7%), methamphetamine (*n* = 3, 3.3%), hallucinogens (*n* = 2, 2.2%), ecstasy (*n* = 2, 2.2%), benzodiazepines (*n* = 1, 1.1%), and ketamine (*n* = 1, 1.1%). Two patients (2.2%) did not indicate the substance for which they sought treatment. The majority of the patients

had only 1 addiction diagnosis (*n* = 64, 69.6%). However, 12 (13.0%) reported 2 substances as the reason for seeking treatment; 6 (6.5%), 3 substances; 5 (5.4%), 4 substances; 1 (1.1%), 5 substances; 2 (2.2%), 6 substances; and 1 (1.1%), 7 substances. Patients had comorbid mental illnesses such as depression (*n* = 31, 33.7%), social anxiety disorder (*n* = 7, 7.6%), generalized anxiety disorder (*n* = 6, 6.5%), panic disorder (*n* = 4, 4.3%), bipolar disorder (*n* = 3, 3.3%), agoraphobia (*n* = 2, 2.2%), and specific phobia (*n* = 1, 1.1%). Regarding comorbidities, 39 (42.4%) patients indicated having any comorbidity: 22 (23.9%), 1 comorbidity; 10 (10.9%), 2 comorbidities; 3 (3.3%), 4 comorbidities; and 4 (4.3%), 3 comorbidities.

Control sample
An overall 2070 controls (48.9% men, 50.8% women, 0.2% diverse) were matched with patients from the SUD sample by employing the R library *matchit* (version 4.4.0, running under R version 4.2.1)[54] with nearest-neighbor matching based on the variables age, sex, and education level. Finally, 92 were included as the control sample in the data analysis. Descriptions of samples are given in Tables 1 and 2.

Measures
Assessment of SUD
Patients were diagnosed in clinics. For diagnostic clarification of the presence of an addictive disorder, the Salus Clinics use the following as screening measurements: the Alcohol Use Disorders Identification Test,[55] a questionnaire for prescription drug misuse (Kurzfragebogen zum Medikamentenmissbrauch),[56] the Fagerström Test for Nicotine Dependence,[57,58] and the Inventory of Drug-Taking Situations.[59] After screening, a structured clinical interview for mental disorders, the Diagnostic Interview for Mental Disorders,[60,61] and the diagnostician's clinical impression of the presence of *ICD-10* criteria were used to make the diagnosis. Only patients with SUD were included, and they were asked about the substances for which they were in treatment.

Sexuality- and pornography-related questions
Participants were asked about ever using pornography, the age at first contact with pornography, the age at first voluntarily contact with pornography, and the average time spent watching pornography per week. In addition, the patients were asked for what reason they were undergoing treatment (addiction, depression, agoraphobia, social phobia, etc). In this regard, patients had the opportunity to choose multiple answers.

Assessment of CSBD
CSBD was assessed via the CSBD-19,[8] which comprised 19 items (eg, "My sexual desires controlled me") in which respondents indicated their levels of agreement on a 4-point Likert scale (1, totally disagree; 4, totally agree). According the authors of the questionnaire, a score ≥50 indicates a high risk for CSBD. The internal consistencies of the CSBD-19 were excellent (SUD, *α* = 0.93; control, *α* = 0.94).

Table 1. Comparison of patients with SUD and matched controls: matching variables.

Variable	Controls		SUD		Test	df	P value
	n	%	n	%			
Gender					0.02[a]	1	.878
Male	60	65.2	59	64.1			
Female	32	34.8	33	35.9			
Highest education					4110[b]	—	.724
No degree	2	2.2	3	3.3			
Lower SLC	18	19.6	21	22.8			
Intermediate SLC	38	41.3	34	37.0			
Upper SLC[c]	22	23.9	22	23.9			
University degree	12	13.0	12	13.0			
Age, y, mean (SD)	39.3	10.5	39.9	10.3	−0.40[d]	182	.691

Abbreviations: SLC, school-leaving certificate; SUD, substance use disorder. [a] Chi-square test. [b] Mann-Whitney U test. [c] Qualification for university. [d] T-test.

Table 2. Comparison of CSBD/PUD prevalence between patients with SUD and matched controls.

Diagnosis	Controls		SUD		χ^2	df	P value
	n	%	n	%			
CSBD[a]					1.683	1	.195
No	85	92.4	89	96.7			
Yes	7	7.6	3	3.3			
PUD[b]					2.080	1	.149
No	86	93.5	90	97.9			
Yes	6	6.5	2	2.2			

Abbreviations: CSBD, compulsive sexual behavior disorder; CSBD-19, Compulsive Sexual Behavior Disorder Scale; PPCS-6, short version of the Problematic Pornography Consumption Scale; PUD, pornography use disorder; SUD, substance use disorder. [a] A score $\geq$50 in the CSBD-19 indicates a CSBD diagnosis. [b] A score $\geq$50 in the CSBD-19 and a score $\geq$20 in the PPCS-6 indicate a PUD diagnosis.

Assessment of trait sexual motivation

A shortened version of the Trait Sexual Motivation Questionnaire,[62] the short Trait Sexual Motivation Questionnaire (s-TSMQ), was used to assess trait sexual motivation via an economic set of 16 items. Four subscales reflect the 4 dimensions of trait sexual motivation: solitary sexuality (eg, "I masturbate regularly"), importance of sex (eg, "Sex is important to me"), seeking sexual encounters (eg, "I often go out to find a partner for sex"), and comparison with others (eg, "Most people want less sex than me"), each containing 4 items. Participants answered on a 6-point Likert scale (0 = not at all, 5 = very much). The internal consistencies of the s-TSMQ were good to excellent in the present study: total score (SUD, $\alpha = 0.94$; control, $\alpha = 0.94$) and the dimensions of solitary sexuality (SUD, $\alpha = 0.87$; control, $\alpha = 0.86$), importance of sex (SUD, $\alpha = 0.87$; control, $\alpha = 0.86$), seeking sexual encounters (SUD, $\alpha = 0.93$; control, $\alpha = 0.94$), and comparison with others (SUD, $\alpha = 0.89$; control, $\alpha = 0.93$).

Problematic pornography consumption and PUD

The short version of the Problematic Pornography Consumption Scale (PPCS-6)[63] was used to assess problematic pornography consumption over the past 6 months. Participants answered 6 items on a 7-point Likert scale (eg, "I felt that porn is an important part of my life"; 1 = never, 7 = all the time). According to the authors of the PPCS-6, a score $\geq$20 indicates problematic use of pornography. The internal consistencies of the PPCS-6 were good in the present study (SUD, $\alpha = 0.84$; control, $\alpha = 0.92$).

PUD diagnosis

We defined PUD as the combination of a CSBD and problematic pornography use. PUD was determined by combining the CSBD-19 cutoff score indicating a high risk for CSBD ($\geq$50) and the PPCS-6 cutoff score indicating problematic use of pornography ($\geq$20).

Statistical analyses

If >20% of item responses on a scale of the CSBD-19, s-TSMQ, and PPCS-6 were missing, the score was excluded from analyses. Otherwise, missing item responses were imputed via predictive mean matching as performed by the R package *mice* (version 3.14.0)[64] running under R version 4.2.0.[54] To analyze the data, we used IBM Statistics (version 28.0.1)[65] and R (version 4.2.0).[54] To describe the data and prevalence of CSBD, we calculated frequencies and descriptive statistics for variables and scores of the CSBD-19, s-TSMQ, and PPCS-6. To compare groups, we used *t*-tests for variance heterogeneous populations (Welch tests) for continuous data and Mann-Whitney tests for rank data; for 2 × 2 tables, the "N − 1" chi-square test[66] was used because of the low expected frequencies. $P < .05$ was considered statistically significant.

Results
Description of matching variables

Comparison of matching variables in Table 1 shows that the data sets were similar in terms of gender, education level, and age.

Comparison of variables of interest by groups

There was no significant difference between groups regarding CSBD or PUD prevalence (Table 2).

Regarding CSBD/PUD-related personal characteristics (Table 3), we found a significantly higher frequency of

Table 3. Comparison of patients with SUD with matched controls: CSBD/PUD-related personal characteristics.

Variable	Controls		SUD				
	Mean	SD	Mean	SD	*t*-test	*df*	*P* value
Age at first, y							
Contact with pornography	16.63	4.40	14.48	5.09	2.90	155.17	.004
Voluntary contact with pornography	17.49	4.09	16.83	4.81	0.90	136.29	.371
Pornography use, min/wk	74.35	164.22	54.18	84.81	1.05	136.31	.297
CSBD-19	30.46	11.09	30.71	10.80	−0.15	181.87	.877
PPCS-6	14.13	8.36	10.76	6.15	3.03	153.56	.003
s-TSMQ							
Solitary sexuality	2.43	1.39	2.38	1.45	0.29	181.73	.776
Importance of sex	2.91	1.26	3.36	1.36	−2.33	181.09	.021
Seeking sexual encounters	0.89	1.29	1.12	1.33	−1.18	181.86	.239
Comparison with others	1.69	1.29	1.72	1.34	−0.17	181.80	.867
Relationship status, No. (%)					10.18[a]	1	.001
Single	33	36.7	55	60.4			
With partner	57	63.3	36	39.6			

Abbreviations: CSBD-19, Compulsive Sexual Behavior Disorder Scale; PPCS-6, short version of the Problematic Pornography Consumption Scale; PUD, pornography use disorder; s-TSMQ, short Trait Sexual Motivation Questionnaire; SUD, substance use disorder. [a] Chi-square test.

single participants in the SUD sample than the control sample. Furthermore, patients of the SUD sample reported a significantly higher importance of sex but no significant differences in the other sexual motivation scales. The SUD sample was significantly younger than the control sample when it had its first contact with pornographic material and had a significantly lower risk for problematic pornography consumption (control vs SUD, 25% vs 12%; $\chi^2[1] = 5.167$, $P = .023$). However, we found no significant differences in age at first voluntarily contact with porn, time spent on pornography use per week, and CSBD-19 score.

Discussion

The aim of this study was to compare the prevalence of CSBD and PUD in a SUD group with a control group matched by age, gender, and educational level to examine if patients with SUD are more likely to have a comorbid CSBD. We further assumed that a higher CSBD and PUD prevalence in patients with SUD is accompanied by more pronounced personal characteristics related to CSBD/PUD.

    Against our hypothesis, we found no significant differences in CSBD and PUD prevalence between the SUD sample and the control group. Regarding personal characteristics related to CSBD/PUD, the SUD group reported a lower age for its first contact with pornography and consisted of significantly more single participants than the control group. Additionally, it showed higher levels of sexual motivation in the dimension of importance of sex and lower risk for problematic pornography consumption as measured by the PPCS-6. There were no group differences regarding the age that participants had their first voluntary contact with pornography, the time watching pornography per week, and the symptom severity of CSBD, as well as the sexual motivation dimensions of solitary sexuality, seeking sexual encounters, and comparison with others.

    The prevalence in the control sample matches previously reported CSBD prevalence in general samples.[5-14] In contrast, the prevalence in inpatients with SUD differs from previous CSBD comorbidity reports.[39-43] While 20% to 40% of patients with SUD reported comorbid CSBD in previous studies,[39-43] about 3% of patients did so in our study. Despite the high variance in previously reported comorbidity rates

between CSB and SUD,[39-43] the difference between our results and those of the other studies is surprising. The low prevalence of CSBD and PUD in our SUD sample could be explained by different reasons. One possibility is the lower rate of relationships in the patient sample, which may lead to a lower frequency of subjective problems with one's sexual behaviors and thus a lack of suffering, which would be a prerequisite for a clinically relevant problem.[1] A lower prevalence of subjective problems with one's sexual behavior could also be due to more liberal attitudes toward sexuality. Therefore, in more liberal countries such as Germany,[67,68] the prevalence of CSBD and PUD in general and in SUD samples might be lower than in countries such as the United States and Canada, where previous studies have been conducted.[39-43] Another possibility is that patients experiencing addiction may trivialize their problems with sexual behavior because they feel ashamed or do not feel anonymous answering these questions in the clinical setting, or they may associate these problems with substance use and therefore check lower scores on the survey. In addition, these differences might have arisen due to an improvement in CSBD symptoms as a result of ongoing treatment. Hence, some patients who had fulfilled the diagnostic criteria of CSBD or PUD in the past might not fulfill these criteria anymore. In this case, there would be a reduction of CSBD symptoms in patients getting treatment for SUD. Another important explanatory reason for the surprising result could be the different environments in which the patients with SUD and the individuals in the control group live. Opportunities for sexual activity, whether with a partner or alone, are certainly more limited in a hospital than a normal setting. Because the questions on the problematic sexual behavior questionnaires refer to the past 6 months, the information provided by patients with SUD may underestimate the extent of problems in their normal environment. However, our study does not allow testing this possibility. Therefore, research comparing different phases of SUD treatment is needed. The lacking difference between the CSBD and PUD prevalence rates of the groups partly contrasts with existing literature. Ballester-Arnal et al[38] found a higher prevalence of SUD in their CSBD group. Yet, this could be at least partly explained by the greater proportion of males in the CSBD group, as males are affected more often by SUD.[48] Our

results are in line with the finding of Odlaug et al,[9] who also found no difference in SUD prevalence in the CSBD sample as compared with the non-CSBD sample. Nevertheless, it should be considered that not every substance dependence may occur equally frequent with CSBD.[43] Unfortunately, comparisons of correlations between abuse type (eg, alcohol vs other substances) and CSBD would require larger samples than ours. Further research could therefore investigate if patients with certain SUDs are more likely to manifest a comorbid CSBD as compared with healthy controls.

Given our assumption that patients with SUD have a higher CSBD prevalence than the general population, we expected CSBD- and PUD-related personal characteristics to be more pronounced in persons of the SUD sample. In line with our results, most CSBD- and PUD-related personal characteristics do not differ between groups. However, we found differences in the age at the first contact with pornography, relationship status, sexual motivation dimension of the importance of sex, and risk for problematic pornography consumption. Patients experiencing SUD were on average younger at their first contact with pornography than participants of the control sample. This might be attributable to family characteristics and upbringing, as parent-child interaction, such as overprotective and unsupportive parental relationships, presents a risk factor for the development of addiction.[69] A more frequent occurrence of the unsupportive parenting style among individuals in the addiction group may accompany a greater neglect of control of media used and thus an earlier contact with pornography. Additionally, those in the SUD group reported their relationship status more often as single than the control sample. Instead of being a risk factor for CSBD/PUD, this may, as aforementioned, lead to a lower frequency of subjective problems with one's sexual behaviors. Yet, the evidence on the association between relationship status and having CSBD/PUD is mixed. While one study showed that people with PUD are more often single,[66] 2 studies did not find any difference between the CSBD and non-CSBD groups in terms of relationship status.[9,17] Therefore, the relationship status may predict the risk of manifesting CSBD or PUD only in interaction with other factors, such as loneliness correlation with pornography use.[70] The sexual motivation dimension of the importance of sex was more pronounced in the SUD sample. This dimension reflects the need to be sexually active and to get sexually aroused[62] and represents 1 symptom of CSBD/PUD.[1] As assumed, patients of the SUD sample have a higher need to be sexually active, although this did not translate into an increased prevalence of CSBD or PUD. As mentioned, factors such as trivialization or misattribution of negative impactions may contribute to an underestimation of the prevalence of CSBD and PUD in the clinical sample. This could also be an explanation for why problematic pornography consumption is significantly more pronounced in the control sample. Individuals in this sample may feel less inhibited in answering our questions or have less of a tendency to minimize the true extent of their problematic sexual behavior. Overall, we found more personal characteristics related to CSBD and PUD in the SUD sample than the control sample, supporting the assumption of common mechanisms in CSBD and SUD.

Our starting point was the hypothesis that SUD and CSBD/PUD show an overcomorbidity. This confirmation of this hypothesis would support the conceptualization of CSBD and PUD as behavioral addiction and the idea of common underlying mechanisms, such as inhibitory control or cue reactivity. Although we could not confirm our main hypothesis of an overcomorbidity of SUD and CSBD/PUD, the results concerning vulnerability factors for the development of CSBD/PUD suggest some similarity between these disorders. If further research confirms similar mechanisms underlying SUD and CSBD/PUD, the clinical implication for inpatient treatment of SUD could include more awareness of other behavioral addictions, such as CSBD/PUD.

Finally, some limitations in our studies could have affected our findings. Therefore, results should be interpreted with caution. One limitation is that questionnaires include the risk of biases leading to an over- or underestimation of scores. To assess CSBD and PUD prevalence, we used questionnaires asking about one's thoughts, feelings, and behaviors regarding sexual intercourse or pornography consumption over the previous 6 months. This could lead to a recency effect, as the last days and weeks may be remembered better than the months further back. For those in the SUD group who stayed at an inpatient clinic, limited bandwidth internet or limits to meeting sexual partners could have contributed to underestimating their sexual problems due to use reduction or abstinence since intake. Nevertheless, contact with sexual partners and internet access were possible for patients during treatment. As such, the extent to which the SUD and control groups had similar access to sexual activities is unclear, and it is likely that the control group's access was less restricted. In addition, questionnaires can only serve screening purposes. A valid diagnosis would have required a clinical interview, which did not yet exist at the time of the survey. However, questionnaires are the best instruments to economically measure sexuality- and pornography-related data. Another limitation is the response rate of 52.3% in the SUD sample. Therefore, we most likely studied a selective inpatient sample of patients having no problem giving information about their thoughts, feelings, and behaviors regarding sexual intercourse or pornography consumption. Individuals with problematic pornography use have a higher tendency to feel uncomfortable answering pornography-related questions.[71,72] Yet, our sample does not seem to be more selective than previous comorbidity studies regarding response rates.[9,38,41] A methodological limitation lies in the different approaches to data collection in the 2 samples (paper-pencil version vs online survey, amount of reward, etc). By data cleaning and sample matching, though, we took the best possible precautions to obtain comparable data sets. Unfortunately, we do not have data on how many individuals with a possible SUD are in our control group. Nevertheless, it can be assumed that there are significantly fewer diagnoses in the control group than the SUD group. Since previous studies did not collect data from a control group, our comparative data nevertheless represent a relevant gain in knowledge.

Diagnostic and clinical implications

Individuals with SUDs have an increased vulnerability to developing comorbid disorders.[72] While our research showed no differences in prevalence rates for CSBD or PUD, this might be due to the specific stage in the development of the disorder in our sample with SUD, as participants were recruited from a rehabilitation clinic for SUD. If key vulnerabilities (eg, emotional dysregulation) remain unaddressed in treatment or patients do not learn alternative ways of coping with intense emotions and stress, they might abstain from substance use

but turn to other forms of dysfunctional emotion regulation, such as excessive pornography use. Therefore, we recommend screening individuals with SUDs for CSBD and PUD to prevent problem shifting. For clinical practice, this implies discussing functional measures to handle emotional difficulties and raising awareness for problematic or dysfunctional coping mechanisms, such as excessive pornography use or other problematic sexual behaviors.

Conclusion

For the first time, this study compared CSBD and PUD prevalence rates between a SUD sample and a control sample with an instrument based on the *ICD-11* criteria for CSBD. Overall, we found no significant difference in CSBD and PUD prevalence rates between groups. We conclude that patients with SUD are not more likely to have a comorbid CSBD than persons without SUD. However, some higher rates of vulnerability factors of CSBD/PUD might suggest some similarities between SUD and CSBD/PUD.

Acknowledgments

Author contributions

Conception and design: S.G., C. Markert, R.S., B.W. Acquisition of data: I.B., S.G., C. Markert, F.S., N.T., B.W. Analysis and interpretation of data: S.G., C. Markert, R.S., B.W. Drafting the article: S.G. Revising it for intellectual content: C. Markert, R.S., B.W. Final approval of the completed article: I.B., S.G., D.K., C. Markert, C. Muhl, F.S., R.S., N.T., B.W.

Funding

Conflicts of interest

The authors report no conflicts of interest.

References

1. World Health Organization. *ICD-11 for mortality and morbidity statistics*. Accessed July 25, 2022. https://icd.who.int/browse11/l-m/en.
2. Efrati Y, Gola M. Treating compulsive sexual behavior. *Curr Sex Health Rep*. 2018;**10**(2):57–64. https://doi.org/10.1007/s11930-018-0143-8.
3. Kafka MP. Hypersexual disorder: a proposed diagnosis for *DSM-V*. *Arch Sex Behav*. 2010;**39**(2):377–400. https://doi.org/10.1007/s10508-009-9574-7.
4. Goodman A. Diagnosis and treatment of sexual addiction. *J Sex Marital Ther*. 1993;**19**(3):225–251. https://doi.org/10.1080/00926239308404908.
5. Kuzma JM, Black DW. Epidemiology, prevalence, and natural history of compulsive sexual behavior. *Psychiatr Clin North Am*. 2008;**31**(4):603–611. https://doi.org/10.1016/j.psc.2008.06.005.
6. Baranowski AM, Vogl R, Stark R. Prevalence and determinants of problematic online pornography use in a sample of german women. *J Sex Med*. 2019;**16**(8):1274–1282. https://doi.org/10.1016/j.jsxm.2019.05.010.
7. Dickenson JA, Gleason N, Coleman E, Miner MH. Prevalence of distress associated with difficulty controlling sexual urges, feelings, and behaviors in the United States. *JAMA Netw Open*. 2018;**1**(7):184468. https://doi.org/10.1001/jamanetworkopen.2018.4468.
8. Bőthe B, Potenza MN, Griffiths MD, *et al*. The development of the Compulsive Sexual Behavior Disorder Scale (CSBD-19): an *ICD-11* based screening measure across three languages. *J Behav Addict*. 2020;**9**(2):247–258. https://doi.org/10.1556/2006.2020.00034.
9. Odlaug BL, Lust K, Schreiber LRN, *et al*. Compulsive sexual behavior in young adults. *Ann Clin Psychiatry*. 2013;**25**(3):193–200.
10. Castro-Calvo J, Gil-Llario MD, Giménez-García C, Gil-Juliá B, Ballester-Arnal R. Occurrence and clinical characteristics of compulsive sexual behavior disorder (CSBD): a cluster analysis in two independent community samples. *J Behav Addict*. 2020;**9**(2):446–468. https://doi.org/10.1556/2006.2020.00025.
11. MacLaren VV, Best LA. Multiple addictive behaviors in young adults: student norms for the shorter PROMIS questionnaire. *Addict Behav*. 2010;**35**(3):252–255. https://doi.org/10.1016/j.addbeh.2009.09.023.
12. Cooper A, Morahan-Martin J, Mathy RM, Maheu M. Toward an increased understanding of user demographics in online sexual activities. *J Sex Marital Ther*. 2002;**28**(2):105–129. https://doi.org/10.1080/00926230252851861.
13. Rettenberger M, Klein V, Briken P. The relationship between hypersexual behavior, sexual excitation, sexual inhibition, and personality traits. *Arch Sex Behav*. 2016;**45**(1):219–233. https://doi.org/10.1007/s10508-014-0399-7.
14. Jepsen D, Brzank PJ. Hypersexual behaviour among young adults in Germany: characteristics and personality correlates. *BMC Psychiatry*. 2022;**22**(1):804. https://doi.org/10.1186/s12888-022-04370-8.
15. Briken P, Wiessner C, Štulhofer A, *et al*. Who feels affected by "out of control" sexual behavior? Prevalence and correlates of indicators for *ICD-11* compulsive sexual behavior disorder in the German Health and Sexuality Survey (GeSiD). *J Behav Addict*. 2022;**11**(3):900–911. https://doi.org/10.1556/2006.2022.00060.
16. Carnes PJ, Delmonico DL. Childhood abuse and multiple addictions: research findings in a sample of self-identified sexual addicts. *Sex Addict Compuls*. 1996;**3**(3):258–268. https://doi.org/10.1080/10720169608400116.
17. Reid RC, Carpenter BN, Hook JN, *et al*. Report of findings in a *DSM-5* field trial for hypersexual disorder. *J Sex Med*. 2012;**9**(11):2868–2877. https://doi.org/10.1111/j.1743-6109.2012.02936.x.
18. Sassover E, Weinstein A. Should compulsive sexual behavior (CSB) be considered as a behavioral addiction? A debate paper presenting the opposing view. *J Behav Addict*. 2022;**11**(2):166–179. https://doi.org/10.1556/2006.2020.00055.
19. Borgogna NC, Aita SL. Another failure of the latent disease model? The case of compulsive sexual behavior disorder. Commentary to the debate: "Behavioral addictions in the *ICD-11*.". *J Behav Addict*. 2022;**11**(3):615–619. https://doi.org/10.1556/2006.2022.00069.
20. Brand M, Rumpf H-J, Demetrovics Z, *et al*. Which conditions should be considered as disorders in the *International Classification of Diseases* (ICD-11) designation of "other specified disorders due to addictive behaviors"? *J Behav Addict*. 2022;**11**(2):150–159. https://doi.org/10.1556/2006.2020.00035.
21. Lew-Starowicz M, Coleman E. Mental and sexual health perspectives of the *International Classification of Diseases* (ICD-11) compulsive sexual behavior disorder. Commentary to the debate: "Behavioral addictions in the *ICD-11*.". *J Behav Addict*. 2022;**11**(2):226–229. https://doi.org/10.1556/2006.2022.00032.
22. Briken P, Turner D. What does "sexual" mean in compulsive sexual behavior disorder? Commentary to the debate: "Behavioral addictions in the *ICD-11*.". *J Behav Addict*. 2022;**11**(2):222–225. https://doi.org/10.1556/2006.2022.00026.

23. Efrati Y, Kraus SW, Kaplan G. Common features in compulsive sexual behavior, substance use disorders, personality, temperament, and attachment. *Int J Environ Res Public Health*. 2021;**19**(1):296. https://doi.org/10.3390/ijerph19010296.

24. Elmquist JA, Shorey RC, Anderson S, Stuart GL. The relation between compulsive sexual behaviors and aggression in a substance-dependent population. *J Aggress Maltreat Trauma*. 2016;**25**(1):110–124. https://doi.org/10.1080/10926771.2015.1081664.

25. Brem MJ, Shorey RC, Anderson S, Stuart GL. Does experiential avoidance explain the relationships between shame, PTSD symptoms, and compulsive sexual behaviour among women in substance use treatment? *Clin Psychol Psychother*. 2018;**25**(5):692–700. https://doi.org/10.1002/cpp.2300.

26. Shorey RC, Elmquist J, Gawrysiak MJ, Anderson S, Stuart GL. The relationship between mindfulness and compulsive sexual behavior in a sample of men in treatment for substance use disorders. *Mindfulness (N Y)*. 2016;**7**(4):866–873. https://doi.org/10.1007/s12671-016-0525-9.

27. Brem MJ, Shorey RC, Anderson S, Stuart GL. Dispositional mindfulness, shame, and compulsive sexual behaviors among men in residential treatment for substance use disorders. *Mindfulness (N Y)*. 2017;**8**(6):1552–1558. https://doi.org/10.1007/s12671-017-0723-0.

28. Allen A, Kannis-Dymand L, Katsikitis M. Problematic internet pornography use: the role of craving, desire thinking, and metacognition. *Addict Behav*. 2017;**70**:65–71. https://doi.org/10.1016/j.addbeh.2017.02.001.

29. Caselli G, Ferla M, Mezzaluna C, Rovetto F, Spada MM. Desire thinking across the continuum of drinking behaviour. *Eur Addict Res*. 2012;**18**(2):64–69. https://doi.org/10.1159/000333601.

30. Snagowski J, Laier C, Duka T, Brand M. Subjective craving for pornography and associative learning predict tendencies towards cybersex addiction in a sample of regular cybersex users. *Sex Addict Compuls*. 2016;**23**(4):342–360. https://doi.org/10.1080/10720162.2016.1151390.

31. Field M, Munafò MR, Franken IHA. A meta-analytic investigation of the relationship between attentional bias and subjective craving in substance abuse. *Psychol Bull*. 2009;**135**(4):589–607. https://doi.org/10.1037/a0015843.

32. Mechelmans DJ, Irvine M, Banca P, *et al.* Enhanced attentional bias towards sexually explicit cues in individuals with and without compulsive sexual behaviours. *PLoS One*. 2014;**9**(8):e105476. https://doi.org/10.1371/journal.pone.0105476.

33. Carter BL, Tiffany T, SE, Tiffany ST. Meta-analysis of cue-reactivity in addiction research. *Addiction*. 1999;**94**(3):327–340. https://doi.org/10.1046/j.1360-0443.1999.9433273.x.

34. Klucken T, Wehrum-Osinsky S, Schweckendiek J, Kruse O, Stark R. Altered appetitive conditioning and neural connectivity in subjects with compulsive sexual behavior. *J Sex Med*. 2016;**13**(4):627–636. https://doi.org/10.1016/j.jsxm.2016.01.013.

35. Zilberman N, Yadid G, Efrati Y, Neumark Y, Rassovsky Y. Personality profiles of substance and behavioral addictions. *Addict Behav*. 2018;**82**:174–181. https://doi.org/10.1016/J.ADDBEH.2018.03.007.

36. Draps M, Sescousse G, Potenza MN, *et al.* Gray matter volume differences in impulse control and addictive disorders: an evidence from a sample of heterosexual males. *J Sex Med*. 2020;**17**(9):1761–1769. https://doi.org/10.1016/J.JSXM.2020.05.007.

37. Raymond NC, Coleman E, Miner MH. Psychiatric comorbidity and compulsive/impulsive traits in compulsive sexual behavior. *Compr Psychiatry*. 2003;**44**(5):370–380. https://doi.org/10.1016/S0010-440X(03)00110-X.

38. Ballester-Arnal R, Castro-Calvo J, Giménez-García C, Gil-Juliá B, Gil-Llario MD. Psychiatric comorbidity in compulsive sexual behavior disorder (CSBD). *Addict Behav*. 2020;**107**:106384. https://doi.org/10.1016/j.addbeh.2020.106384.

39. Kraus SW, Potenza MN, Martino S, Grant JE. Examining the psychometric properties of the Yale-Brown obsessive-compulsive scale in a sample of compulsive pornography users. *Compr Psychiatry*. 2015;**59**:117–122. https://doi.org/10.1016/j.comppsych.2015.02.007.

40. Black DW, Kehrberg LLD, Flumerfelt DL, Schlosser SS. Characteristics of 36 subjects reporting compulsive sexual behavior. *Am J Psychiatry*. 1997;**154**(2):243–249. https://doi.org/10.1176/ajp.154.2.243.

41. Wines D. Exploring the applicability of criteria for substance dependence to sexual addiction. *Journal of Treatment and Prevention*. 1997;**4**(3):195–220. https://doi.org/10.1080/10720169708404228.

42. Deneke E, Knepper C, Green BA, Carnes PJ. Comparative study of three levels of care in a substance use disorder inpatient facility on risk for sexual addiction. *Sex Addict Compuls*. 2015;**22**(2):109–125. https://doi.org/10.1080/10720162.2014.979382.

43. Stavro K, Rizkallah E, Dinh-Williams L, Chiasson JP, Potvin S. Hypersexuality among a substance use disorder population. *Sex Addict Compuls*. 2013;**20**(3):210–216. https://doi.org/10.1080/10720162.2013.787379.

44. Wölfling K, Zeeck A, te Wildt B, *et al.* Behavioral addictions in psychosomatic care. *Psychother Psychosom Med Psychol*. 2022;**72**(3/4):139–147. https://doi.org/10.1055/a-1647-3280.

45. Mitchell KR, Mercer CH, Ploubidis GB, *et al.* Sexual function in Britain: findings from the third National Survey of Sexual Attitudes and Lifestyles (Natsal-3). *Lancet*. 2013;**382**(9907):1817–1829. https://doi.org/10.1016/S0140-6736(13)62366-1.

46. Palacios-Ceña D, Carrasco-Garrido P, Hernández-Barrera V, Alonso-Blanco C, Jiménez-García R, Fernández-de-las-Peñas C. Sexual behaviors among older adults in Spain: results from a population-based national sexual health survey. *J Sex Med*. 2012;**9**(1):121–129. https://doi.org/10.1111/J.1743-6109.2011.02511.X.

47. Martyniuk U, Dekker A. Adult pornography use in Germany: results of a pilot study. *Zeitschrift Für Sexualforschung*. 2018;**31**(3):237–249. https://doi.org/10.1055/a-0664-4441.

48. Cotto JH, Davis E, Dowling GJ, Elcano JC, Staton AB, Weiss SRB. Gender effects on drug use, abuse, and dependence: a special analysis of results from the National Survey on Drug Use and Health. *Gend Med*. 2010;**7**(5):402–413. https://doi.org/10.1016/J.GENM.2010.09.004.

49. Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of *DSM-IV* disorders in the National Comorbidity Survey Replication. *Arch Gen Psychiatry*. 2005;**62**(6):593–602. https://doi.org/10.1001/ARCHPSYC.62.6.593.

50. Zilberman N, Yadid G, Efrati Y, Rassovsky Y. Who becomes addicted and to what? Psychosocial predictors of substance and behavioral addictive disorders. *Psychiatry Res*. 2020;**291**:113221. https://doi.org/10.1016/j.psychres.2020.113221.

51. Blinka L, Ševčíková A, Dreier M, Škařupová K, Wölfling K. Online sex addiction: a qualitative analysis of symptoms in treatment-seeking men. *Front Psych*. 2022;**13**:907549. https://doi.org/10.3389/fpsyt.2022.907549.

52. Koós M, Fuss J, Klein V, Demetrovics Z, Bőthe B. Sexual motivations underlying compulsive sexual behavior in women and men from Germany and Hungary. *J Sex Med*. 2022;**19**(2):170–181. https://doi.org/10.1016/j.jsxm.2021.11.005.

53. Efrati Y, Gola M. Understanding and predicting profiles of compulsive sexual behavior among adolescents. *J Behav Addict*. 2018;**7**(4):1004–1014. https://doi.org/10.1556/2006.7.2018.100.

54. R Core Team. *R: A Language and Environment for Statistical Computing*. R Foundation for Statistical Computing; 2022.

55. Saunders JB, Aasland OG, Babor TF, De La Fuente JR, Grant M. Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption-II. *Addiction*. 1993;**88**(6):791–804. https://doi.org/10.1111/j.1360-0443.1993.tb02093.x.

56. Watzl H, Rist F, Höcker W, Miehle K. Entwicklung eines Fragebogens zur Erfassung von Medikamentenmißbrauch bei

Suchtpatienten. Development of a questionnaire for assessing abuse of prescription drugs in patients with addictive disorders. In: Heide M, Lieb H eds. *Sucht Und Psychosomatik: Beiträge des 3 Heidelberger Kongress. Addiction and Psychosomatic: Contributions From the Third Heidelberg Congress*. Nagel; 1991.

57. Heatherton TF, Kozlowski LT, Frecker RC, Fagerström K-O. The Fagerström Test for Nicotine Dependence: a revision of the Fagerstrom Tolerance Questionnaire. *Br J Addict*. 1991;**86**(9):1119–1127. https://doi.org/10.1111/j.1360-0443.1991.tb01879.x.

58. Fagerström K-O. Measuring degree of physical dependence to tobacco smoking with reference to individualization of treatment. *Addict Behav*. 1978;**3**(3-4):235–241. https://doi.org/10.1016/0306-4603(78)90024-2.

59. Turner NE, Annis HM, Sklar SM. Measurement of antecedents to drug and alcohol use: psychometric properties of the Inventory of Drug-Taking Situations (IDTS). *Behav Res Ther*. 1997;**35**(5):465–483. https://doi.org/10.1016/S0005-7967(96)00119-2.

60. Margraf J, Cwik JC, Suppiger A, Schneider S. *DIPS Open Access: Diagnostic Interview for Mental Disorders. DIPS Open Access: Diagnostisches Interview Bei Psychischen Störungen*. Ruhr-Universität Bochum; 2017.

61. Margraf J, Cwik JC, Pflug V, Schneider S. Structured clinical interviews for mental disorders across the lifespan: psychometric quality and further developments of the DIPS open access interviews. Strukturierte klinische interviews zur Erfassung psychischer Störungen über die Lebensspanne: Gütekriterien und Weiterentwicklungen der DIPS-Verfahren. *Z Klin Psychol Psychother*. 2017;**46**(3):176–186. https://doi.org/10.1026/1616-3443/A000430.

62. Stark R, Kagerer S, Walter B, Vaitl D, Klucken T, Wehrum-Osinsky S. Trait Sexual Motivation Questionnaire: concept and validation. *J Sex Med*. 2015;**12**(4):1080–1091. https://doi.org/10.1111/jsm.12843.

63. Bőthe B, Tóth-Király I, Demetrovics Z, Orosz G. The short version of the Problematic Pornography Consumption Scale (PPCS-6): a reliable and valid measure in general and treatment-seeking populations. *J Sex Res*. 2021;**58**(3):342–352. https://doi.org/10.1080/00224499.2020.1716205.

64. van Buuren S. Flexible imputation of missing data. In: Chapman H ed. *CRC Interdisciplinary Statistics*. CRC Press LLC; 2018.

65. IBM Corp. *IBM SPSS Statistics for Windows*. IBM Corp; 2021.

66. Campbell I. Chi-squared and Fisher-Irwin tests of two-by-two tables with small sample recommendations. *Stat Med*. 2007;**26**(19):3661–3675. https://doi.org/10.1002/SIM.2832.

67. Scott J. Changing attitudes to sexual morality: a cross-national comparison. *Sociology*. 1998;**32**(4):815–845. https://doi.org/10.1177/0038038598032004010.

68. Widmer ED, Treas J, Newcomb R. Attitudes toward nonmarital sex in 24 countries. *J Sex Res*. 1998;**35**(4):349–358. https://doi.org/10.1080/00224499809551953.

69. Rhodes T, Lilly R, Gómez CF, *et al*. Risk factors associated with drug use: the importance of "risk environment." Drugs: Education, Prevention and Policy. 2023;**10**(4):303–329. https://doi.org/10.1080/0968763031000077733.

70. Butler MH, Pereyra SA, Draper TW, Leonhardt ND, Skinner KB. Pornography use and loneliness: a bidirectional recursive model and pilot investigation. *J Sex Marital Ther*. 2018;**44**(2):127–137. https://doi.org/10.1080/0092623X.2017.1321601.

71. Bőthe B, Tóth-Király I, Potenza MN, Orosz G, Demetrovics Z. High-frequency pornography use may not always be problematic. *J Sex Med*. 2020;**17**(4):793–811. https://doi.org/10.1016/j.jsxm.2020.01.007.

72. Swendsen JD, Merikangas KR. The comorbidity of depression and substance use disorders. *Clin Psychol Rev*. 2000;**20**(2):173–189. https://doi.org/10.1016/S0272-7358(99)00026-4.