AKADÉMIAI KIADÓ

Journal of Behavioral Addictions

9 (2020) 2, 446-468

DOI:
10.1556/2006.2020.00025

FULL-LENGTH REPORT

Occurrence and clinical characteristics of Compulsive Sexual Behavior Disorder (CSBD): A cluster analysis in two independent community samples

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Received: August 30, 2019 • Revised manuscript received: November 23, 2019; March 9, 2020 • Accepted: April 5, 2020 • Published online: June 16, 2020

ABSTRACT

Background and aims: Compulsive Sexual Behavior Disorder (CSBD) is characterized by a persistent failure to control intense and recurrent sexual impulses, urges, and/or thoughts, resulting in repetitive sexual behavior that causes a marked impairment in important areas of functioning. Despite its recent inclusion in the forthcoming ICD-11, concerns regarding its assessment, diagnosis, prevalence or clinical characteristics remain. The purpose of this study was to identify participants displaying CSBD through a novel data-driven approach in two independent samples and outline their sociodemographic, sexual, and clinical profile. *Methods:* Sample 1 included 1,581 university students (females = 56.9%; M_{age} = 20.58) whereas sample 2 comprised 1,318 community members (females = 43.6%; M_{age} = 32.37). First, we developed a new composite index to assess the whole range of CSBD symptoms based on three previously validated scales. Based on this new composite index, we subsequently identified individuals with CSBD through a cluster analytic approach. *Results:* The estimated occurrence of CSBD was 10.12% in sample 1 and 7.81% in sample 2. Participants with CSBD were mostly heterosexual males, younger than respondents without CSBD, reported higher levels of sexual sensation seeking and erotophilia, an increased offline and especially online sexual activity, more depressive and anxious symptoms, and poorer self-esteem. *Conclusions:* This research provides further evidence on the occurrence of CSBD based on an alternative data-driven approach, as well as a detailed and nuanced description of the sociodemographic, sexual, and clinical profile of adults with this condition. Clinical implications derived from these findings are discussed in detail.

KEYWORDS

Compulsive Sexual Behavior Disorder (CSBD), cluster analysis, occurrence, clinical profile

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INTRODUCTION

Compulsive Sexual Behavior Disorder (CSBD), also known as "sexual addiction", "hypersexual disorder (HD)", or "problematic sexual behavior", has been included in the 11th revision of the International Classification of Diseases (ICD-11) by the World Health Organization (2018). A conservative approach was taken, and CSBD was recognized as an impulse-control disorder (Kraus et al., 2018). At a clinical level, CSBD is characterized by a

persistent failure to control intense and recurrent sexual impulses, urges, and/or thoughts, resulting in repetitive sexual behavior that causes a marked impairment in important areas of functioning (Kraus et al., 2018). This uncontrolled pattern of sexual behavior leads to engage in multiple and non-pleasurable sexual activities, including excessive pornography consumption often accompanied by compulsive masturbation ("pornographic binges") (Wordecha et al., 2018), casual sex with multiple partners, excessive engagement in paid sexual services, or compulsive sexual intercourse within a stable relationship (Derbyshire & Grant, 2015; Kafka, 2010; Karila et al., 2014; Reid, Carpenter, & Lloyd, 2009, Reid et al., 2012). These behaviors produce a significant personal and psychological distress (Reid et al., 2009), as well as problems on various aspects of daily living (McBride, Reece, & Sanders, 2008). As a result, individuals struggling with CSBD often require professional help (psychiatric and/or psychological treatments) to gain control over their sexual impulses, thoughts, and behaviors, as well as to recover their sexual and general quality of life (Derbyshire & Grant, 2015; Gola & Potenza, 2016; Hook, Reid, Penberthy, Davis, & Jennings, 2014). Although no large epidemiological studies have been performed, it is estimated that CSBD affects 1–6% of adult population (Bőthe et al., 2019; Klein, Rettenberger, & Briken, 2014; Kuzma & Black, 2008), with males comprising around 80% of patients seeking for treatment (Kaplan & Krueger, 2010). The aim of this study was to identify people displaying CSBD through a novel data-driven approach in two independent samples, as well as outline their sociodemographic, sexual, and clinical profile.

CSBD diagnostic framework and criteria

Even when CSBD has been included in the ICD-11, the appropriate diagnostic framework and criteria for this clinical condition are still under discussion (Kraus et al., 2018; Walton, Cantor, Bhullar, & Lykins, 2017). Concerning current nosological status, a myriad of theoretical positions about how CSBD should be classified has been proposed and this clinical condition has been conceptualized as an addictive disorder (Potenza, Gola, Voon, Kor, & Kraus, 2017), a sexual disorder (Kafka, 2010; Walton et al., 2017), an impulse control disorder (Reid, Berlin, & Kingston, 2015), or not considered a disorder at all (Moser, 2013). Each theoretical approach proposes different criteria for the diagnosis of this condition, further emphasizing the conceptual chaos and hindering the identification of an unique profile of patients displaying symptoms of this clinical condition (Karila et al., 2014; Wéry & Billieux, 2017).

Current evidence derived from studies in clinical populations suggests that CSBD satisfies the majority of the core criteria proposed for the operational definition of behavioral addictions (Billieux et al., 2017; Kardefelt-Winther et al., 2017): (a) excessive time/effort spent on sexual behavior; (b) impaired self-control; (c) systematic failure to fulfill family, social, or work responsibilities; and (d) persistence in the sexual behavior despite its consequences. These criteria coincide with those proposed for the inclusion of CSBD in the ICD-11 (World Health Organization, 2018) and with some of the criteria proposed by Kafka (2010) for the recognition of Hypersexual Disorder (HD) in the DSM-5. Additionally, Kafka's proposal included an important criterion not considered by the ICD-11: i.e., repetitively engaging in sexual fantasies, urges, or behaviors in response to dysphoric mood states (e.g., anxiety or depression) or in response to stressful life events (work problems, bereavement, etc.). Different studies support the relevance of the use of sex as a maladaptive coping mechanism aimed to compensate for unpleasant affective states or stressful life events in people with CSBD (Reid, Carpenter, Spackman, & Willes, 2008; Schultz, Hook, Davis, Penberthy, & Reid, 2014).

Furthermore, there are other symptoms not directly included neither in the DSM-5 nor the ICD-11 but relevant in the manifestation of CSBD: i.e., preoccupation with sex, salience, and self-perceived sexual problems. These symptoms constitute common cognitive manifestations of CSBD. Seminal models such as the "component model of addiction" (Griffiths, 2005) or recent network analysis have highlighted the important role of cognitive symptoms in cybersex addiction (Baggio et al., 2018) or HD (Werner, Štulhofer, Waldorp, & Jurin, 2018). As defined by Griffiths (2005, p. 193), salience refers to "when the particular activity [sex] becomes the most important activity in the person's life and dominates their thinking (preoccupations and cognitive distortions), feelings (cravings) and behavior (deterioration of socialized behavior)". Similarly, different studies highlight the crucial role of self-perceived sexual problems in the identification of patients displaying CSBD (Grubbs, Perry, Wilt, & Reid, 2019c).

Main approaches in the identification and classification of people with CSBD

Clinicians and researchers should be very cautious when diagnosing CSBD (Humphreys, 2018). One of the issues that hinders the reliability of many studies in the field is the way in that these researches identify and classify participants with CSBD. Different criteria have been employed to address this aim. Some studies have identified individuals with CSBD based on their scores on different self-report measures (Parsons, Grov, & Golub, 2012). Unfortunately, the majority of CSBD assessment scales do not provide reliable cutoff scores derived from clinical samples (Miner, Raymond, Coleman, & Swinburne Romine, 2017), so proposed thresholds are often arbitrary and/or based on statistical (not clinical) criteria. The study conducted by Bőthe et al. (2019) constitutes an illustrative example: after analyzing psychometric properties of the Hypersexual Behavior Inventory in a large nonclinical sample, these authors were unable to find a sensitive and specific cutoff score for the diagnosis of CSBD. Furthermore, positive predictive value for the cutoff typically used for the diagnosis of hypersexuality (raw score >53) was 14% (meaning that among participants scoring above 53 in the HBI, only 14% really qualified for this

diagnosis). Thus, they recommended the use of alternative indicators and measures for the diagnosis of this condition.

Alternatively, other researchers have considered self-identification as having problems controlling sexual behavior (Smith et al., 2014) or seeking treatment for CSBD (Scanavino et al., 2013) as reliable indicators of CSBD. As an example, recently Grubbs et al. (Grubbs, Grant, & Engelman, 2019a; Grubbs, Kraus, & Perry, 2019b) conducted two studies in which problematic pornography use was measured through single items such as "*I am addicted to pornography*" or "*I would call myself an internet pornography addict*". However, some individuals recognizing themselves as having CSBD problems may not actually exhibit either the clinical characteristics or the severity of this disorder, but only moral disapproval of their own sexual behavior (Grubbs, Perry, et al., 2019c; Grubbs, Wilt, Exline, Pargament, & Kraus, 2018; Kraus & Sweeney, 2019).

Finally, other studies identified CSBD participants through structured or semi-structured clinical interviews (Reid et al., 2012). Even when this approach is considered as a "golden rule" when assessing the presence and severity of CSBD (Hook, Hook, Davis, Worthington, & Penberthy, 2010; Womack, Hook, Ramos, Davis, & Penberthy, 2013), the quality of this assessment often relies on the particular diagnostic criteria guiding this semi-structured interview. Further, assessment through structured clinical interview is time-consuming, so applicability of this procedure in research (i.e., studies comprising large samples) is often limited.

In the absence of an accurate diagnostic framework for CSBD (Kraus & Sweeney, 2019), an alternative approach is to identify individuals with CSBD through data-driven approaches (e.g., cluster analyses). This procedure is particularly advised in research contexts, where a large number of participants should be assessed in a limited time frame and classification as sexually compulsive or not occurs post hoc. A recent study by Efrati & Gola (2018b) satisfactorily identified adolescents with CSBD (12 and 14% of two independent samples) through a data-driven approach (Latent Profile Analyses, LPA). Internal and external validity of this cluster approach was demonstrated by analyzing psychosexual profile of adolescents in the CSBD cluster (characterized by an external locus of control, anxious attachment, greater loneliness, higher frequency of pornography use, and more online sexual activities). Similarly, Bőthe et al. (2019) identified adults with high risk of serious hypersexuality (around 1% of the sample) using LPA. Therefore, in the absence of an appropriate diagnostic framework as well as brief and sound screening tools (Montgomery-Graham, 2017), data-driven approaches constitute a reliable method to explore CSBD in research contexts comprising large samples.

The present study

The purpose of the present study was to explore the occurrence and sociodemographic, sexual, and clinical characteristics of CSBD in two independent community samples. However, we tackled two limitations of previous research before addressing this aim: (1) the lack of standardized screening tools for assessing the whole range of cognitive, behavioral, and emotional symptoms of CSBD and (2) the low accuracy of different approaches usually applied in research contexts to identify CSBD patients. Therefore, we followed a three-step process to address the study aim.

First, we developed a new composite index to assess the whole range of CSBD symptoms. This index relied on three previously validated scales for the assessment of CSBD: the Hypersexual Behavior Inventory (HBI, Reid, Garos, & Carpenter, 2011b), the Sexual Compulsivity Scale (SCS, Kalichman & Rompa, 1995), and the Sexual Addiction Screening Test (SAST, Carnes, 1983). Independently, these measures tend to be excessively narrow in the assessment of CSBD, not covering the wide range of symptoms that should be explored to accurately assess this clinical condition (Womack et al., 2013); however, altogether these scales offer a very comprehensive assessment of CSBD symptoms and severity. To deal with the problem of using these scales independently, we performed a comprehensive review of their content, linking their items with different CSBD symptoms and creating a composite index assessing the following criteria: (a) loss of control, (b) neglect, (c) unable to stop, (d) continued engagement despite interference, (e) coping, and (f) Preoccupation, salience, and self-perceived sexual problems (for a comprehensive description of each symptom, see Table A1 in the Appendix). The theoretical frameworks for linking scale items with each specific symptom were the ICD-11 CSBD criteria (World Health Organization, 2018), the DSM-5 proposal for the diagnosis of hypersexuality (Kafka, 2010), and the component model of addiction (Griffiths, 2005). The procedure was equivalent to that followed by Womack et al. (2013) in their review of hypersexuality measures: two independent coders linked each item with a diagnostic criterion, and a third independent coder resolved any discrepancies. For the sake of clarity, items assessing more than one CSBD symptom or not clearly assessing any symptom were excluded from the new composite index.

Based on this composite index, we subsequently identified individuals with CSBD through a cluster analytic approach. Cluster analysis lets to uncover homogeneous groups of individuals according to the magnitude and the pattern of scores in different indicators, and has been increasingly used for the identification of people with different mental health issues (such as problematic use of mobile dating apps [Rochat, Bianchi-Demicheli, Aboujaoude, & Khazaal, 2019] or excessive engagement in videogames [Musetti et al., 2019]). Through this method, we classified 2,899 participants derived from two independent samples into two clusters (non-CSBD and CSBD participants). Considering the preliminary nature of proposed CSBD criteria and the precarious development of cutoff scores, this data-driven approach presents advantages in the identification of this clinical population, such as avoiding the use of arbitrary cutoff scores or relying on self-perception of sexual problems. Furthermore, cluster analysis is useful for understanding intraindividual dynamics, instead of

interindividual differences (such in the case of variable-oriented approaches) (Bergman & Magnusson, 1997). Finally, compared to more complex data-driven approaches that require the use of advanced statistical software for their calculation (e.g., LPA), cluster analysis could be easily implemented through popular software (e.g., SPSS), with a high degree of overlap between the results of both statistical procedures (DiStefano & Kamphaus, 2006; Eshghi, Haughton, Legrand, Skaletsky, & Woolford, 2011).

Finally, we employed clusters derived from the previous analyses to explore the occurrence and characteristics of participants qualifying as sexually compulsives. Different a priori hypotheses were tested. Because current evidence points out that the prevalence of CSBD ranges between 1 and 6% (Bőthe et al., 2019; Walton et al., 2017), it was hypothesized that occurrence of CSBD in our samples will fall into this range, with males comprising a large proportion (~80%) of participants in this group. As for offline and online sexual behavior, we expect to find a greater frequency, variety, and severity of sexual behaviors among CSBD participants (Klein et al., 2014; Odlaug et al., 2013; Winters, Christoff, & Gorzalka, 2010). Linked to this increased sexual activity, we expect that CSBD participants will score higher in sexual dispositional traits such as sexual sensation seeking (Kalichman & Rompa, 1995; Klein et al., 2014) or erotophilia (Rettenberger, Klein, & Briken, 2015). Finally, to the extent that CSBD patients tend to use sex as a coping mechanism, we also hypothesized that scores on scales assessing depression (Schultz et al., 2014), anxiety (Carvalho, Guerra, Neves, & Nobre, 2014; Reid, Bramen, Anderson, & Cohen, 2014; Voon et al., 2014), and self-esteem (Chaney & Burns, 2015; Reid, Carpenter, Gilliland, & Karim, 2011a) would be increased in CSBD participants.

METHODS

Participants and procedure

Participants in this research were recruited from two independent studies on CSBD. Data acquisition for the first sample was conducted between 2012 and 2015. During this period, we used a cross-sectional, street intercept survey method to collect data on a large convenience sample of Spanish college students. In particular, the research team set an information table in the main entrance of different higher education centers and a member of the team actively approached potential participants. Students were asked to voluntarily collaborate with a research on sexual behavior. Those who accepted, completed an individual in-office assessment where an experienced clinical psychologist administered various self-reports. The average time to complete the study was around 1 hour and 45 minutes and participants received 10€ as a compensation for their participation.

Data acquisition for the second sample was conducted between 2016 and 2018. Sampling objective was to assess CSBD in a large sample of Spanish-speaking community members. The research was conducted online through a secured online platform aimed to provide information and assessment about CSBD (https://adiccionalsexo.uji.es/). Participants were enrolled utilizing a combination of active and passive recruitment strategies. Active recruitment included: (1) email blast through different institutions' listservs (universities, organizations, etc.); (2) dissemination of the study on radios and newspapers websites; (3) posting banners on Facebook through the «suggested publications» marketing service and; (4) posting tear-off flyers in high-density spots (shopping centers, supermarkets, etc.). The study survey was also accessible through any search engine by using terms such as "sexual addictions" and/or "sex addiction assessment" (in Spanish) (passive recruitment). During the time the study was accessible, 3,025 participants accessed the survey. Initial data derived from the online platform were screened to avoid duplicitous, inconsistent, and/or fake responses (e.g., participants reporting >100 years old). Given that one of the CSBD scales that we used for participants clustering (the Hypersexual Behavior Inventory, HBI) was placed at the end of the online survey, only those participants who completed 100% of the survey were included in the study. After removals, a total of 1,318 participants were included in the final dataset. The average time to complete the study was 27.82 minutes (SD = 13.83) and participants did not receive compensation for participating.

Consequently, a total of 2,899 from two independent samples participated in the study. The first dataset included a convenience sample of 1,581 Spanish university students (56.9% females) ranging between 18 and 27 years old (M = 20.58; SD = 2.17). The second dataset included a more heterogeneous sample of 1,318 community members (43.6% females) aged from 18 to 75 years old (M = 32.37; SD = 13.42). Table 1 shows participants' characteristics in both samples.

Measures

Participant characteristics. Participants were asked to report their gender, age, whether they were engaged or not in a stable relationship, sexual orientation, and religious beliefs.

CSBD signs and symptoms. CSBD signs and symptoms were assessed through the Spanish version of three scales: the Hypersexual Behavior Inventory (HBI, Ballester-Arnal, Castro-Calvo, Gil-Julià, Giménez-García, & Gil-Llario, 2019; Reid, Garos, et al., 2011b), the Sexual Compulsivity Scale (SCS, Ballester-Arnal, Gómez-Martínez, Gil-Llario, & Salmerón-Sánchez, 2013; Kalichman & Rompa, 1995), and the Sexual Addiction Screening Test (SAST, Castro-Calvo, Ballester-Arnal, Billieux, Gil-Juliá, & Gil-Llario, 2018; Carnes, 1983). The HBI is a 19-item scale designed to measure three basic dimensions of hypersexuality: i.e. the use of sex in response to dysphoric mood states, problems in controlling or reducing sexual thoughts, urges, and behaviors, and persistence despite negative consequences. The SCS is a 10-item scale that assesses obsessive and intrusive sexual

Table 1. Participants' characteristics for each dataset

	Sample 1 (n = 1,581)% or M (SD)	Sample 2 (n = 1,318)% or M (SD)	Inferential statistic	Effect size
Gender (male)	43.1%	56.4%	$\chi^2 = 51.23^{***}$	$V = 0.13$
Gender (female)	56.9%	43.6%		
Age	20.58 (2.17)	34.11 (16.74)	$t = -7.68^{***}$	$d = 1.13$
Steady partner (yes)	52.3%	69.6%	$\chi^2 = 93.18^{***}$	$V = 0.18$
Religious beliefs (atheist)	54.7%	68.5%	$\chi^2 = 73.00^{***}$	$V = 0.16$
Religious beliefs (practicing believer)	38.7%	24.9%		
Religious beliefs (non-practicing believer)	6%	6.7%		
Sexual orientation (heterosexual)	92.0%	73.7%	$\chi^2 = 185.54^{***}$	$V = 0.31$
Sexual orientation (bisexual)	3.3%	13.7%		
Sexual orientation (homosexual)	4.5%	12.6%		

Note. $^{***}P < 0.001$

thoughts and out-of-control sexual behaviors. Finally, the SAST is a 25-item scale designed to screen for the presence of different addictive sexual behaviors and symptoms (e.g., sexual preoccupations, impaired control over sexual behavior, or problems resulting from sexual behavior).

The composite index of CSBD symptoms developed *ad hoc* for this research included a selection of items from these three scales (see Table A1 in the Appendix). The SCS and the HBI are rated on a 4 and 5-point Likert scale, whereas the SAST is rated on a dichotomous scale. To ensure that scales share a common metric, raw scores were z-transformed. Reliability for this composite index is reported in the results section.

Sexual profile: Online sexual behavior. Participants in both samples self-reported the average time they spent per week on online sexual activities (in minutes) and completed the Spanish version of the Internet Sex Screening Test (ISST, Ballester-Arnal, Gil-Llario, Gómez-Martínez, & Gil-Julià, 2010; Delmonico, Miller, & Miller, 2003). The ISST evaluates the degree to which individual's online sexual behavior is or not problematic. Twenty-five items on a dichotomous scale (0 = *False;* 1 = *True*) provide a total score ranging from 0 to 25. Ballester-Arnal et al. (2010) reported good internal consistency ($\alpha = 0.88$) and test-retest stability ($r = 0.82$) in a sample of college students. In our study, internal consistency was appropriate ($\alpha = 0.83$ sample 1; $\alpha = 0.82$ sample 2).

Additionally, participants in the sample 2 answered two questions on self-perceived severity perception: (1) Have you ever been worried about your cybersex consumption? (*yes/no*) and (2) Do you think you spend more time than advised online for sexual purposes? (*yes/no*).

Sexual profile: Offline sexual behavior. Participants in both samples completed a series of questions assessing basic aspects of their sexual behavior, such as: (1) whether they had ever engaged or not in sexual intercourse with an opposite-sex or a same-sex partner (*yes/no*); (2) lifetime number of sexual partners (only asked to participants in dataset 1); (3) frequency of sexual intercourse; and (4) if they had engaged in different sexual behaviors (i.e. masturbation, oral sex, vaginal sex, and anal sex) (*yes/no*).

Sexual dispositional traits. Participants in both samples completed the Spanish adaptation of the Sexual Sensation Seeking Scale (SSSS, Ballester-Arnal, Ruiz-Palomino, Espada, Morell-Mengual, & Gil-Llario, 2018; Kalichman & Rompa, 1995), an 11-item scale rated on a 4-point Likert scale (1 = *Not at all like me*; 4 = *Very much like me*) that assesses "the propensity to attain optimal levels of sexual excitement and to engage in novel sexual experiences" (Kalichman et al., 1994, p. 387). Internal consistency for this scale was .82 in its Spanish adaptation. In our study, Cronbach's alpha value was .83 in sample 1 and .82 in sample 2.

Additionally, participants in the first sample completed the Spanish version of the Sexual Opinion Survey (SOS, Del Rio-Olvera, López-Vega, & Santamaría, 2013), a 20-item scale assessing erotophobia-erotophilia (i.e., the disposition to respond to sexual cues along a negative-positive dimension of affect and evaluation). Items were rated on a 7-point response format (1 = *Strongly agree*; 7 = *Strongly disagree*). Internal consistency for this scale was .85 in its Spanish adaptation. In our study, Cronbach's alpha value was .83.

Clinical profile. In sample 1, the current presence and severity of depression and anxiety symptoms was assessed through the Spanish versions of the Beck Depression Inventory (BDI-II, Beck, Steer, & Brown, 2011) and the state-version of the State-Trait Anxiety Inventory (STAI, Spielberger, Gorsuch, & Lushene, 2002). The BDI-II is one of the most widely used scales in the assessment of current levels of depressive symptomatology, both in clinical and research settings (Wang & Gorenstein, 2013). This scale is comprised by 21 items rated on a 4-point Likert scale ranging from 0 to 3 (answers categories differ for each item). The STAI (state-version) is a widely used, long-stablished measure for current levels of anxiety (Barnes, Harp, & Jung, 2002), which comprises 20 items answered on a Likert scale with four response options (0 = *Strongly agree*; 3 = *Strongly disagree*).

In the present research, Cronbach's alpha for the BDI-II and the STAI-State was .89 and .91 respectively.

In sample 2, presence and severity of current depression and anxiety symptoms was assessed through the Spanish version of the Hospital Anxiety and Depression Scale (Tejero, Guimera, Farré, & Peri, 1986). The HADS is a 14-item screening scale originally developed to identify anxiety disorders and depression among patients in non-psychiatric hospital contexts. Items were responded to on a 4-point Likert scale ranging from 1 to 4 (answers categories differ for each item). Since its development, this scale has been widely used also in the assessment of somatic, psychiatric, and primary care patients, as well as in general population (Bjelland, Dahl, Haug, & Neckelmann, 2002). In our study, internal consistency for HADS-anxiety (α = 0.83) and HADS-depression (α = 0.77) was appropriate.

Finally, participants in both sample 1 and 2 completed the Spanish version of the Rosenberg Self-Esteem Scale (RSES, Martín-Albo, Núñez, Navarro, & Grijalvo, 2007), a unidimensional 10-item scale assessing general self-esteem. Participants responded to on a 4-point Likert scale, ranging from *strongly disagree* to *strongly agree*. In the present study, Cronbach's alpha for both the dataset 1 (α = 0.89) and 2 was appropriate (α = 0.89).

Data analysis

We undertook analyses in four steps. First, descriptive analyses were conducted to characterize participants in terms of sociodemographic data using the SPSS statistic package (version 25.0). To compare participants' characteristics in sample 1 and 2, we performed *t* tests (continuous variables) and chi-square tests (categorical variables). Two effect size indices (Cohen's *d* and Cramer's *V*) were computed by using G*Power (version 3.1). For Cohen's *d*, effect sizes of about .20 were considered small, close to .50 moderate and greater than .80 large (Cohen, 1988); for Cramer's *V*, these sizes corresponded to values of .10, .30 and .50 (Ellis, 2010).

Second, a Confirmatory Factor Analysis (CFA) was conducted to test the psychometric suitability of our theoretically driven classification of CSBD symptoms. EQS software (version 6.2) was used to perform the CFA. Due to the non-normal distribution of the data, robust estimation methods were used. The CFA's goodness of fit was analyzed with the following indices: Satorra-Bentler chi-square (χ^2), relative chi-square (χ^2/df), general model significance (*P*), root mean square error of approximation (RMSEA), comparative and incremental fit indexes (CFI and IFI), and the Standardized Root Mean Square Residual (SRMR). An appropriate fit was considered when χ^2 was not significant ($P > .05$), χ^2/df was between 1 and 2, CFI and IFI were $\geq$.95, and RMSEA and SRMR was $\leq$.05 (Bagozzi & Yi, 2011). According to less restrictive criteria, values between 2 and 3 for χ^2/df, $\geq$ .90 for CFI and IFI, $\leq$ .08 for RMSEA, and $\leq$.10 for the SRMR were considered acceptable (Hooper, Coughlan, & Mullen, 2008). Two reliability indices were calculated for each CSBD symptoms' subscale: Cronbach's alpha (α) and McDonald's Omega (ω). The «userfriendlyscience» R package (Peters, 2014) was used to estimate these indices.

Third, we employed data clustering techniques to identify subgroups of participants with similar CSBD profiles. The six CSBD symptoms' subscales confirmed during the previous analytic stage were used to estimate the presence of different CSBD profiles. As recommended (Hair, Black, & Babin, 2010; Henry, Tolan, & Gorman-Smith, 2005), this aim was addressed by combining hierarchical and non-hierarchical clustering strategies and confirming the accuracy of the resulting clusters through different strategies. At a first step, a hierarchical cluster analysis was conducted (Ward's method, Euclidian distance measurement) to propose a tentative estimation of the number of homogeneous clusters in the dataset on the basis of the agglomeration schedule and the dendogram. Then, the optimal number of CSBD profiles and the cluster membership were determined using a two-step cluster classification method. Two indices were used to assess the goodness of fit of the proposed cluster solution in comparison with competing models ranging from 1 to 10 clusters: the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC). Despite its simplicity, this "auto-cluster" procedure has demonstrated its superiority to other more complex estimation methods in determining the optimal number of clusters to be retained (Eshghi et al., 2011; Gelbard, Goldman, & Spiegler, 2007). To confirm the accuracy of this cluster solution, we applied the following strategies: (a) we re-analyzed the data from dataset 1 through *k-means* (specifying the number of clusters derived from previous analyses) and estimated the convergence between both methods (Fisher & Ransom, 1995); (2) we randomly split the sample from dataset 1 into two equal subsamples, analyzed each half separately and compared the solution (Michaud & Proulx, 2009); (3) we applied the same cluster solution in a completely independent database (sample 2); and (4) we tested the criterion-related validity of the cluster solution (i.e., if the resulting clusters differ in variables of interest in ways consistent with theory). The criterion-validity of proposed clusters was assessed by comparing scores on the six CSBD subscales (internal validity); additionally, external validity was explored by comparing clusters in relation to sociodemographic, sexual, and clinical indicators (SSS scores, time online for sexual purposes, etc.).

Ethics

The study procedures were carried out in accordance with the Declaration of Helsinki. The Institutional Review Board of the Jaume I University approved the study. Volunteer participants in the research were informed about the study aim and they provided informed consent.

RESULTS

Confirmatory Factor Analysis (CFA) of CSBD symptoms

In order to verify the psychometric goodness of fit of our theoretically-driven classification of CSBD symptoms

(Table 1), a CFA was performed in both sample 1 and 2. Goodness of fit of two possible models was tested: a model where the six first-order factors (i.e., CSBD symptoms) were correlated (M1) and a model where these factors were grouped under a second order factor (M2). This second approach was in line with models proposing a unidimensional expression of CSBD symptoms (Graham, Walters, Harris, & Knight, 2016) and has received support by recent works on the factorial structure of a CSBD assessment scale (Castro-Calvo et al., 2018). As Table 2 shows, M1 obtained the best model fit in both sample 1 and 2. Factor loadings derived from the CFA are included as an additional content in appendices (Table A2 in the appendix).

Regarding internal consistency (Table 3), ordinal Cronbach's α and McDonald's ω for the majority of the CSBD subscales indicated an appropriate internal consistency (α and ω between .67–.89 in sample 1 and .68–.91 in sample 2).

Cluster formation

To identify subgroups of participants with similar CSBD profiles, we conducted a hierarchical cluster analysis in sample 1. The six CSBD subscales confirmed during the previous step were employed as clustering variables in this analysis. To ensure that these variables share a common metric, their scores were z-transformed. The hierarchical cluster analysis was performed using Ward's method with Squared Euclidian distance measurement, revealing that the appropriate number of clusters to be considered was two. The subsequent two-step method as well as the analysis of the BIC and AIC values confirmed the same cluster solution. Cluster 1 (labeled "non-CSBD") consisted of 1,421 participants (89.88%) displaying a low-CSBD risk profile; cluster 2 ("CSBD") included 160 participants (10.12%) with a high-CSBD risk profile.

To confirm the accuracy of this two-cluster solution, we conducted three confirmation analyses. First, data from sample 1 were re-analyzed by using an alternative, non-hierarchical, cluster approach: *k-means*. Once performed, we compared cluster membership convergence between both solutions, finding that 100% of those participants originally included in the non-CSBD cluster and 86.3% of those assigned to the CSBD were categorized in the same cluster through this alternative approach. The second confirmation approach consisted in randomly split the sample from dataset 1 into two equal subsamples, analyze each half separately through the two-step method, and compare the accuracy of cluster membership assignment. The convergence through this method was even higher, with 98.4 and 100% of participants assigned to non-CSBD and CSBD clusters categorized in the original profiles. Finally, we replicated the initial clustering method in a totally independent sample (sample 2), obtaining once again the same advised two-cluster solution. In this case, non-CSBD cluster comprised 92.19% of the sample (n = 1,215) whereas the CSBD cluster included the other 7.81% (n = 103).

Analyses of the resulting clusters

The criterion-related validity of the two-cluster solution was tested by comparing participants on direct CSBD indicators

Table 2. Goodness-of-fit indices for the CFA (CSBD composite index)

	χ^2	*df*	*P*	χ^2/df	RMSEA (CI)	SRMR	CFI	IFI
Six correlated first-order factors (M1, sample 1)	1,202.14	758	<0.001	1.58	0.019 (017; 0.021)	0.03	0.96	0.96
Six first-order factors under a second-order factor (M2, sample 1)	2,487.97	766	<0.001	3.24	0.038 (036; 0.039)	0.03	0.85	0.85
Six correlated first-order factors (M1, sample 2)	1,722.08	758	<0.001	2.27	0.031 (0.029; 0.031)	0.03	0.91	0.91
Six first-order factors under a second-order factor (M2, sample 2)	2,952.61	766	<0.001	3.85	0.047 (0.045; 0.048)	0.03	0.79	0.79

Note. CFA = confirmatory factor analysis; χ^2 = Satorra-Bentler chi-square; *df* = degrees of freedom; *P* = general model significance; χ^2/df = normed chi-square; RMSEA = root mean square error of approximation; CFI = comparative fit index; IFI = incremental fit index.

Table 3. Reliability of CSBD symptom's subscales (CSBD composite index)

Symptom's subscales	Sample 1 (n = 1,581)		Sample 2 (n = 1,318)	
	α (CI)	Ω (CI)	α (CI)	Ω (CI)
Loss of control	0.82 (0.81; 0.83)	0.85 (0.83; 0.86)	0.85 (84; 0.86)	0.87 (0.86; 0.88)
Neglect	0.75 (0.73; 0.77)	0.78 (0.76; 0.80)	0.77 (76; 0.79)	0.80 (0.78; 0.82)
Unable to stop	0.67 (0.65; 0.68)	0.67 (0.64; 0.70)	0.76 (75; 0.78)	0.79 (0.77; 0.81)
Continued engagement despite interference	0.69 (0.68; 0.71)	0.73 (0.70; 0.75)	0.78 (77; 0.80)	0.80 (0.78; 0.82)
Coping	0.88 (0.87; 0.89)	0.89 (0.88; 0.90)	0.90 (0.89; 0.91)	0.91 (0.90; 0.92)
Preoccupation, salience, and severity perception	0.68 (0.66; 0.71)	0.72 (0.70; 0.74)	0.68 (0.66; 0.71)	0.69 (0.66; 0.72)

Table 4. Internal validity of the 2-cluster solution

Symptoms scale	Sample 1 (n = 1,581)				Sample 2 (n = 1,318)			
	Cluster 1 (non-CSBD, n = 1,421) M (SD) or %	Cluster 2 (CSBD, n = 160) M (SD) or %	Inferential statistic	Effect size	Cluster 1 (non-CSBD, n = 1,215) M (SD) or %	Cluster 2 (CSBD, n = 103) M (SD) or %	Inferential statistic	Effect size
CSBD symptoms (composite index)[a]								
Loss of control	−0.16 (0.43)	1.42 (0.80)	$t = -39.18^{***}$	$d = 2.46$	−0.15 (0.43)	1.76 (0.88)	$t = -38.25^{***}$	$d = 2.75$
Neglect	−0.17 (0.51)	1.56 (0.87)	$t = -37.46^{***}$	$d = 2.42$	−0.15 (0.46)	1.83 (1.27)	$t = -33.97^{***}$	$d = 2.07$
Unable to stop	−0.13 (0.57)	1.16 (0.96)	$t = -25.07^{***}$	$d = 1.63$	−0.12 (0.61)	1.61 (0.89)	$t = -26.40^{***}$	$d = 2.26$
Continued engagement despite interference	−0.11 (0.34)	1.06 (0.73)	$t = -34.99^{***}$	$d = 2.05$	−0.11 (0.42)	1.38 (0.77)	$t = -31.61^{***}$	$d = 2.40$
Coping	−0.12 (0.62)	1.14 (0.82)	$t = -23.71^{***}$	$d = 1.73$	−0.10 (0.67)	1.22 (0.86)	$t = -18.87^{***}$	$d = 1.71$
Preoccupation, salience, and self-perceived severity	−0.13 (0.46)	1.22 (0.68)	$t = -33.04^{***}$	$d = 2.32$	−0.12 (.49)	1.41 (0.65)	$t = -29.50^{***}$	$d = 2.65$
Prevalence of CSBD according to different cut-offs								
Participants above HBI cut-off score (HBI ≥53)[b]	0.7%	58.3%	$\chi^2 = -759.32^{***}$	$V = 0.70$	0.7%	63.1%	$\chi^2 = -707.74^{***}$	$V = 0.73$
Participants above SCS cut-off score (SCS ≥2 4)[c]	1.5%	59.0%	$\chi^2 = -690.85^{***}$	$V = 0.66$	1.2%	43.7%	$\chi^2 = -393.86^{***}$	$V = 0.54$
Participants above SAST cut-off score (SAST >13)[d]	0.1%	30.1%	$\chi^2 = -426.50^{***}$	$V = 0.52$	2.6%	52.4%	$\chi^2 = -385.97^{***}$	$V = 0.54$

Note. $^{*}P < 0.05$; $^{**}P < 0.01$; $^{***}P < 0.001$

[a] Cluster means are expressed as z-scores.

[b] Reid, Garos, & Carpenter (2011b).

[c] Parsons, Bimbi, and Halkitis (2001) proposed that values ≥24 on the SCS may indicate severe sexual compulsivity like symptoms.

[d] Carnes (1989).

Table 5. External validity of the 2-cluster solution

Symptoms scale	Sample 1 (n = 1,581)				Sample 2 (n = 1,318)			
	Cluster 1 (non-CSBD, n = 1,421) M (SD) or %	Cluster 2 (CSBD, n = 160) M (SD) or %	Inferential statistic	Effect size	Cluster 1 (non-CSBD, n = 1,215) M (SD) or %	Cluster 2 (CSBD, n = 103) M (SD) or %	Inferential statistic	Effect size
Sociodemographic profile								
Gender (male)	40.1%	69.4%	$\chi^2 = 50.22^{***}$	$V = 0.18$	55.1	72.8%	$\chi^2 = 12.17^{***}$	$V = 0.09$
Age	20.58 (2.16)	20.53 (2.82)	$t = 0.287$	$d = 0.01$	34.55 (17.02)	30.87 (15.58)	$t = 2.11^{*}$	$d = 0.22$
Steady partner (yes)	54%	37.5%	$\chi^2 = 16.81^{***}$	$V = 0.10$	69.5%	69.9%	$\chi^2 = 0.36$	$V = 0.02$
Sexual orientation (heterosexual)	93%	82.5%	$\chi^2 = 29.84^{***}$	$V = 0.14$	74.5%	66%	$\chi^2 = 7.27^{*}$	$V = 0.07$
Sexual orientation (bisexual)	2.5%	10%			12.9%	22.3%		
Sexual orientation (homosexual)	4.4%	7.5%			12.7%	11.7%		
Sexual dispositional traits								
Sexual Sensation Seeking Scale (SSSS, range between 11–44)	24.86 (6.37)	30.89 (5.37)	$t = -7.19^{***}$	$d = 1.02$	24.17 (6.27)	29.82 (6.20)	$t = -8.78^{***}$	$d = 0.90$
Sexual Opinion Survey (SOS, range between 20–140)	109.99 (13.47)	113.93 (16.42)	$t = -1.27$	$d = 0.26$				
Sexual profile: Online Sexual Behavior								
Minutes per week devoted to cybersex	65.29 (90.85)	152.37 (185.40)	$t = -5.47^{***}$	$d = 0.59$	118.54 (230.54)	263.50 (340.06)	$t = -5.84^{***}$	$d = 0.49$
Internet Sex Screening Test (ISST, range between 0–25)	4.91 (3.76)	8.97 (4.45)	$t = -7.73^{***}$	$d = 0.98$	6.27 (3.95)	11.93 (4.60)	$t = -13.76^{***}$	$d = 1.32$
Have you ever been worried about your cybersex consumption? (yes)					30.5%	59.4%	$\chi^2 = 35.10^{***}$	$V = 0.17$

(continued)

Table 5. Continued

Symptoms scale	Sample 1 (n = 1,581)				Sample 2 (n = 1,318)			
	Cluster 1 (non-CSBD, n = 1,421) M (SD) or %	Cluster 2 (CSBD, n = 160) M (SD) or %	Inferential statistic	Effect size	Cluster 1 (non-CSBD, n = 1,215) M (SD) or %	Cluster 2 (CSBD, n = 103) M (SD) or %	Inferential statistic	Effect size
Do you think you spend more time than advised online for sexual purposes? (yes)					12.5%	50.5%	$\chi^2 = 105.42^{***}$	$V = 0.29$
Sexual profile: Offline Sexual behavior								
Lifetime sexual intercourse (yes)	96.8%	95.7%	$\chi^2 = 0.21$	$V = 0.02$	82.3%	82.5%	$\chi^2 = 0.04$	$V = 0.006$
Same−sex sexual intercourse (yes)	11.7%	29%	$\chi^2 = 13.30^{***}$	$V = 0.18$	28.6%	40.8%	$\chi^2 = 6.71^{**}$	$V = 0.07$
Lifetime number of sexual partners	5.53 (5.52)	9.77 (15.14)	$t = -3.85^{***}$	$d = 0.37$				
Sexual intercourse: more than three times per week	20.5%	33.3%	$\chi^2 = 5.31^{*}$	$V = 0.11$	37.1%	54.9%	$\chi^2 = 11.82^{***}$	$V = 0.10$
Masturbation (yes)	84.8%	98.6%	$\chi^2 = 9.83^{**}$	$V = 0.16$	92%	93.2%	$\chi^2 = 0.18$	$V = 0.01$
Oral sex (yes)	89.5%	94.3%	$\chi^2 = 1.49$	$V = 0.06$	88.2%	86.4%	$\chi^2 = 0.30$	$V = 0.02$
Vaginal intercourse (yes)	92.1%	92.9%	$\chi^2 = 0.05$	$V = 0.01$	81.9%	80.6%	$\chi^2 = 0.10$	$V = 0.01$
Anal intercourse (yes)	34.3%	51.4%	$\chi^2 = 7.18^{**}$	$V = 0.13$	52%	56.3%	$\chi^2 = 0.70$	$V = 0.02$
Clinical profile								
Beck Depression Inventory (BDI-II, range between 0–63)	7.20 (6.61)	12.49 (8.65)	$t = -5.59^{***}$	$d = 0.68$				
State-Trait Anxiety	11.77 (15.69)	15.69 (9.09)	$t = -3.65^{***}$	$d = 0.33$				

(continued)

Table 5. Continued

Symptoms scale	Sample 1 (n = 1,581)				Sample 2 (n = 1,318)			
	Cluster 1 (non-CSBD, n = 1,421) M (SD) or %	Cluster 2 (CSBD, n = 160) M (SD) or %	Inferential statistic	Effect size	Cluster 1 (non-CSBD, n = 1,215) M (SD) or %	Cluster 2 (CSBD, n = 103) M (SD) or %	Inferential statistic	Effect size
Inventory (STAI-State, range between 0–60)								
Hospital Anxiety and Depression Scale (HADS-Depression, range between 7–28)					10.79 (3.18)	13.36 (3.36)	t = −7.73***	d = 0.78
Hospital Anxiety and Depression Scale (HADS-Anxiety, range between 7–28)					13.83 (3.75)	17.35 (4.48)	t = −9.02***	d = 0.85
Rosenberg Self-esteem Scale (RSES, range between 10–40)	31.54 (5.45)	29.50 (5.88)	t = 2.79**	d = 0.35	31.74 (5.92)	28.33 (6.42)	t = 5.57***	d = 0.55

Note. *P < 0.05; **P < 0.01; ***P < 0.001

(internal validity) as well as by analyzing the sociodemographic, sexual, and clinical profile of CSBD participants (external validity). As displayed in Table 4, participants in the CSBD cluster significant differs from non-CSBD participants in their scores on the six CSBD subscales, both in sample 1 and 2 (all the differences significant at $P < 0.001$ and large effect sizes). CSBD symptoms that better discriminated between both clusters were loss of control ($d = 2.46$ [sample 1]; $d = 2.75$ [sample 2]), neglect ($d = 2.42$; $d = 2.07$), and preoccupation ($d = 2.32$; $d = 2.65$). The proportion of participants scoring above the HBI, SCS, and SAST cut-offs ranged between 30.1 and 63.1% in the CSBD cluster, compared to 0.1–2.6% in the non-CSBD group.

Concerning external correlates (Table 5), CSBD participants were mostly males (69.4 and 72.8% in sample 1 and 2) and included a higher prevalence of heterosexual participants (82.5 and 66%). In sample 2, CSBD participants were younger than non-CSBD participants ($d = 0.22$) whereas in sample 1, the prevalence reporting having a steady partner was lower ($V = 0.10$). CSBD participants were more sexual sensation seekers ($d = 1.02$ [sample 1]; $d = 0.90$ [sample 2]), showed slightly increased erotophilic tendencies ($d = 0.26$ in sample 1), and displayed an increased online sexual activity. In particular, CSBD participants spent twice as long on the Internet for sexual purposes ($d = 0.59$; $d = 0.45$), scored significantly higher in a scale assessing excessive and problematic engagement in this behavior (ISST, $d = 0.98$; $d = 1.32$), and an important proportion answered affirmatively to questions related to severity perception (50% of respondents in sample 2 considered they spent too much time online for sexual purposes and 60% was worried about this behavior). Offline sexual behavior of CSBD participants in sample 1 was characterized by a higher number of sexual partners ($d = 0.37$), a higher frequency of sexual intercourse ($V = 0.11$), and an increased prevalence of different sexual behaviors. Offline sexual behavior of CSBD participants in sample 2 only differed from non-CSBD participants in the frequency of sexual intercourse ($V = 0.10$) and the prevalence of same-sex sexual intercourse ($V = 0.07$). Finally, CSBD participants in both samples showed greater levels of depression and anxiety than non-CSBD participants, as expressed by their increased scores in the BDI-II and STAI-state (d of 0.68 and 0.33 respectively) and the HADS-Depression and HADS-Anxiety (d of 0.78 and 0.85 respectively). On the contrary, CSBD participants displayed lower levels of self-esteem (d of 0.35 in sample 1 and 0.55 in sample 2).

DISCUSSION

The main aim of this study was to explore the occurrence and sociodemographic, sexual, and clinical characteristics of CSBD in two independent community samples. On the whole, this study (a) estimated an occurrence of CSBD between 8 and 10% and (b) found that participants with CSBD were mostly heterosexual males, younger than respondents without CSBD, reported higher levels of sexual sensation seeking and erotophilia, an increased offline and especially online sexual activity, more depressive and anxious symptoms, and poorer self-esteem.

Given that previous research was limited by the lack of standardized screening tools for assessing the whole range of CSBD signs and symptoms and the low accuracy of the different methods often employed in research contexts to identify patients displaying this condition, we followed an alternative approach to address this aim: we developed a new composite index based on three previously validated scales that we then employed to identify participants struggling with CSBD through a data-driven approach (cluster analyses). Through this method, 10.12 and 7.81% of participants in two independent samples were identified as potentially suffering from CSBD. These figures are similar to those reported in adolescents through a similar data-driven approach (Efrati & Gola, 2018b) or in adults through different screening methods (Dickenson, Gleason, Coleman, & Miner, 2018; Giordano & Cecil, 2014; Långström & Hanson, 2006; Rettenberger et al., 2015; Skegg, Nada-Raja, Dickson, & Paul, 2010), but higher to those found through more clinically reliable assessment methods (Odlaug et al., 2013; e.g., structured interviews, Odlaug & Grant, 2010). A potential explanation for this increased prevalence is that our cluster approach captured not only clinically relevant levels of CSBD, but also subclinical manifestations of this condition (i.e., people displaying problematic but nonclinical out-of-control sexual behaviors that are nonetheless often accompanied by relevant levels of impairment and distress). This point is supported by the fact that between 41 and 69.9% (sample 1) and 36.9%–51.3% (sample 2) of the participants in the CSBD cluster did not met some of the cut-off scores proposed by the HBI, the SCS, or the SAST for the diagnosis of this condition. At a clinical level, these findings suggest that people reporting CSBD symptoms constitutes a heterogeneous group including both patients displaying nonclinical but distressing out-of-control sexual behaviors and patients qualifying for the entire clinical condition. This position is totally in line with recent models proposing two different pathways for problematic use of pornography: one path for users displaying genuine problems to control their sexual behavior (i.e., compulsive use) and the other for users experiencing psychological distress because their sexual behaviors do not align with their personal/moral/religious values (Grubbs, Perry, et al., 2019c; Kraus & Sweeney, 2019). Thus, mental health professionals should be cautious when assessing patients reporting CSBD signs to distinguish between clinical and subclinical presentations of this condition and to advise tailored psychological and/or psychiatric interventions according to the severity and characteristics of the clinical picture (Derbyshire & Grant, 2015; Hook et al., 2014).

Regarding the sociodemographic profile of participants in the CSBD cluster, our findings indicate that gender and sexual orientation are relevant in the manifestation of this condition, but less important than previously hypothesized. Classically, researchers have argued that men were more vulnerable to develop CSBD, given their intrinsic sexual motivations, arousability, and permissive attitudes toward casual sex (Kafka, 2010; Mckeague, 2014). In this line, Kaplan & Krueger (2010) suggested that males represent around 80% of CSBD patients. Similarly, researchers have pointed out that gays and bisexuals, particularly men, are more prone to develop a CSBD due to the availability of a great variety of potential sexual outlets and their difficulty for engaging in a typical courtship (Parsons et al., 2008). Supporting this point, different studies have found a prevalence of sexual compulsivity up to 30% in community samples of non-heterosexuals (Kelly et al., 2009; Parsons et al., 2012) and 51% in a sample of highly sexually active Men who have Sex with Men (MSM) (Parsons, Rendina, Moody, Ventuneac, & Grov, 2015). Similarly, Bőthe et al. (2018) found that LGBTQ males and females had highest scores on the HBI and other hypersexuality indicators. In our study, although most participants in the CSBD cluster were male, a substantial proportion were females (30.6% in sample 1; 27.2% in sample 2). As for sexual orientation, prevalence of homosexuals in the CSBD cluster was only slightly higher (sample 1) or even lower (sample 2) to that observed in the non-CSBD cluster, whereas the proportion of bisexuals in the CSBD category only increased in a 7.5 and a 9.4% compared to non-CSBD cluster. Altogether, these findings suggest that whereas CSBD in women has been overlooked or conceptualized as a manifestation of other clinical issues, its presentation among non-heterosexuals (especially MSM) has received much more attention, especially given that the total proportion of CSBD cases that represent (17.5% in sample 1; 34% in sample 2) is similar or even lower to that represented by females. Given the relevance of the syndemic problems associated with CSBD among non-heterosexuals (Rooney, Tulloch, & Blashill, 2018), further research on the expression of this condition in this population is warranted; however, it is also relevant to increase our knowledge on the etiology, manifestation, and clinical characteristics of CSBD in females (Carvalho et al., 2014).

As hypothesized, important differences between participants with and without CSBD were found in the manifestation of two sexual dispositional traits. In particular, participants with CSBD were more sexual sensation seekers and were more likely to report increased erotophilic tendencies. Different studies have systematically found an intimate link between sexual compulsivity and sexual sensation seeking (Kalichman & Rompa, 1995; Klein et al., 2014), but to the extent we know, this is the first time that a clear link between CSBD and erotophilia is stablished. Both sexual sensation seeking and erotophilia are considered as dimensions of personality (Fisher, White, Byrne, & Kelley, 1988; Kalichman & Rompa, 1995): i.e., stable and enduring predispositional traits that are independent from other transient states (such as CSBD). At a theoretical level, these findings resonate with the dual control model, which proposes that CSBD may result from the combination of a reduced sexual inhibition and an increased sexual excitation (conditioned by aspects such as sexual sensation seeking or erotophilia) (Bancroft, Graham, Janssen, & Sanders, 2009; Kafka, 2010).

Interesting findings also emerged when we analyzed the sexual profile from the CSBD participants. Contrarily to our initial hypothesis, participants in the CSBD cluster did not greatly differ from non-CSBD participants regarding their offline sexual behavior. In sample 1, CSBD participants reported a higher number of sexual partners, a slightly higher frequency of sexual intercourse, and an increased prevalence of sexual behaviors such as masturbation or anal intercourse; In sample 2, CSBD participants only differed from non-CSBD respondents in terms of frequency of sexual intercourse. All these differences only reached a small effect size ($d < .50$ and $V < .30$). There are different potential explanations for these small differences. The first one is related to limitations in the way that sexual profile was assessed. In our research, offline sexual behavior was assessed through lifetime indicators (e.g., "*have you ever engaged in anal intercourse?*"); given that CSBD tends to be episodic and increases in severity as time goes by (Reid et al., 2012), assessment methods should be sensitive to transient changes in sexual behavior (e.g., "*during the last month, have you engaged in anal intercourse?*"). Supporting this explanation, Stupiansky et al. (2009) did not find differences between women high and low in sexual compulsivity when they explored lifetime prevalence of oral, anal, and vaginal sex; however, significant differences emerged when they asked about these behaviors during the past 30 days. Furthermore, the measure of the frequency of offline sexual behaviors instead of their occurrence may be a more sensitive indicator of CSBD. Another potential explanation is that recent cultural shifts promoting permissiveness and positive attitudes toward casual sex (e.g., "hookup culture") have impacted on the prevalence and frequency of different sexual behaviors (Garcia, Reiber, Massey, & Merriwether, 2012), thus disguising the potential effects of CSBD on offline sexual behavior. Finally, another plausible explanation is that the increasing accessibility and proliferation of different OSAs has changed the way in that patients with CSBD satisfy their sexual impulses, thus preferring the Internet as the main sexual outlet. In our study, we found that individuals with CSBD spent much more time on the Internet for sexual purposes, scored significantly higher in a scale assessing excessive and problematic engagement in OSAs, and a notable proportion (more than 50%) was worried about this behavior and considered that they spent too much time doing so. In this case, differences between CSBD and non-CSBD participants reached extremely large effect sizes (d up to 1.32). Altogether, these results suggest that people with CSBD show a clear preference for OSAs as their preferred sexual

outlet, instead of real-life sexual interactions. These results are congruent with those reported by Wéry et al. (2016) in a sample of 72 patients self-identified as "sexual addicts". In this research, 53.5% of sexual addicts indicated that the Internet was their favorite medium for engaging in sexual activities, in front of 46.5% that preferred real-life sexual encounters.

As systematically reported in previous studies, CSBD participants in our research presented a clinical profile characterized by higher current levels of anxiety and depression, as well as poorer self-esteem. In our research, anxiety and depression were measured through different scales (BDI and STAI in sample 1; HADS in sample 2), thus confirming that these findings were independent from the scale employed to measure these variables. These results emphasize the relevance of the use of sex as a maladaptive coping mechanism aimed to compensate for unpleasant affective states, stressful life events, or a poor self-esteem in people with CSBD (Odlaug et al., 2013; Reid et al., 2008; Schultz, Hook, Davis, Penberthy, & Reid, 2014). At a clinical level, the presence of these underlying vulnerability factors justifies the development of new therapeutic approaches aimed to promote healthy emotion regulation strategies through mindfulness-based interventions (Blycker & Potenza, 2018), cognitive-behavioral therapy, or cognitive analytic therapy (Efrati & Gola, 2018a). In this regard, psychological interventions aimed to promote emotion regulation strategies showed promising results in reducing CSBD symptoms (Efrati & Gola, 2018a; Hook et al., 2014).

Limitations and future directions

Despite a number of interesting and novel findings, this study was limited in different ways. First, this research is correlational and therefore, do not address whether CSBD determines the emergence of the sexual and clinical profile typically observed in this condition or, on the contrary, the presence of certain previous psychological configurations (e.g., high erotophilia, sexual sensation seeking, or emotional problems) increases the vulnerability to develop CSBD. Second, the occurrence of CSBD reported in the study may be biased (inflated) due to our sampling approach. The first study was advertised as a sexuality survey; therefore, people with especial interest in sex (more prone to suffer from CSBD) may be overrepresented. Similarly, participants in the second study were recruited through the Internet, advertising the study as a sexuality survey. Additionally, the survey was accessible under search terms such as "sexual addiction", thus increasing the probability that people experiencing CSBD symptoms accessed the survey.

Furthermore, CSBD profile was determined through a novel composite index derived from well-stablished self-report measures. This index was designed according to the most relevant and reliable criteria to identify CSBD (Kafka, 2010; Kraus et al., 2018; Wéry & Billieux, 2017). However, even when self-reports are considered as a well-meaning first approach for the screening of CSBD, its diagnosis actually requires a more in-depth assessment of the nature and context of individual's sexual problems. For that reason, instead of (or in combination with) self-report measures, the use of structured or semi-structured clinical interviews focused on excessive and uncontrolled sexual behavior (e.g., the HD Diagnostic Clinical Interview [HD-DCI]) are usually advised for the appropriate diagnosis of CSBD (Womack et al., 2013). Thus, future research should consider the inclusion of a more in-depth exploration of the presence and severity of CSBD through more reliable assessment procedures (e.g., that followed in the DSM-5 field trial for hypersexual disorder) (Reid et al., 2012).

CONCLUSIONS

Since the inclusion of CSBD in the ICD-11, this clinical condition is becoming widely studied. However, further research is needed to confirm and consolidate existing findings in the field. By employing a novel data-driven approach, this study throws light on its occurrence and sociodemographic, sexual, and clinical profile. One of the central findings in this study is that CSBD signs and symptoms are common in the general population, mainly among men but also in a considerable proportion of females. These people usually exhibit higher levels of sexual sensation seeking and erotophilia, highlighting potential underlying factors explaining its beginning and maintenance. Contrarily to our initial hypothesis, people with and without CSBD barely differs in terms of offline sexual behavior; in contrast, individuals with CSBD presents a notable increased OSA. This finding suggests that the increasing accessibility and proliferation of different OSAs has changed the way in that CSBD patients satisfy their sexual impulses, preferring the Internet as the main sexual outlet. Finally, patients with CSBD displayed more depressive and anxious symptoms, as well as a poorer self-esteem.

Funding sources: This research was supported by grant P1.1B2012-49 and P1.1B2015-82 of the University Jaume I of Castellón, APOSTD/2017/005 of the County Council Department of Education, Culture and Sports of the Valencian Community, and grant PSI2011-27992/11 I 384 of the Ministry of Science and Innovation (Spain).

Authors' contribution: RBA and MDGL contributed to study design, obtaining funding, and/or study supervision. RBA, MDGL, JCC, CGG and BGJ participated in recruiting participants, collecting data, analysis/interpretation of data, and/or writing of the paper.

Conflict of interest: The authors declare no conflict of interest.

APPENDICES

Table A1. Composite index to assess CSBD symptoms

Symptom	Description	Scale	Item
Loss of control	ICD-11: Persistent pattern of failure to control intense, repetitive sexual impulses or urges resulting in repetitive sexual behavior.	HBI	My sexual behavior controls my life.
		HBI	My sexual cravings and desires feel stronger than my self-discipline.
		SCS	I sometimes get so horny I could lose control.
		SCS	I feel that sexual thoughts and feelings are stronger than I am.
		SCS	I have to struggle to control my sexual thoughts and behavior.
		SAST	Do you have trouble stopping your sexual behavior when you know it is inappropriate?
		SAST	Do you feel controlled by your sexual desire?
		SAST	Do you ever think your sexual desire is stronger than you are?
Neglect	ICD-11: Repetitive sexual activities becoming a central focus of the person's life to the point of neglecting health and personal care or other interests, activities and responsibilities.	HBI	I sacrifice things I really want in life in order to be sexual.
		HBI	My sexual thoughts and fantasies distract me from accomplishing important tasks.
		HBI	My sexual activities interfere with aspects of my life, such as work or school.
	DSM-5: Time consumed by sexual fantasies, urges or behaviors repetitively interferes with other important (non-sexual) goals, activities and obligations.	SCS	I sometimes fail to meet my commitments and responsibilities because of my sexual behaviors.
Unable to stop	ICD-11: Numerous unsuccessful efforts to significantly reduce repetitive sexual behavior.	HBI	Even though I promised myself I would not repeat a sexual behavior, I find myself returning to it over and over again.
	DSM-5: Repetitive but unsuccessful efforts to control or significantly reduce these sexual fantasies, urges or behaviors.	HBI	My attempts to change my sexual behavior fail.
		SAST	Have you made efforts to quit a type of sexual activity and failed?
		SAST	Have you attempted to stop some parts of your sexual activity?
		SAST	Have you felt the need to discontinue a certain form of sexual activity?
Continued engagement despite interference	ICD-11: Continued repetitive sexual behavior despite adverse consequences or deriving little or no satisfaction from it	HBI	I engage in sexual activities that I know I will later regret.
		HBI	I do things sexually that are against my values and beliefs.
	DSM-5: Repetitively engaging in sexual behaviors while disregarding the risk for physical or emotional harm to self or others.	HBI	Even though my sexual behavior is irresponsible or reckless, I find it difficult to stop.
		SCS	My sexual thoughts and behaviors are causing problems in my life.
		SCS	My desires to have sex have disrupted my daily life.
		SAST	Have you ever felt degraded by your sexual behavior?
		SAST	When you have sex, do you feel depressed afterwards?
		SAST	Has anyone been hurt emotionally because of your sexual behavior?

(continued)

Table A1. Continued

Symptom	Description	Scale	Item
		SAST	Has your sexual behavior ever created problems for you or your family?
		SAST	Has your sexual activity interfered with your family life?
Coping	DSM-5 (criterion A2): Repetitively engaging in sexual fantasies, urges or behaviors in response to dysphoric mood states (e.g., anxiety, depression, boredom, irritability). DSM-5 (criterion A3): Repetitively engaging in sexual fantasies, urges or behaviors in response to stressful life events.	HBI	I use sex to forget about the worries of daily life.
		HBI	Doing something sexual helps me feel less lonely.
		HBI	I turn to sexual activities when I experience unpleasant feelings (e.g., frustration, sadness, anger).
		HBI	When I feel restless, I turn to sex in order to soothe myself.
		HBI	Doing something sexual helps me cope with stress.
		HBI	Sex provides a way for me to deal with emotional pain I feel.
		HBI	I use sex as a way to try and help me deal with my problems
		SAST	Has sex been a way for you to escape your problems?
Preoccupation, salience, and self-perceived sexual problems	Salience: "When the particular activity [sex] becomes the most important activity in the person's life and dominates their thinking (preoccupations and cognitive distortions), feelings (cravings) and behavior (deterioration of socialized behavior)" (Griffiths, 2005, p. 193).	HBI	I feel like my sexual behavior is taking me in a direction I don't want to go.
		SCS	I find myself thinking about sex while at work.
		SCS	I think about sex more than I would like to.
		SAST	Do you often find yourself preoccupied with sexual thoughts?
		SAST	Do you feel that your sexual behavior is not normal?
		SAST	Do you ever feel bad about your sexual behavior?

Table A2. Factorial loadings and correlations between factors of the CSBD composite index derived from the CFA

	Item	Factor 1 (Loss of control)	Factor 2 (Neglect)	Factor 3 (Unable to stop)	Factor 4 (Continued engagement)	Factor 5 (Coping)	Factor 6 (Preoccupation)
Factorial loadings (factor 1)	My sexual behavior controls my life.	0.56 (0.56)					
	My sexual cravings and desires feel stronger than my self-discipline.	0.68 (0.82)					
	I sometimes get so horny I could lose control.	0.68 (0.81)					
	I feel that sexual thoughts and feelings are stronger than I am.	0.75 (0.79)					
	I have to struggle to control my sexual thoughts and behavior.	0.74 (0.83)					

(continued)

Table A2. Continued

	Item	Factor 1 (Loss of control)	Factor 2 (Neglect)	Factor 3 (Unable to stop)	Factor 4 (Continued engagement)	Factor 5 (Coping)	Factor 6 (Preoccupation)
	Do you have trouble stopping your sexual behavior when you know it is inappropriate?	0.56 (0.64)					
	Do you feel controlled by your sexual desire?	0.48 (0.58)					
	Do you ever think your sexual desire is stronger than you are?	0.59 (0.67)					
Factorial loadings (factor 2)	I sacrifice things I really want in life in order to be sexual.		0.59 (0.69)				
	My sexual thoughts and fantasies distract me from accomplishing important tasks.		0.64 (0.68)				
	My sexual activities interfere with aspects of my life, such as work or school.		0.71 (0.75)				
	I sometimes fail to meet my commitments and responsibilities because of my sexual behaviors.		0.75 (0.80)				
Factorial loadings (factor 3)	Even though I promised myself I would not repeat a sexual behavior, I find myself returning to it over and over again.			0.71 (0.74)			
	My attempts to change my sexual behavior fail.			0.68 (0.79)			
	Have you made efforts to quit a type of sexual activity and failed?			0.69 (0.74)			
	Have you attempted to stop some parts of your sexual activity?			0.70 (0.76)			
	Have you felt the need to discontinue a certain form of sexual activity?			0.63 (0.70)			
Factorial loadings (factor 4)	I engage in sexual activities that I know I will later regret.				0.60 (0.76)		

(continued)

Table A2. Continued

	Item	Factor 1 (Loss of control)	Factor 2 (Neglect)	Factor 3 (Unable to stop)	Factor 4 (Continued engagement)	Factor 5 (Coping)	Factor 6 (Preoccupation)
	I do things sexually that are against my values and beliefs.				0.65 (0.75)		
	Even though my sexual behavior is irresponsible or reckless, I find it difficult to stop.				0.55 (0.67)		
	My sexual thoughts and behaviors are causing problems in my life.				0.56 (0.53)		
	My desires to have sex have disrupted my daily life.				0.64 (0.70)		
	Have you ever felt degraded by your sexual behavior?				0.75 (0.64)		
	When you have sex, do you feel depressed afterward?				0.61 (0.50)		
	Has anyone been hurt emotionally because of your sexual behavior?				0.61 (0.52)		
	Has your sexual behavior ever created problems for you or your family?				0.54 (0.48)		
	Has your sexual activity interfered with your family life?				0.56 (0.46)		
Factorial loadings (factor 5)	I use sex to forget about the worries of daily life.					0.66 (0.69)	
	Doing something sexual helps me feel less lonely.					0.60 (0.66)	
	I turn to sexual activities when I experience unpleasant feelings (e.g., frustration, sadness, anger).					0.71 (0.79)	
	When I feel restless, I turn to sex in order to soothe myself.					0.73 (0.77)	
	Doing something sexual helps me cope with stress.					0.67 (0.73)	
	Sex provides a way for me to deal with emotional pain I feel.					0.81 (0.84)	

(continued)

Table A2. Continued

	Item	Factor 1 (Loss of control)	Factor 2 (Neglect)	Factor 3 (Unable to stop)	Factor 4 (Continued engagement)	Factor 5 (Coping)	Factor 6 (Preoccupation)
	I use sex as a way to try and help me deal with my problems					0.77 (0.82)	
	Has sex been a way for you to escape your problems?					0.63 (0.58)	
Factorial loadings (factor 6)	I feel like my sexual behavior is taking me in a direction I don't want to go.						0.61 (0.58)
	I find myself thinking about sex while at work.						0.60 (0.63)
	I think about sex more than I would like to.						0.66 (0.78)
	Do you often find yourself preoccupied with sexual thoughts?						0.56 (0.58)
	Do you feel that your sexual behavior is not normal?						0.49 (0.52)
	Do you ever feel bad about your sexual behavior?						0.58 (0.67)
Correlations between factors	Factor 1 (Loss of control)						
	Factor 2 (Neglect)	0.85* (0.87*)					
	Factor 3 (Unable to stop)	0.65* (0.81*)	0.72* (0.75*)				
	Factor 4 (Continued engagement)	0.90* (0.87*)	0.92* (0.90*)	0.74* (0.85*)			
	Factor 5 (Coping)	0.78* (0.68*)	0.60* (0.69*)	0.50* (0.65*)	0.62* (0.70*)		
	Factor 6 (Preoccupation)	0.94* (0.94*)	0.91* (0.87*)	0.68* (0.88*)	0.90* (0.95*)	0.82* (0.72*)	

Note. The first figures in each cell correspond to results from sample 1, whereas results from sample 2 are in parentheses; *$P < 0.001$.

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