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Investigating Clinically and Scientifically Useful Cut Points on the Compulsive Sexual Behavior Inventory

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Abstract

Introduction—One of the major obstacles to conducting epidemiological research and determining the incidence and prevalence of compulsive sexual behavior has been the lack of relevant, empirically derived cut points on the various instruments that have been used to measure the concept.

Aim—To further develop the Compulsive Sexual Behavior Inventory (CSBI) through exploring predictive validity and developing an empirically determined and clinically useful cut point for defining CSB.

Methods—A sample of 242 men who have sex with men was recruited from various sites in a moderate-size Midwestern city. Participants were assigned to a CSB group or a control group using an interview for the diagnosis that was patterned after the Structured Clinical Interview for the *Diagnostic and Statistical Manual for Mental Disorders, Fourth Edition*. The 22-item CSBI was administered as part of a larger battery of self-report inventories.

Main Outcome Measures—ROC analyses were used to compute AUC measures to ascertain predictive validity of the total scale, the control subscale and the violence subscale. Cut-points were determined through consensus of experts balancing sensitivity and specificity as determined by ROC curves.

Results—Analyses indicated that the 22-item CSBI was a good predictor of group membership, as was the 13-item control subscale. The Violence subscale added little to the predictive accuracy of the instrument and thus, it likely measures something other than CSB. Two relevant cut points were found, one that minimized false negatives and another, more conservative cut-point that minimized false positives.

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Conclusion—The CSBI as currently configured measures two different constructions and only the Control subscale is helpful in diagnosing CSB. We have, therefore, decided to eliminate the Violence subscale and move forward with a 13-item scale that we have named the CSBI-13. Two cut points were developed from this revised scale, one which is useful as a clinical screening and the other, more conservative measure useful for etiological and epidemiological research.

Keywords

Definitions; Cut Points; Hypersexuality; Compulsive Sexual Behavior; Sexual Addiction

There have been a number of scales developed over the last 50 years to assess compulsive sexual behavior, often referred to as sexual addiction. The three most commonly used scales in the scientific literature are the Sexual Compulsivity Scale (SCS: Kalichman & Rompa [1]), the Compulsive Sexual Behavior Inventory (CSBI: Coleman et al [2]), and the recently developed Hypersexual Behavior Inventory (HBI: Reid et al. [3]). While there are several additional tools (see Hook et al. [4]; Muench et al. [5]), these three appear most prominently in studies of HIV risk, STI risk, and investigations of hypersexuality (also referred to as CSB, or Sexual Addiction).

Despite the widespread use of the SCS and CSBI in research, there are currently no empirically derived cut points for either scale that distinguishes those with or without compulsive sexual behavior. Benotsch, Kalichman, and Kelly [6] and Benotsch, Kalichman, and Pinkerton [7] used the 85th percentile of SCS scores (which was approximately 24) to divide male participants into high and low sexual compulsivity. This process was then adopted by other researchers studying the association between sexual compulsivity and HIV risk behaviors (e.g., Grov et al. [8]; Parsons et al. [9]). However, there has never been an investigation of the extent to which this cut point adequately discriminates between those with Compulsive Sexual Behavior and those without the constellation of symptoms that characterize this proposed disorder. Similarly, there is no empirically derived cut point for the HBI, although the authors do propose a cutoff score of 53.1, which is based on the mean and standard deviation of scores for control subjects in a study that compared men with and without “hypersexual behavior,” where the hypersexual group was defined as men who sought treatment for sexual addiction [10].

Clearly, the lack of an empirically derived cut point on the most scientifically sound self-report instruments for Compulsive Sexual Behavior hinders the epidemiological study of CSB, the ability to estimate population level incidence, and prevalence, and limits the clinical utility of these instruments. This paper is based on data collected as part of a larger study designed to explore the psychological and cognitive factors that explain hypersexuality and HIV risk in men who have sex with men. The study involved a number of behavioral tasks, self-report measures, and psychophysiological assessment. This paper is limited to exploring the Compulsive Sexual Behavior Inventory and the extent to which it is a useful tool for screening for CSB.

The CSBI is composed of two subscales, Control and Violence [11]. While factor analysis [2] and confirmatory factor analysis [11] confirm this two-factor structure, researchers have argued that the violence subscale does not measure the core features of CSB [4]. Thus,

before exploring empirical cut points, we will investigate, using receiver operator curve analyses, the predictive utility of the total CSBI score and the two subscales to determine whether the control and violence scale both contribute to prediction of CSB.

Methods

Participants

Participants were 242 men (see Table 1) who were recruited using print and social media materials (e.g., Facebook, Craigslist) posted at and around the university campus and in GLBT and HIV service organizations, bars, and sexual health clinics. Participants had to be male, at least 18 years old, to have had sex with other men, and to have been sexually active within the past 90 days. Participants provided written informed consent prior to beginning data collection procedures, and received, at the end of the session, a \$100 gift card. All procedures were approved by the university's Committee for the Protection of Human Subjects.

Instruments

Compulsive Sexual Behavior Inventory—(CSBI: Miner et al. [11]). The CSBI is a 22-item scale that was developed to screen for compulsive sexual behavior (CSB). The individual items are shown in Table 2. Items are rated on a 5-point scale, 1=never, 2=rarely, 3=occasionally, 4=frequently, and 5=very frequently. High scores indicate more symptoms of CSB. It contains two subscales: Control, which indicates difficulty controlling one's sexual behavior, and Violence, which includes items indicating perpetrating or being the victim of sexual violence (see table 2).

The original scale was developed by a team of expert clinicians and consisted of items related to sexual control and items measuring various characteristics associated with CSB. A total of 42 items were developed and the instrument was further refined through testing its factor structure and its ability to discriminate between those with CSB and those with other sexual dysfunctions [2], resulting in an instrument with three subscales, Control, Abuse, and Violence. The scale was further refined using confirmatory factor analysis [11], which resulted in the 22-item scale used in this study.

CSB Group Assignment—Participants were assigned to either the CSB group (n=93) or non-CSB group (n=149) based on a SCID-type interview¹ that operationalizes CSB as follows: (A) Over a period of at least 6 months, experiencing recurrent intense sexual arousing fantasies, sexual urges, or behaviors involving one or more of the following: Compulsive cruising and multiple partners; compulsive masturbation, including use of internet pornography and cybersex, and/or compulsive sex within a relationship; (B) The fantasies, sexual urges or behaviors cause clinically significant distress, or impairment in social, occupational, or other important areas of functioning; and (C) Not due to another medical condition, such as substance abuse, or attributable to another psychiatric disorder such as mania, or a normal developmental stage. Interviews were conducted by two trained

¹Interview schedule can be obtained by contacting the first author.

staff members, audio recorded, and reviewed by two other research staff members. This definition of CSB and the SCID-type interview have been used in our previous studies of CSB [12-20]. Discrepancies were resolved in consultation with two co-authors (NR and EC). Group assignment showed good inter-rater reliability ($K = .79$).

Statistical Analysis—Analysis included two steps. First, we conducted a Receiver Operating Curve analysis of the predictive validity of the total CSBI scale, the CSBI-control Subscale, and the CSBI-violence Subscale. Predictive validity was measured using the Area Under the Curve (AUC) of the Receiver Operating Curve, which is a measure of predictive accuracy that corresponds to the proportion of randomly selected individuals with the disorder or behavior of interest who score higher on the instrument than those without it [21]. The results of the ROC analysis were used to select the appropriate scale for identifying CSB. The appropriate clinical cut point was determined by two experts comparing the calculated sensitivity, the degree to which CSB can be detected, and specificity, the degree to which those without CSB can be detected, of the scale. Finally, the cut points were applied to the developmental sample and positive predictive value, a measure of the accuracy with which those with the disorder are detected (true positives divided by true plus false positives), negative predictive value, the degree to which those without the disorder are detected (true negatives divided by true plus false negatives), and accuracy were calculated.

Results

Figure 1 shows that the CSBI Total score and the CSBI Control score have substantially the same predictive power, while the CSBI-Violence scale provides little incremental predictive power.

While all three AUCs are significant, the AUC associated with the Violence Scale is considered poor, while those associated with the CSBI and the CSBI control scales are considered good [22]. Since there is substantially no difference between the Control Scale and the Total Scale, we will proceed by exploring a clinical cut point for the Control Scale and as we move forward will redefine the CSBI as a single factor which contains 13 items and eliminate the items that make up the Violence Subscale, which is unhelpful in screening for CSB.

Figure 2 is the distribution of 13-item CSBI scores for the CSB and non-CSB groups as assigned by our SCID-type interview. It is clear from this figure that those who meet criteria for CSB show a substantially different distribution on the CSBI than those who do not meet criteria.

In drawing a clinical cut point, that is identifying a score that clinicians can use to determine whether someone has CSB, two psychometric measures must be considered, the sensitivity, which is the probability that someone scoring above a specific score will in fact have CSB and specificity, which is the probability that someone scoring below the cut point will not have CSB. The above graph plots sensitivity and 1-specificity, which can be thought of as the false negative rate. So, an optimal cut point is that score where both sensitivity and

specificity are maximized. However, in practice, it is necessary to consider the purpose of the cut point and the relative importance of missing cases, that is those with the disorder (false negatives) or assuming someone without the disorder has it (false positives). After discussion, the decision was that since the CSBI is thought of as a screening tool, but it also might be used for epidemiological or other studies where it is the definition of CSB, we would determine two cut points, one more conservative than the other. After looking at the sensitivity and 1 – specificity of the 13-item CSBI, we determined that 30 would provide a good cut point for those interested in screening for CSB, sensitivity = .82, specificity = .61; and 35 would provide a good conservative cut point, sensitivity = .72, specificity = .79.

To better understand the ability of this 13-item scale to predict if someone should be considered to have CSB at the two cut points, positive predictive value (PPV), the proportion of scores above the cut point that are found in individuals with CSB, and negative predictive value (NPV), the proportion of scores below the cut point that are found in individuals without CSB, were computed at each cut point. Also computed was the accuracy rate, the proportion of individuals who were correctly classified as either having CSB or not having CSB. These numbers are shown in the Table 3.

As can be seen, the more liberal cut point does, in fact, maximize the correct prediction of CSB, but at the cost of misclassifying larger numbers of individuals without the disorder and a decrease in overall accuracy. The more conservative cut point is more accurate, and misclassifies few individuals as CSB who are not, but this is at the cost of missing more individuals with CSB.

Discussion

This study addressed two issues with respect to the CSBI: the critique that inclusion of items on violence perpetration and victimization were extraneous to the measurement of hypersexual behavior, and the identification of a useful cut point for screening and research purposes. Our data indicate that the CSBI is a good predictor of hypersexual behavior, at least in men who have sex with men, but that the Violence Subscale fails to add incrementally to such prediction beyond the Control Subscale. Thus, it appears that it is the Control scale that measures compulsive sexual behavior, thus we have revised the CSBI to be a 13-item scale (CSBI-13), comprised only of the items that made up the Control Subscale [2, 11].

Currently, none of the available scales, whether they are thought to measure hypersexual behavior, sexual addiction, sexual compulsivity, or compulsive sexual behavior, have an empirically derived cut point with which to screen in or out hypersexuality. Using data from our investigation of sexual compulsivity and HIV risk, we explored the optimal cut points for identifying those who met criteria for compulsive sexual behavior as determined by a SCID-type interview that operationalizes the hypersexuality diagnostic criteria. While optimizing both sensitivity and specificity is important to assigning an appropriate cut point, we identified both a conservative and a liberal cut point. Thus, we propose that for use as a clinical screen, the optimizing of Positive Predictive Value over Negative Predictive Value is appropriate. That is, the CSBI was designed as a screening tool to be used by clinicians to

determine if CSB is likely to be present, leading to a more detailed clinical exploration of those with positive tests. Given that purpose, we propose that a score of 30 is a reasonable screening cut point, so that those scoring 30 or above are screened positive for CSB. However, in studies that are using a self-report measure to explore the incidence or prevalence of CSB or want to understand the causes or correlates of the syndrome, it is most important that those screened into the CSB group actually have CSB. So, it is acceptable to miss some cases of CSB as long as the CSB group is minimally contaminated by individuals who don't meet criteria. Therefore, we chose a more conservative cut point that maximizes Negative Predictive Value and overall accuracy. That cut point was 35.

This study is limited by the reliance on a sample of MSM, in whom CSB might present differently than other populations, including women and heterosexual males. Further, we have not conducted cross-validation of our cut points, thus we may maximize the magnitude of our classification measures and our statistics may suffer some shrinkage when reassessed using other samples and populations. In order to ascertain the true predictive accuracy of our proposed cut points, they should be subjected to independent cross validation, preferably with a more representative population samples. True PPV and NPV are related to the population base rate of the phenomenon being estimated [23], thus more representative samples, with known prevalence of hypersexuality are needed to further explore the optimal cut points for both clinical screening and epidemiological research.

In summary, we are proposing a new 13-item CSBI, renamed the CSBI-13, to replace the 22-item scale that has been in use since 2001. We found that, as noted by others [4], the Control subscale was a good predictor of CSB, while the Violence subscale did not add incrementally to prediction. Of course, independent cross-validation of this revised scale is necessary to ensure that the context of deleted questions does not change the characteristics of the scale. Also, we propose two tentative cut points. A clinically useful cut point of 30, which allows for screening in those likely to meet diagnostic criteria for CSB or hypersexuality, and a cut point of 35, which allows investigators to be confident that they have a relatively uncontaminated group of CSB individuals, although some individuals who would meet criteria for CSB if more detailed investigation were conducted will be misclassified as non-CSB. The higher cut point also results in higher overall diagnostic accuracy, further indicating that it would be useful as a measure of CSB in epidemiological and other self-report research.

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Figure 1. ROC Curves for CSBI Total Score and CSBI Subscales predicting membership in CSB group

Figure 2. Distribution of CSBI Control Score by CSB Group Membership

Table 1**AUC Scores for CSBI Total Scale and its Subscales**

Test Result Variable(s)	Area Under the Curve				
	Area	Std. Error	Asymptotic Sig.	Asymptotic 95% Confidence Interval	
				Lower Bound	Upper Bound
CSBI total scale	.836	.028	.000	.782	.890
CSBI control scale	.823	.028	.000	.767	.879
CSBI violence scale	.640	.037	.000	.567	.713

Table 2
Items for 22-item Compulsive Sexual Behavior Inventory

1. How often have you had trouble controlling your sexual urges?
2. Have you felt unable to control your sexual behavior?
3. How often have you used sex to deal with worries or problems in your life?
4. How often have you felt guilty or shameful about aspects of your sexual behavior?
5. How often have you concealed or hidden your sexual behavior from others?
6. How often have you been unable to control your sexual feelings?
7. How often have you made pledges or promises to change or alter your sexual behavior?
8. How often have your sexual thoughts or behaviors interfered with the formation of friendships?
9. How often have you developed excuses and reasons to justify your sexual behavior?
10. How often have you missed opportunities for productive and enhancing activities because of your sexual activity?
11. How often have your sexual activities caused financial problems for you?
12. How often have you felt emotionally distant when you were engaging in sex with others?
13. How often have you had sex or masturbated more than you wanted to?
14. How often have you been arrested or legally apprehended for your sexual behavior?
15. Have you forced anyone against his/her will?
16. Have you ever hit, kicked, punched, slapped, thrown, choked, restrained or beaten any of your sexual partners?
17. Have you given others physical pain for sexual pleasure?
18. In fighting, have you been hit, kicked, punched, slapped, thrown, choked, restrained, or beaten by your current or most recent partner?
19. Have you received physical pain for sexual pleasure?
20. Have you received money to have sex?
21. Have you been forced to have sex with your husband, wife, or lover?
22. Have you been watched masturbating or having sex without giving permission?

Table 3
Positive Predictive Values, Negative Predictive Values and Accuracy Rates for Cut Scores of 30 and 35

Cut Point	PPV	NPV	ACC
30	.82	.61	.69
35	.72	.83	.79

PPV=Positive Predictive Value; NPV=Negative Predictive Value, ACC= Accuracy