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Reliability, Validity, and Psychometric Development of the Hypersexual Behavior Inventory in an Outpatient Sample of Men

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Psychometric properties of the Hypersexual Behavior Inventory (HBI) are reported using treatment-seeking samples of hypersexual men. Study 1 details item reduction and exploratory factor analysis of the HBI. Study 2 provides results of a confirmatory factor analysis yielding a 3-factor model measuring Control, Consequences, and Coping associated with sexual thoughts, feelings, and behaviors. Concurrent and discriminant validity was established with measures of theoretically related and dissimilar constructs. The psychometric properties of the HBI suggest it reflects the proposed DSM-V classification criteria for hypersexual disorder and has both the clinical and research utility to advance a more comprehensive understanding of hypersexuality.

The proposed diagnostic criteria for Hypersexual Disorder (HD) in the DSM-V characterize this phenomenon as a repetitive and intense preoccupation with sexual fantasies, urges, and behaviors, leading to adverse consequences and clinically significant distress or impairment in social, occupational, or other important areas of functioning (Kafka, 2010; Kaplan & Krueger, 2010;

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Reid, 2010). One defining feature of this proposed disorder is multiple unsuccessful attempts to control or diminish the amount of time spent engaging in sexual fantasies, urges, and behaviors in response to dysphoric mood states or stressful life events (Kafka, 2010). Hypersexual Disorder has received increased attention among mental health professionals and researchers as efforts are made to understand more clearly the etiology, consequences, and associated features of HD, including possible health risks associated with sexually transmitted diseases (Coleman et al., 2010; Dodge, Reece, Cole, & Sandfort, 2004; Reid, Carpenter, Gilliland, & Karim, in press; Rinehart & McCabe, 1997, 1998). Studies also have sought to understand how HD might impact family systems and more specifically dyadic distress in monogamous committed relationships (Reid, Carpenter, Draper, & Manning, 2010). In an effort to elucidate hypothesized constructs of hypersexual behavior, this article reports the development of a scale designed to capture and quantify distinct aspects of this phenomenon described in the literature.

Definition of Hypersexual Behavior

Although most models of hypersexual behavior share common elements, the various models posit distinct and important differences that potentially influence how clinicians conceptualize the etiology of hypersexuality and thus how they approach treatment. The definition of hypersexual behavior used in the present study was consistent with DSM-V proposed HD criteria, which require evidence of a pattern of persistent symptoms spanning a minimum of six consecutive months and including (a) an excessive or disproportionate amount of time consumed by sexual thoughts, urges, and behaviors; (b) using sex in response to unpleasant affective states or to cope with stress; (c) multiple unsuccessful attempts to reduce or control sexual thoughts, fantasies, and behavior; (d) continued preoccupation with and pursuit of sex despite negative consequences to self or others; and (e) volitional impairment in interpersonal, social, or occupational domains of life (Kafka, 2010; Reid & Carpenter, 2009a, 2009b). Furthermore, the symptoms cannot occur exclusively within the context of another Axis I disorder (e.g., the manic phase of bipolar disorder), be substance induced, or occur in relation to neurological pathology (Coleman, 1991; Kafka, 1997, 2001; Reid, Carpenter, & Lloyd, 2009). Assessment of hypersexual behavior among patients diagnosed with Borderline Personality Disorder is also questionable, as this population exhibits patterns of hypersexuality related to Axis II pathology (Sansone, Barnes, Muennich, & Wiederman, 2008). Hypersexual behavior is distinct and separate from the phenomenon of persistent sexual arousal syndrome, in which an individual experiences persistent sexual arousal in the absence of desire (Leiblum & Nathan, 2001; Mahoney & Zarate, 2007). Similarly, sexual incompatibility in a dyadic relationship in which one partner has a desire

for greater frequency or variation of sexual relations does not constitute hypersexuality in the absence of other symptoms associated with this proposed disorder. Features associated with hypersexual behavior can include solo or relational sexual activities and can be comorbid with paraphilic tendencies (Kafka, 1997). Although hypersexual behavior is generally construed to fall within the spectrum of conventional sexual practices deemed socially acceptable, the bandwidth of "normal" is quite broad; therefore, it is plausible that some manifestations of hypersexuality will be socially objectionable to certain populations and acceptable to others (Reid, 2007).

Rationale for This Study

Several scales have been proposed to measure hypersexual behavior (Carnes, Green, & Carnes, 2010; Carter & Ruiz, 1996; Coleman, Miner, Ohlerking, & Raymond, 2001; Exner, Meyer-Bahlburg, & Ehrhardt, 1992; Kalichman & Rompa, 1995; Lo Conte, O'Leary, & Labouvie, 1997; Mercer, 1998). Limitations among these measures vary and include (a) problematic double-barreled items; (b) lack of generalizability; (c) poor or undefined psychometric properties; (d) problems with reliability or validity; (e) narrow scope of measurement (i.e., uni-factorial scales that fail to capture a more comprehensive picture of hypersexual behavior); (f) lack of norming data; and (g) questions that might unintentionally exclude some hypersexual individuals, such as relationship items that bias endorsement from those who participate exclusively in solo-sex behaviors including compulsive pornography use or excessive masturbation (Hook, Hook, Davis, Worthington, & Penberthy, 2010).

Thus, the rationale and purpose of the present study was to develop a measure of hypersexuality that addresses some of the limitations of previous scales. Given the increase in research about hypersexuality, the advantage of a new scale was that it afforded the opportunity to deductively generate items based on the current literature in the field. Attempts were made to create a theoretically supported, multi-factorial scale that was capable of evaluating both solo and relational hypersexual behavior. During the development of the items, care was taken to incorporate aspects of the literature that suggests sex is used maladaptively to cope with uncomfortable mood states or to respond to stress (Reid, Carpenter, Spackman, & Willes, 2008; Reid, Harper, & Anderson, 2009). Finally, attempts were made during scale development to acquire a more inclusive sample to allow for greater generalizability. In addressing limitations inherent in current measures of hypersexuality, we desired to develop a scale that would demonstrate a more accurate assessment of hypersexuality and thus have greater clinical and research utility. Although preliminary psychometrics for this scale were reported in a poster presentation at the annual convention of the American

Psychological Association (Reid & Garos, 2007), this manuscript represents the most current research on the reliability and validity of the items for this instrument.

STUDY 1
METHOD

Developing Initial Item Pool

In Study 1, an initial item pool for our scale, named the Hypersexual Behavior Inventory (HBI), was generated and administered to a sample of men seeking help for hypersexual behavior at several outpatient mental health clinics throughout the United States. Items were developed with a focus on three prominent themes that emerged in current literature: (a) deficits in controlling sexual thoughts, feelings, and behavior; (b) using sex to cope with unpleasant affective experiences or in response to stress; and (c) experiencing undesirable consequences associated with one's sexual behavior. To address potential scale construction limitations noted in other research, items were constructed using established guidelines from experts in test construction (Anastasi, 1988; Comrey, 1988; DeVellis, 1991; Jackson, 1971; Noar, 2003). Specifically, items were written in a clear and concise language that (a) avoided double-barreled queries; (b) avoided the use of double negatives, which can lend ambiguity to test items; (c) included both positively and negatively worded statements to filter random responding and acquiescence; (d) was free of gender bias, cultural discrimination, and emphasis on solo or relational sex; (e) was rated between an eighth- and ninth-grade reading level so that the meaning and content of statements is easily understood; and (f) covered the breadth of content domain captured by the construct of hypersexual behavior as advanced in the literature by the authors and their colleagues.

The initial pool of 80 items utilized a 5-point Likert-type response format: 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, and 5 = Very Often, with all items fully labeled in an effort to increase the interpretability of responses and reduce ambiguity associated with item endorsement (Weijters, Cabooter, & Schillewaert, 2010). To help establish content validity, all items were evaluated by several prominent researchers who have published on the topic of hypersexuality, as well as by patients who were invited to evaluate the rationally derived item pool. The professional evaluators included four licensed clinical psychologists, two board-certified psychiatrists, a licensed clinical social worker, and a licensed marriage and family therapist. Recommendations regarding relevance, clarity, brevity, and singularity of items were given (Fishman & Galgeura, 2003). Based on evaluators' feedback, an initial item-elimination process resulted in a pool of 65 items and the creation

of written instructions to respondents clarifying how sex should be defined while endorsing HBI items (see Appendix A).

Participants and Procedure

Study procedures were conducted in accordance with the policies, rules, and guidelines of the sponsoring universities' Institutional Review Board, and prior consent was obtained from all participants. Data was numerically coded to ensure participants' anonymity. Participants were asked to complete a demographic questionnaire and the 65-item HBI. They were instructed to endorse items based on sexual experiences during the previous 90-day period. Participants received no compensation for their participation.

Participants for Study 1 consisted of a convenience sample of male patients ($N = 324$) from outpatient treatment clinics located in Arizona, Utah, California, and Texas who sought help for issues associated with hypersexual behavior. Participants ranged in age from 18 to 68, with a mean age of 32 years. Ethnic representation included Caucasian ($n = 302$), Hispanic ($n = 13$), Asian ($n = 7$), and Black/African American ($n = 2$). Self-reported sexual preference included heterosexual ($n = 305$), gay ($n = 17$), and bisexual ($n = 2$). Relationship status included never married ($n = 106$), first marriage ($n = 149$), separated ($n = 16$), divorced ($n = 34$), remarried ($n = 12$), and cohabitating ($n = 7$). Self-reported sexual behaviors for the sample included compulsive masturbation, pornography dependence, habitual solicitation of commercial sex workers, extra-marital affairs, protracted sexual promiscuity, and unprotected sex with multiple anonymous partners.

RESULTS

Item Reduction and Exploratory Factor Analysis

Items were analyzed for extreme scores, heterogeneity of variance, sphericity, and tolerance. Data met the requirements of test assumptions of normality, linearity, homoscedasticity, homogeneity, and multicollinearity. Subsequently no transformations were conducted. A trimmed mean (5%) was calculated to eliminate a few extreme scores that might disproportionately impact the mean. The distribution of scores among the various demographic regions was comparable and subsequently the data was combined for analysis.

In order to eliminate undesirable items from the initial item pool, each item's mean and variance were examined. Items that appeared to have skewed means or low variance were removed. For example, items rarely or too easily endorsed by the clinical sample were removed (e.g., "I have to lie or make excuses about what I've done sexually"). Next, items were examined based on the three themes derived from the literature using reliability analysis. Specifically, the items were conceptually grouped and the corrected

item-total and squared multiple correlations were examined for items on the three subscales. Additionally, Cronbach's alpha correlations were evaluated for each subscale. Items that significantly diminished their respective subscale reliability were removed. The remaining items were judged to sufficiently retain the breadth of content in the original scale model.

A Maximum Likelihood factor analysis was conducted with oblique rotation for the remaining items. Examination of factors, based on eigen value size and on examination of the scree plot, suggested a 3-factor solution. Our criteria for item retention included (a) factor loadings of 0.50 or higher; (b) percentage of variance explained by each factor; (c) interpretable factors (e.g., face validity); and (d) a minimum of four items loading on a factor to ensure factor stability. Complexly loaded items spanning two or more factors were removed, resulting in a 3-factor solution consisting of 19 items. Again, the remaining items were judged to sufficiently retain the expected content of the intended scale. Factors were named Control, Coping, and Consequences and accounted for 49%, 11%, and 6% of the total item variance respectively. Scale items, their respective factor loadings, and Cronbach's alpha coefficients for each subscale are noted in Table 1. The intercorrelations of the subscales are found in Table 2.

Reliability

Reliability analysis of the final scale, calculated using Cronbach's alpha coefficient, found high internal reliability for the overall scale ($\alpha = .95$) and subscales (Control $\alpha = .94$, Coping $\alpha = .90$, and Consequences $\alpha = .87$).

Validity

Preliminary evidence for the construct validity of the HBI is derived from statistical evidence that supports the factor structure. As Table 1 indicates, items were highly correlated and loaded on their respective factors in a manner supporting the hypothesized constructs for hypersexual behavior.

DISCUSSION

The results of Study 1 provide initial support for the reliability and factor structure of the HBI and its subscales. The HBI was shown to be an internally consistent three-factor measure with loadings that cluster on the respective rationally derived subscales and in a manner that also reflects meaningful content and validity of subscale items. Collectively, these results provide preliminary evidence that the HBI possesses adequate factor structure that captures the construct of hypersexual behavior among a sample of treatment-seeking men. On the Flesch Reading Ease Test the items yielded

TABLE 1 Factor Loadings, Reliability, and Descriptive Data for the HBI

	Factor Loadings	
	Study 1	Study 2
Total HBI Scale (Mean = 66.3, SD = 13.8)	α =.95	α =.96
Factor 1: Control (Mean = 30.9, SD = 5.9)	α =.94	α =.95
2. Even though I promised myself I would not repeat a sexual behavior, I find myself returning to it over and over again.	.62	.84
4. I engage in sexual activities that I know I will later regret.	.78	.87
7. My attempts to change my sexual behavior fail.	.66	.82
10. I do things sexually that are against my values and beliefs.	.67	.82
11. Even though my sexual behavior is irresponsible or reckless I find it difficult to stop.	.68	.83
12. I feel like my sexual behavior is taking me in a direction I don't want to go.	.60	.82
15. My sexual cravings and desires feel stronger than my self-discipline.	.54	.82
17. Sexually, I behave in ways I think are wrong.	.77	.86
Factor 2: Coping (Mean = 23.2, SD = 6.4)	α =.90	α =.91
1. I use sex to forget about the worries of daily life.	.75	.86
3. Doing something sexual helps me feel less lonely.	.69	.70
6. I turn to sexual activities when I experience unpleasant feelings (e.g., frustration, sadness, anger).	.68	.81
8. When I feel restless, I turn to sex in order to soothe myself.	.59	.78
13. Doing something sexual helps me cope with stress.	.81	.82
16. Sex provides a way for me to deal with emotional pain I feel.	.79	.85
18. I use sex as a way to try and help me deal with my problems.	.72	.89
Factor 3: Consequences (Mean = 12.1, SD = 3.9)	α =.87	α =.89
5. I sacrifice things I really want in life in order to be sexual.	.56	.76
9. My sexual thoughts and fantasies distract me from accomplishing important tasks.	.73	.79
14. My sexual behavior controls my life.	.66	.89
19. My sexual activities interfere with aspects of my life such as work or school.	.71	.75

Note. Study 1 factor loadings from a Maximum Likelihood with oblique rotation. Study 2 factor loadings from CFA.
Means and standard deviations reported are for Study 2.

TABLE 2 Correlations for HBI Total and Subscale Scores in Study 1

	Hypersexual Behavior Inventory			
HBI Scales	Control	Coping	Consequences	HBI Total
Control	—	.759**	.844**	.947**
Coping	—	—		.919**
Consequences		.820**		.926**
HBI Total				

Note. ** $p < .01$ (2-tailed).

a score of 66.1, suggesting that individuals with a seventh-grade level of education or higher can read and understand the test items. Further evidence for validity of the HBI scale items is part of the purpose for Study 2.

STUDY 2

The purpose of the second study was to replicate and confirm the factor structure of the HBI using structural equation modeling with a new sample. We also sought to determine whether evidence supported our conceptualization of hypersexuality as consistent with existing literature about hypersexual behavior. Although partial support for our hypotheses was evident from the factor structure that emerged for the HBI in our first study, we sought to strengthen the evidence for these relationships by including additional measures in this second study that captured the constructs of interest (e.g., stress vulnerability, emotional distress, impulsivity, boredom proneness) in order to determine discriminant and convergent validity of the HBI. If significant correlations between measures of these constructs and the HBI subscales emerged in the hypothesized direction, empirical support would be established for our conceptualization of hypersexual behavior.

METHOD

Participants and Procedure

Study 2 followed the same procedures as Study 1. An additional outpatient clinic in Pennsylvania was added to our data collection sites. Participants completed a demographic survey, the 19-item HBI, and several other widely used measures to help establish concurrent and discriminant validity for our scale.

The clinical sample consisted of male participants ($N = 203$) from clinics in Arizona, Utah, California, Texas, and Pennsylvania who sought help for issues associated with hypersexual behavior. Participants ranged in age from 18 to 68, with a mean age of 33 years. Ethnic representation included Caucasian ($n = 198$), Hispanic ($n = 3$), and Asian ($n = 2$). Self-reported sexual preference included heterosexual ($n = 186$), gay ($n = 9$), and bisexual ($n = 8$) orientation. Relationship status included never married ($n = 64$), first marriage ($n = 94$), separated ($n = 8$), divorced ($n = 19$), remarried ($n = 15$), and cohabitating ($n = 3$). Self-reported sexual behaviors for the clinical sample paralleled those in Study 1 and included compulsive masturbation, pornography dependence, habitual solicitation of commercial sex workers, extra-marital affairs, protracted sexual promiscuity, and unprotected sex with multiple anonymous partners.

Measures

SEXUAL COMPULSIVITY SCALE (SCS)

The SCS (Kalichman et al., 1994; Kalichman & Rompa, 1995, 2001) was developed to assist in research of high-risk sexual behaviors predominantly among homosexual male subjects, although it has since been used in several studies of both heterosexual and homosexual populations (Cooper, Delmonico, & Burg, 2000; Dodge et al., 2004; Kalichman & Rompa, 1995, 2001; Reece & Dodge, 2004). The SCS is a 10-item scale that queries sexual thoughts, feelings, and behaviors. Respondents endorse items on a 4-point Likert-type scale ranging from 1 (*Not at all like me*) to 4 (*Very much like me*). High reliability (Cronbach's $\alpha = .89$) was demonstrated in a pilot convenience sample of homosexual men (Kalichman et al., 1994), and internal consistency for the scale has been shown from $\alpha = .86$ to $\alpha = .87$ with a sample of homosexual men and inner-city men and women, respectively (Kalichman & Rompa, 1995).

COMPULSIVE SEXUAL BEHAVIOR INVENTORY (CSBI)

The CSBI is a 22 item[1] Likert-type scale with a 5-point response format ranging from 1 (*never*) to 5 (*very frequently*) with higher scores reflecting greater levels of compulsive sexual behavior. The scale yields a 2-factor structure with corresponding subscales named Control and Violence (Miner, Coleman, Center, Ross, & Rosser, 2007). The Control subscale items purport to capture respondent difficulties controlling the frequency of sexual urges and behaviors, emotional discord related to sex, and the frequency that sex interferes with relationships, productive activities, and financial stability. The Violence subscale items purport to assess aspects of sexual aggression including the frequency of physical violence towards sexual partners, sexual pleasure related to inflicting or receiving physical pain, sex for money, and forced sex by a romantic partner. Cronbach's alphas for the two subscales were reported in the original study describing the scale development showing high internal consistency for the Control ($\alpha = .96$) and Violence ($\alpha = .88$) subscale items (Coleman et al., 2001). In the original scale development, discriminant function analysis correctly classified 92% of a combined sample of pedophiles ($N = 35$), non-paraphilic sexually compulsive individuals ($N = 15$) and control subjects ($N = 42$; Coleman et al., 2001). Miner and colleagues (2007) sought to replicate the factor structure among a sample of Latino men ($N = 1,026$) who reported having sex with men. Using confirmatory factor analytic procedures, evidence supporting a 2-factor model emerged showing an acceptable goodness of fit (RMSEA = .045, CFI = .99, GFI = .95). Test-retest reliability of the CSBI items ($r = .86, p \leq .001$) conducted on a sample subset ($n = 29$) of the Latino men across a 7–10 day period provided further support for the stability of the CSBI items across the test-retest measure point. The CSBI items have demonstrated concurrent and

discriminant validity when compared to items on measures of theoretically related and dissimilar constructs (Miner et al., 2007; Coleman, Raymond, & McBean, 2003). In the present study we used the Control subscale items, which yielded high reliability in our sample ($\alpha = .92$).

NEO PERSONALITY INVENTORY—REVISED

The NEO-PI-R (Costa & McCrae, 1992), designed to measure the Five Factor Model (FFM) of personality, was used to assess self-reported personality traits. The NEO-PI-R consists of 240 items answered on a 5-point Likert-type scale ranging from *strongly disagree* to *strongly agree.* The NEO-PI-R assesses 30 facets, 6 for each dimension of the FFM. Raw scores are standardized as T-scores ($M = 50$, $SD = 10$) using respective sex norms reported in the NEO manual. Additional evidence on convergent and discriminant validity is presented in the NEO manual (Costa & McCrae, 1992), including cross-observer agreement and prediction of external criteria such as psychological well-being, needs and motives, creativity, educational and occupational achievements, and coping mechanisms.

PERCEIVED STRESS SCALE (PSS)

The PSS is a 10-item unifactorial Likert-type scale with a 5-point response format: $0 =$ Never, $1 =$ Almost Never, $2 =$ Sometimes, $3 =$ Fairly Often, and $4 =$ Very Often. Items 4, 5, 7, and 8 are reverse-scored prior to summation of all scale items, yielding a total PSS score. Scores range from 0 to 40, with higher scores reflecting greater levels of perceived stress (Cohen & Williamson, 1988). The PSS purports to measure the degree to which situations are appraised as stressful, based on how unpredictable, uncontrollable, and burdened respondents perceive their lives to be. Normative data have been collected on a community sample ($N = 2,387$), with means and standard deviations varying slightly depending on income level, gender, and smoking status. The reported overall mean for the combined sample in the norming group is 13.02 ($SD = 6.35$). Mean scores for men ($n = 960$) were $M = 12.1$, $SD = 5.9$, and were significantly lower than for the sample of women ($n = 1,427$): $M = 13.7$, $SD = 6.35$. Reliability analysis of the scale items shows adequate internal consistency ($\alpha = .78$). Test-retest reliability is unavailable for the 10-item PSS; however, the previous, 14-item version of the PSS demonstrated stability over time ($r = .85$; Cohen, Kamarck, & Mermelstein, 1983).

BOREDOM PRONENESS SCALE—SHORT FORM (BPS)

The two-factor, 12-item short form of the BPS uses a 7-point Likert-type scale with a response format of 1 (*strongly disagree*) to 7 (*strongly agree*), with higher scores indicating greater levels of boredom. The scale was developed

to assess the degree to which respondents experience boredom due to perceived monotony or lack of variety (Vodanovich, Wallace, & Kass, 2005). Data collected on a community sample of workers ($N = 787$) in various occupations produced one factor that measures an individual's inability to generate interesting activities (i.e., internal stimulation) and a second factor that captures perceptions of low environmental stimulation (i.e., external stimulation). Reported Cronbach's alphas for the two subscales showed high internal consistency (Internal Stimulation $\alpha = .86$ and External Stimulation $\alpha = .89$). Confirmatory factor analysis for the BPS yielded an acceptable goodness of fit (RMSEA = .05, CFI = .92, and GFI = .94).

GENERAL EMOTIONAL DYSREGULATION MEASURE (GEDM)

The two-factor, 13-item GEDM scale uses a 5-point Likert-type format with choices ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), with higher scores reflecting greater levels of emotional dysregulation. One factor captures levels of general emotional arousal and dysregulation, especially when coping with negative affective states. The second factor reflects positive emotions of happiness and joy. The GEDM showed stability over time with a high test-retest reliability coefficient ($r = .81$, p $< .01$) and high internal consistency ranging from .82 to .84 (Newhill, Mulvey, & Pilkonis, 2004).

Analysis

The distribution of scores among the various demographic regions in the second study was again comparable and subsequently the data were combined for analysis. The confirmatory factor analysis (CFA) was conducted using the EQS structural equations modeling program (Bentler, 2006). Confirmatory factor analysis is considered the method of choice when validating a personality assessment instrument developed with factor analytic procedures. Confirmatory factor analysis is superior to typical exploratory factor analytic procedures because fit indexes are available that can verify the viability and plausibility of the factor structure under consideration. Goodness of fit of the model was assessed with the Maximum Likelihood (ML) chi-square statistic, the Comparative Fit Index (CFI), and the Root Mean Square Error of Approximation (RMSEA). The CFI has a range from 0 to 1 and reports the improvement in fit of a hypothesized model over a model of complete independence in which no relations exist among the measured components of a latent variable or among the latent variables, which in this case are analogous to the hypothesized factors. The RMSEA seeks to evaluate the error of approximation in the population as an index of goodness of fit for the model under optimally chosen parameter values for the covariance matrix if it were available (Browne & Cudeck, 1993). Thus, it has been termed by some as an index of *mis*fit. The discrepancy, as measured by the RMSEA, is based per degree of freedom, making it sensitive to the number of estimated

parameters in the model. Desirable values are .95 or greater for CFI (Hu & Bentler, 1999) and .05 or less for RMSEA (Browne & Cudeck, 1993).

RESULTS

Confirmatory Factor Analysis

Five outliers were removed in order to obtain multivariate normality and linearity. The chi-square statistic (χ^2) was significant, as expected given the large sample size, and was subsequently rejected in favor of the alternative fit indices (Bentler, 1990, 2007; Bollen, 1989; Floyd & Widaman, 1995). Confirmatory factor analysis was conducted using Maximum Likelihood estimation, and the analysis yielded an acceptable fit that did not require the addition of any non-hypothesized associations to improve the fit (MLχ^2[136] = 206.8, $p < .001$; CFI = .95; RMSEA = .057). Factor loadings, means, and standard deviations are reported in Table 1. Table 3 reports correlations among the hypothesized factors in the CFA, and the factor model is illustrated in Figure 1.

Reliability

Reliability analysis of the scale, calculated using Cronbach's alpha coefficient, found high internal reliability for the overall scale ($\alpha = .96$) and subscales (Control $\alpha = .95$, Coping $\alpha = .91$, and Consequences $\alpha = .89$). The overall scale test-retest reliability was high ($r = .91$, $p < .01$) based on a subset of patients ($n = 92$) who completed the scale a second time after a two-week interval. Test-retest reliability also extended to items for the Control subscale ($r = .89$), the Coping subscale ($r = .88$), and the Consequences subscale ($r = .90$), demonstrating further support for the stability of the HBI across the test-retest measure point.

Validity

Correlation analyses were used to provide support for the concurrent validity of the HBI in order to determine the degree of association with theoretically

TABLE 3 Correlations for Hypersexuality-Related Scales and the HBI in Study 2

	HBI	Control	Coping	Consequences	CSBI	SCS
HBI Total	—	.87**	.87**	.84**	.92**	.82**
Control		—	.57**	.72**	.85**	.71**
Coping			—	.56**	.73**	.72**
Consequences				—	.81**	.68**
CSBI					—	.75**
SCS						—

Note. ** Correlation is significant at the $p < .01$ level (2-tailed). HBI: Hypersexual Behavior Inventory; CSBI: Compulsive Sexual Behavior Inventory, Control Subscale; SCS: Sexual Compulsivity Scale.

FIGURE 1 Confirmatory Factor Analysis of the HBI and the 3-Factor Structure. Model shows standardized parameter estimates. Residual error coefficients are omitted for simplicity.

related measures. The HBI total and subscale scores yielded strong relationships that were positively correlated with the SCS and with the CSBI Control subscale. These relationships are summarized in Table 3. Further evidence for the concurrent validity of the HBI has been established with a measure of pornography consumption (Reid, Li, Gilliland, Stein, Karim, & Fong, in press). The correlations in the present study, along with the results of previous studies, provide support for the HBI's concurrent validity with similar scales purported to measure a theoretically similar construct.

Discriminant validity for the HBI has been noted in other studies in which measures that were significantly associated with other phenomena diverged from aspects of hypersexuality as measured by the HBI. For example, in a recent study on hypersexuality and emotions (Reid, 2010), the HBI total scores yielded non-significant or very low correlations with facets

of emotion such as surprise ($r = -.07$; *ns*), interest ($r = -.13$; *ns*), disgust ($r = .35, p < .01$), and fear ($r = .34, p < .01$). In a study assessing psychological symptom patterns in hypersexual patients (Reid, Carpenter, & Lloyd, 2009), HBI scores yielded non-significant low correlations with somatization ($r = .15$; *ns*), paranoid ideation ($r = .20$; *ns*), and hostility ($r = .02$; *ns*). A recent investigation of executive deficits measured by self-report (Reid, Karim, McCrory, & Carpenter, 2010) showed significant but modest correlations with HBI scores across several indices, including behavior regulation ($r = .33, p < .05$) and metacognition ($r = .39, p < .05$) as measured by the Behavior Rating Inventory of Executive Function—Adult Version (Roth, Isquith, & Gioia, 2005). Shame, too, although correlated with hypersexual behavior as measured by the HBI, has been shown to be a distinct construct from hypersexual behavior (Reid, Stein, & Carpenter, in press).

Correlation analyses were used to compare the HBI scales with facets of personality as measured by the NEO-PI-R. Specific facets of personality were chosen based on hypothesized theoretical links to hypersexual behavior. Given previous findings in the literature suggesting hypersexual behavior is used in response to dysphoric mood states and to cope with stress, we examined facets associated with affect regulation (e.g., neuroticism), stress vulnerability, and impulse control. As expected, the HBI total scale score and subscale scores showed significant positive correlations with tendencies toward affect dysregulation (see Table 4), specifically Anxiety ($r = .41, p < .01$) and Depression ($r = .67, p < .01$). Significant positive correlations also emerged for Impulsiveness ($r = .71, p < .01$), stress proneness as measured by the Vulnerability subscale ($r = .57, p < .01$), and scores on the Perceived Stress Scale ($r = .49, p < .01$). Additionally, boredom proneness showed a significant positive correlation with the HBI ($r = .44, p < .01$),

TABLE 4 Correlations for HBI Total and Subscale Scores with Facets of Personality in Study 2

	Hypersexual Behavior Inventory			
Study Variables	HBI Total	Control	Coping	Consequences
NEO-PI-R Personality Facets				
Anxiety	.412**	.351**	.422**	.443**
Angry Hostility	.278*	.244*	.271*	.305**
Depression	.674**	.635**	.615**	.651**
Self-Consciousness	.523**	.522**	.421**	.569**
Impulsiveness	.706**	.654**	.679**	.663**
Vulnerability	.572**	.529**	.522**	.585**
Self-Discipline	−.484**	−.465**	−.413**	−.510**
Boredom Proneness Scale	.440**	.365**	.491**	.335**
Emotional Dysregulation	.456**	.395**	.426**	.472**
Perceived Stress Scale	.485**	.371**	.435**	.274**

Note. ** $p < .01$ (2-tailed), * $p < .05$ (2-tailed).

while Self-Discipline showed a significant negative correlation ($r = -.48$, $p < .01$).

Despite the criticisms of assessment scholars, and despite its importance when developing a new scale (Haynes & Lench, 2003; Hunsley & Meyer, 2003), new measures seldom address the issue of incremental validity, that is, the degree to which a new measure makes additional contributions to the field. The factor structure of the HBI provides additional information about hypersexuality that has been omitted in several existing measures, including the SCS and the CSBI. For example, the Coping factor of the HBI provides information about tendencies to use sex in response to dysphoric mood states or stressful life events. This aspect of hypersexuality has been frequently reported in the literature and also included in the proposed classification criteria for HD (Kafka, 2010). The HBI instructions are more clear and precise in defining how respondents should conceptualize sex, enabling clinicians and researchers to better interpret test profiles. The HBI also omits relational items that potentially discriminate or bias against individuals who engage exclusively in solo-sex behavior. Finally, data for the HBI was collected from multiple outpatient clinics throughout the United States, providing a broader demographic sample for the scale development. Collectively, these additional advantages of the HBI support its development as a meaningful contribution to the literature.

Research using measures such as the SCS and CSBI suggest investigators will also use the HBI to classify participants or patient samples into groups or to validate some other procedure. In the absence of large, representative samples using proposed DSM-V criteria, we are reluctant to propose a HBI cut-off score as optimal. Even so, we can use those of our studies comparing treatment-seeking samples of hypersexual men with healthy controls, often college samples of convenience (e.g., Reid, 2010; Reid, Carpenter, & Lloyd, 2009). Our combined samples yielded total HBI scores of $M = 34.2$, $SD = 14.5$ for controls and $M = 66.3$, $SD = 15.6$ for hypersexual individuals. Using the methods outlined by Jacobson & Truax (1991), the "halfway" cut-point for the total HBI score would be 50.25 [(34.2 + 66.3) / 2] for men. Using the criteria of 1.5 standard deviations above the control mean yields a cutoff score of 55.95 [34.2 + 1.5(14.5)]. The average of these two methods is 53.1. Subsequently, awaiting a more definitive study, we propose a total HBI score of ≥ 53 as a preliminary cutoff point to distinguishing clinically elevated scores for men.

DISCUSSION

The construct validity of the HBI structure in a sample of hypersexual men was supported through exploratory factor analysis and replicated in a separate sample using confirmatory factor analysis. A three-factor

solution emerged consistent with existing literature on hypersexual behavior. Specifically, these data provide empirical support for a multi-faceted conceptualization of hypersexuality in which individuals (a) use sex in response to dysphoric mood states and to cope with stress; (b) feel unable to control or reduce their sexual fantasies, urges, and behaviors; and (c) continue to engage in sexual fantasies, urges, and behaviors despite negative consequences or interference in significant life domains.

Our findings showed a significant positive relationship between hypersexuality and emotional dysregulation. Greater hypersexuality was correlated with greater anxiety, tendencies to become easily frustrated, depression, boredom proneness, and general emotional dysregulation. Two separate measures of stress vulnerability and perceived stress also yielded significant positive correlations with greater hypersexuality. These findings suggest that helping hypersexual patients cultivate greater coping mechanisms to address stress and unpleasant emotions might attenuate their maladaptive behavior patterns and reduce hypersexual behavior.

Continued engagement with sexual fantasies, urges, and behaviors despite negative consequences also appears to be a hallmark of hypersexual behavior. Not surprisingly, this was highly correlated with patient reports of feeling unable to control or reduce preoccupation with and engagement in sex. Higher scores on the HBI were significantly correlated with diminished self-discipline and higher impulsivity as measured by the NEO-PI-R personality facets. Whether these traits are generalized to other behaviors or domain specific to sex is a question for further scientific inquiry. Regardless, many of the patients in this study reported numerous consequences related to their sexual choices, including interference with employment, parenting, friendships, family associations, academic or scholastic goals, personal interests, and hobbies. As others have noted, patients reported that hypersexual behavior created attachment ruptures in their primary romantic relationships, leading to significant distress (Reid, Carpenter, & Draper, 2011; Reid & Woolley, 2006). Patients also reported legal difficulties (e.g., arrests due to solicitation of sex from a commercial sex worker), financial losses, sexually transmitted diseases, and emotional disturbances, including feelings of demoralization, loss of self-confidence, and diminished motivation. Despite the high price tag of sex for these individuals, they frequently reported feeling driven by, compelled by, or obsessed with an intense preoccupation with sexual fantasies, urges, and behaviors.

The HBI showed significant positive correlations with other measures of hypersexuality, providing additional evidence for its concurrent validity. The HBI appears to provide clinicians and researchers with a more precise index of hypersexual behavior than existing measures, as it covers multi-dimensional aspects of hypersexuality. Moreover, items on the HBI avoid bias against patients who may engage exclusively in solo versus relational sexual activities. Finally, the HBI contains specific instructions for respondents that

clarify how sex should be conceptualized. These characteristics of the HBI make it a promising measure and one that appears to most closely align with the proposed classification criteria for HD (Kafka, 2010).

Limitations and Future Research

Despite a number of interesting findings, inferences about our results beyond those listed in this study should be made with caution, in part because our samples consisted exclusively of male hypersexual participants who were predominantly Caucasian and heterosexual. Future studies might consider exploring whether the HBI structure can be replicated in a sample of hypersexual women as well as gay, lesbian, transgender, and bisexual individuals. Larger representative samples of healthy controls who report frequent sexual activity in non-problematic ways would be desirable, including more ethnically diverse populations. Causal conclusions cannot be drawn from these data, and future studies should consider using path analysis to explore relationships between hypersexual behavior and other psychological and neuropsychological correlates. Although this study found three factors associated with hypersexuality, it is unlikely that these domains represent all of the possible characteristics of this phenomenon. Finally, future research should consider correlating HBI scores with more descriptive data about sexual behavior and subsequent associated consequences.

CONCLUSION

This article reports the findings from the psychometric development of a new measure of hypersexual behavior in a treatment-seeking sample. Through two studies, the HBI demonstrated high internal consistency and reliability over time. Concurrent, discriminant, and construct validity for the HBI provide empirical evidence that this scale uniquely contributes to our understanding of hypersexuality in self-referred male patients. The factor structure was replicated and supported using confirmatory factor analysis, which established the viability of the three factors that help provide evidence for the criteria of HD as proposed for the DSM-V (Kafka, 2010).

NOTES

1. The original 28-item version was developed with a small sample and included an additional factor related to sexual abuse (Coleman et al., 2001). Miner and colleagues (2007) eliminated this third factor and validated the remaining two-factor structure using confirmatory factor analysis in a large sample of Latino men.

2. A formatted version of the HBI can be obtained online at www.clientchange.com

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APPENDIX A

Hypersexual Behavior Inventory[2]

Below are a number of statements that describe various thoughts, feelings, and behaviors. As you answer each question, select a response that best describes you. Only choose one response per statement and please be sure to answer every question. For the purpose of this questionnaire, sex is defined

as any activity or behavior that stimulates or arouses a person with the intent to produce an orgasm or sexual pleasure (e.g., self-masturbation or solo-sex, using pornography, intercourse with a partner, oral sex, anal sex, etc.). *Sexual behaviors may or may not involve a partner.*

1 = Never 2 = Rarely 3 = Sometimes 4 = Often 5 = Very Often

1. I use sex to forget about the worries of daily life.
2. Even though I promised myself I would not repeat a sexual behavior, I find myself returning to it over and over again.
3. Doing something sexual helps me feel less lonely.
4. I engage in sexual activities that I know I will later regret.
5. I sacrifice things I really want in life in order to be sexual.
6. I turn to sexual activities when I experience unpleasant feelings (e.g., frustration, sadness, anger).
7. My attempts to change my sexual behavior fail.
8. When I feel restless, I turn to sex in order to soothe myself.
9. My sexual thoughts and fantasies distract me from accomplishing important tasks.
10. I do things sexually that are against my values and beliefs.
11. Even though my sexual behavior is irresponsible or reckless, I find it difficult to stop.
12. I feel like my sexual behavior is taking me in a direction I don't want to go.
13. Doing something sexual helps me cope with stress.
14. My sexual behavior controls my life.
15. My sexual cravings and desires feel stronger than my self-discipline.
16. Sex provides a way for me to deal with emotional pain I feel.
17. Sexually, I behave in ways I think are wrong.
18. I use sex as a way to try to help myself deal with my problems.
19. My sexual activities interfere with aspects of my life, such as work or school.