

BEHAVIOR

Understanding the Personality and Behavioral Mechanisms Defining Hypersexuality in Men Who Have Sex With Men



Michael H. Miner, PhD,¹ Rebecca Swinburne Romine, PhD,² Nancy Raymond, MD,^{1,3} Erick Janssen, PhD,⁴ Angus MacDonald III, PhD,⁵ and Eli Coleman, PhD¹

ABSTRACT

Introduction: Hypersexuality has been conceptualized as sexual addiction, compulsivity, and impulsivity, among others, in the absence of strong empirical data in support of any specific conceptualization.

Aim: To investigate personality factors and behavioral mechanisms that are relevant to hypersexuality in men who have sex with men.

Methods: A sample of 242 men who have sex with men was recruited from various sites in a moderate-size mid-western city. Participants were assigned to a hypersexuality group or a control group using an interview similar to the Structured Clinical Interview for the *Diagnostic and Statistical Manual for Mental Disorders, Fourth Edition*. Self-report inventories were administered that measured the broad personality constructs of positive emotionality, negative emotionality, and constraint and more narrow constructs related to sexual behavioral control, behavioral activation, behavioral inhibition, sexual excitation, sexual inhibition, impulsivity, attention-deficit/hyperactivity disorder, and sexual behavior.

Main Outcome Measures: Hierarchical logistic regression was used to determine the relation between these personality and behavioral variables and group membership.

Results: A hierarchical logistic regression controlling for age showed a significant positive relation between hypersexuality and negative emotionality and a negative relation with constraint. None of the behavioral mechanism variables entered this equation. However, a hierarchical multiple regression analysis predicting sexual behavioral control indicated that lack of such control was positively related to sexual excitation and sexual inhibition owing to the threat of performance failure and negatively related to sexual inhibition owing to the threat of performance consequences and general behavioral inhibition.

Conclusion: Hypersexuality was found to be related to two broad personality factors that are characterized by emotional reactivity, risk taking, and impulsivity. The associated lack of sexual behavior control is influenced by sexual excitatory and inhibitory mechanisms, but not by general behavioral activation and inhibitory mechanisms.

J Sex Med 2016;13:1323–1331. Copyright © 2016, International Society for Sexual Medicine. Published by Elsevier Inc. All rights reserved.

Key Words: Hypersexuality; Sexual Compulsivity; Sexual Addiction; Impulsivity

Received April 19, 2016. Accepted June 30, 2016.

¹Department of Family Medicine and Community Health, University of Minnesota, Minneapolis, MN, USA;

²The Schiefelbusch Institute for Life Span Studies, University of Kansas, Lawrence, KS, USA;

³Department of Psychiatry, University of Minnesota, Minneapolis, MN, USA;

⁴Institute for Family and Sexuality Studies, Department of Neurosciences, KU Leuven, Leuven, Flanders, Belgium;

⁵Department of Psychology, University of Minnesota, Minneapolis, MN, USA

Copyright © 2016, International Society for Sexual Medicine. Published by Elsevier Inc. All rights reserved.

<http://dx.doi.org/10.1016/j.jsxm.2016.06.015>

INTRODUCTION

High-frequency and out-of-control sexual behavior, referred to in this article as *hypersexuality*, has been conceptualized as sexual addiction,¹ sexual compulsivity,² compulsive sexual behavior,^{3,4} sexual impulsivity,⁵ impulsive and compulsive sexual behavior,⁶ paraphilia-related disorders,⁷ and out-of-control sexual behavior.⁸ In the absence of strong empirical data in support of any specific conceptualization,⁹ a more general diagnosis of hypersexual disorder was proposed for the *Diagnostic and Statistical Manual for Mental Disorders, Fifth Edition (DSM-5)*.⁹ Although the diagnosis was rejected, in part owing to the relative lack of scientific support for the proposed criteria, the continued need for basic and clinical research on this topic was recognized.¹⁰

The present study aimed to improve our understanding of hypersexuality by examining whether the underlying phenomena are best explained by more general mechanisms, such as those relevant to reward processing and reward sensitivity,¹⁰ or by processes that are more specific to sexuality. Individual differences in reward processing and sensitivity have been studied using, for example, the personality theory by Tellegen,¹¹ which distinguishes among the three higher-order personality factors of positive emotionality (PEM), negative emotionality (NEM), and constraint (CON). Skegg et al¹² found that hypersexuality was related to higher scores on the Stress Reaction and lower scores on the Control subscale of NEM and CON, respectively on the Multidimensional Personality Questionnaire.¹³ In addition, hypersexuality has been found to be related to the “Big Five”¹⁴ factors of neuroticism, which is indicative of deficits in coping skills for stress and vulnerability to depression and anxiety, and (negatively) to agreeableness, which is indicative of individuals with a pattern of distrust, rudeness, manipulation, lack of cooperation, and lack of concern for others.¹⁵ Further, neuroticism was found to be highly correlated with scores on the Sexual Compulsivity Scale¹⁶ and to mediate the relation between shame and hypersexuality.¹⁷ Studies relating Tellegen’s personality structure to the five-factor model indicate that negative emotionality is a higher-order factor that encompasses neuroticism and the inverse of agreeableness.¹⁸ Thus, these findings are consistent and show that hypersexuality is positively associated with NEM.

When it comes to mechanisms more directly relevant to sexuality, the dual control model of sexual response provides a theoretical framework that has proved valuable to our understanding of various aspects of sexual response and behavior, including sexual desire, sexual arousal, and sexual risk taking.¹⁹ The model describes sexual arousal and related processes as controlled by two underlying factors, which reflect distinct neurophysiologic systems, namely sexual inhibition and sexual excitation.²⁰ Individual differences in the propensity for sexual excitation reflect the tendency to experience motivation to engage in sexual behavior and heightened levels of sexual arousal when exposed to sexual cues. The sexual inhibitory system is believed to suppress sexual response and behavior and to do this through two processes: inhibition owing to threat of sexual performance failure and inhibition owing to threat of outcomes of sexual behavior.²¹ Consistent with the dual control model, some initial support has been found for the idea that hypersexuality is more likely in individuals with a high propensity for sexual excitation and a low propensity for sexual inhibition.²² Deficits in inhibition could indicate a more impulsive disorder, although high sexual arousability would be more consistent with the notion that hypersexuality might reflect the high end of a sexual motivation or responsivity dimension.^{23,24}

Recently, two studies compared the relevance and contribution of the dual control model with those of Gray’s²⁵ theory of behavioral activation and inhibition to the prediction of hypersexuality.^{26,27} Gray’s²⁵ behavioral activation system, a

neurophysiologic system sensitive to signals of reward, non-punishment, and escape from punishment, is responsible for the activation of goal-directed behavior and the experience of positive feelings when a person is exposed to cues of impending reward.²⁸ In contrast, Gray’s²⁵ behavioral inhibition system, which is sensitive to signals of punishment, non-reward, and novelty, is considered responsible for the experience of negative affect, such as anxiety, fear, and frustration, in the presence of cues that a desired behavior might lead to punishment or lack of anticipated reward.

Van Lankveld et al²⁷ found significant contributions for the Fear and Anxiety subscales of the Behavioral Inhibition Scale (BIS) in the prediction of the number of sexual partners. However, the addition of the Sexual Inhibition Scale (SIS) and Sexual Excitation Scale (SES) improved the prediction, with inhibition owing to the threat of outcomes of sexual behavior (SIS2) most prominent. Rettenberger et al²⁶ found significant (although small in magnitude) associations between measurements of behavioral activation and behavioral inhibition and measurements of sexual excitation and sexual inhibition. Further, they found that sexual excitation and sexual inhibition were more relevant in explaining hypersexual disorder than were the more general measurements.²⁶ In other words, although hypersexuality is associated with a lack of general behavioral inhibition, the more specifically sexual traits of sexual excitation and inhibition might be more important to our understanding of hypersexuality.

The present study builds on the existing literature and explores the associations between hypersexuality and behavioral activation and inhibition and sexual excitation and inhibition and compares their role with that of individual differences in NEM and PEM.¹² Consistent with work by Parsons et al,²⁹ hypersexuality might be considered to be related, not specifically to the quantity or frequency of various sexual behaviors, but to the affective response to and effects of such behaviors. Relevant to this observation, Bancroft et al³⁰ and Parsons et al³¹ found a connection between negative affect (eg, depression, stress) and hypersexuality. This connection is consistent with the broad personality factors discussed earlier, which relate to coping strategies and sensitivity to negative affect.

The present study also explores the dimensions of impulsivity, including possible involvement of attention-deficit/hyperactive disorder (ADHD), which has been implicated as a causal factor of hypersexuality in clinical observations.³² It has been argued that hypersexuality can best be conceptualized as an impulse control disorder.⁵ Our research indicates that individuals with hypersexuality differ from controls in general measurements of impulsivity, including the Barratt Impulsivity Scale, used in this study, and a go–no-go procedure.^{33,34} Further, the negative association between the CON factor of the Multidimensional Personality Questionnaire¹² and hypersexuality supports this theory regarding impulsivity, because the CON factor is conceptualized as a personality factor characterized by planfulness, lack of risk taking, and high behavioral control.

This study was designed to explore the broad personality factors that might characterize hypersexuality and the more specific elements of those factors, including measurements of behavioral activation and inhibition and of sexual excitation and inhibition. Further, we included measurements of substance abuse because research indicates high levels of such abuse in hypersexual individuals,^{35–38} and substance abuse has been associated with the factors explored in this study.³⁹

METHODS

Participants

Participants were 242 men (Table 1) who were recruited using print and social media materials (eg, Facebook, Craigslist) posted at and around the university campus and in gay, lesbian, bisexual, transgender and HIV service organizations, bars, and sexual health clinics. Recruitment strategies were designed to oversample individuals who would meet criteria for hypersexuality to insure that the sample size was adequate for comparisons between those with and those without hypersexuality. Participants had to be men, 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 before 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

Self-report measurements were completed in the laboratory using a laptop or desktop computer. Data were automatically stored on a secure server.

Multidimensional Personality Questionnaire—Brief Form

The Multidimensional Personality Questionnaire—Brief Form¹³ is a 156-item scale developed to investigate personality structure¹¹ and includes 11 primary personality scales. In this study, we used the three broad trait factors that encompass the primary personality scales: NEM ($\alpha = 0.86$ in this sample), PEM ($\alpha = 0.60$ in this sample), and CON ($\alpha = 0.48$ in this sample).

Behavioral Inhibition and Behavioral Activation Scales

The BIS and the Behavioral Activation Scale (BAS)²⁸ are short (20 items) and measure the distinction between a behavioral activation system, which governs approach-related behaviors, and a behavioral inhibition system, which governs avoidance-related behaviors. The BIS was modified with the deletion of two items: “Even if something happens to me, I rarely experience fear or nervousness” and “When good things happen to me, it affects me strongly,” which showed poor item total correlations. The BIS showed adequate reliability ($\alpha = 0.65$ in this sample) after modification. The BAS, which governs approach-motivated behaviors, includes three subscales: Drive (BAS-D; $\alpha = 0.77$

Table 1. Sample demographic characteristics (N = 242)

	Hypersexuality (n = 93)	No hypersexuality (n = 149)
Age (y), mean (SD)*	34.1 (12.8)	38.4 (10.1)
Race or ethnicity, %		
White	74	80
African American	10	7
Native American	5	3
Asian or Pacific Islander	1	3
Latino	8	3
Other	2	4
Education, %		
Less than high school	2	1
High school graduate	20	22
Some college	27	30
College graduate	22	22
Graduate school	28	24
Missing	1	1
HIV status, % [†]		
Positive	48	17
Negative	47	76
Unknown	5	7

*Groups different at $P < .01$; [†]groups different at $P < .001$.

in this sample), Fun Seeking (BAS-F; $\alpha = 0.67$ in this sample), and Reward Responsiveness (BAS-RR; $\alpha = 0.59$ in this sample).

Sexual Inhibition and Sexual Excitation Scales

The SIS plus SES²¹ is a 45-item instrument. The SIS includes two subscales: SIS1, propensity for sexual inhibition owing to the threat of performance failure ($\alpha = 0.86$ in this sample), and SIS2, propensity for sexual inhibition owing to the threat of performance consequences ($\alpha = 0.86$ in this sample). The SES measures the propensity for sexual excitation ($\alpha = 0.60$ in this sample).

Compulsive Sexual Behavior Inventory

The Compulsive Sexual Behavior Inventory (CSBI)⁴⁰ is a 22-item scale that was developed to screen for compulsive sexual behavior (CSB). 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. In this study, we used only the 13-item Control subscale ($\alpha = 0.93$ in this sample).

Sexual Symptom Assessment Scale

The Sexual Symptom Assessment Scale (SSAS)⁴¹ is a 12-item self-report scale that measures the current severity of hypersexuality symptoms ($\alpha = 0.94$ in this sample). The SSAS includes frequency and intrusiveness of thoughts, urges, and behaviors and attempts to control them.

Barratt Impulsivity Scale

The Barratt Impulsivity Scale⁴² is a 30-item self-report measurement of self-control, ability to delay gratification, and other aspects of impulsivity. The Barratt Impulsivity Scale measures three aspects of impulsive behavior: activation (BIS-A; $\alpha = 0.60$ in this sample), motor (BIS-M; $\alpha = 0.67$ in this sample), and lack of planfulness (BIS-No Plan; $\alpha = 0.61$ in this sample).

Adult ADHD Self-Report Scale

The Adult ADHD Self-Report Scale (ASRS)⁴³ is an 18-item self-report measurement of the clinical presentation of ADHD. It contains two nine-item subscales: ASRS-PtA, the inattention aspects of ADHD ($\alpha = 0.85$ in this sample), and ASRS-PtB, the hyperactivity and impulsivity aspects of ADHD ($\alpha = 0.80$ in this sample).

Drug Use Disorders Test

The Drug Use Disorders Test (DUDIT)⁴⁴ is an 11-item screening scale for drug dependence. It includes questions related to frequency, urges, attempts to control use, and negative effects of use of drugs other than alcohol ($\alpha = 0.92$ in this sample).

Hypersexuality Group Assignment

Participants were assigned to the hypersexuality group ($n = 93$) or the non-hypersexuality group ($n = 149$) based on an interview similar to the Structured Clinical Interview for the *Diagnostic and Statistical Manual for Mental Disorders, Fourth Edition* (SCID; the interview schedule can be obtained by contacting the first author). Hypersexuality criteria were operationalized as follows: (i) over a period of at least 6 months, experiencing recurrent intense sexual arousing fantasies, sexual urges, or behaviors involving at least one of the following: compulsive cruising and multiple partners, compulsive masturbation, including use of internet pornography and cybersex, and/or compulsive sex within a relationship; (ii) fantasies, sexual urges, or behaviors cause clinically significant distress or impairment in social, occupational, or other important areas of functioning; and (iii) 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 staff members, audio recorded, and reviewed by two other research staff members. Discrepancies were resolved in consultation with two co-authors (N.R. and E.C.). Group assignment showed good inter-rater reliability ($\kappa = 0.79$). This definition of hypersexuality and the SCID-type interview used in this study are consistent with definitions and methods from our previous research.^{33,34,37,41,45–49}

Statistical Analysis

Group differences for categorical demographic variables were explored using χ^2 analyses. Age and scale scores were explored using independent-group t-tests. If the assumption of equality of variance, as indicated by a Levene test result, was not met, then

the degrees of freedom were adjusted to account for the non-equivalence.

Hierarchical logistic analysis was used to examine the contribution of our independent variables to the prediction of hypersexuality. After controlling for age, which differed between hypersexual and non-hypersexual participants, in step 1, our analyses were designed to assess the effects of broad personality factors before determining whether more specific aspects of behavioral control, reward processing, and reward sensitivity explained hypersexuality. Thus, the contributions of PEM, NEM, and CON were tested followed by impulsivity measurements and then behavioral activation and inhibition or sexual excitation and inhibition. To examine in more detail the effects of general aspects of reward processing and reward sensitivity, we followed the initial analyses with two additional logistic regressions, one which entered the BIS-BAS after controlling for age and the other which entered the SIS-SES after controlling for age. These analyses allowed us to ascertain whether the effects of the more specific personality-related processes were masked by the broad personality bands, which conceptually could account for the effects of the BIS-BAS and SIS-SES variables (which measure general reward processing and reward sensitivity and specifically sexual reward processes and sensitivity, respectively). Our initial analyses tested the BIS-BAS and SIS-SES separately to determine whether either had first-order associations with hypersexuality. If first-order associations were found for the two sets of variables, then we conducted additional logistical analyses to determine the relative strength of the associations between the more general and the more sexually specific variables.

Hypersexuality, as defined in this study, included a period of at least 6 months when an individual experienced his sexual behavior as excessive and out of control and then experienced dysfunction or distress as a result of his behavior. However, a major concern in understanding hypersexuality is not just the conjunction between lack of control and dysfunction or distress, but how to explain the associated lack of sexual behavioral control. To further explore the factors that might be associated with this lack of sexual behavior control, a multiple linear regression was used to explore the associations among the BIS-BAS, SIS-SES, and CSBI Control. A hierarchical analysis was used that controlled for age and DUDIT score and then the BIS-BAS or SIS-SES was entered. A significant second step was followed by entering the three broad personality factors, PEM, NEM, and CON.

RESULTS

Table 2 presents the mean and SD of each independent variable and hypersexuality group membership. Group differences were found for NEM, CSBI Control, SSAS, BIS-M, BIS-No Plan, DUDIT, and ASRS-PtB. For all variables, subjects in the hypersexuality group had significantly higher scores than those not in the hypersexuality group. The logistic regression analyses showed that two broad personality bands, NEM and CON, were

Table 2. Study variables by hypersexuality group

Scale	Hypersexuality		Non-hypersexuality		t (df)	P value
	Mean	SD	Mean	SD		
PEM	33.9	6.7	34.0	6.2	—	NS
NEM	15.0	8.0	12.9	6.8	−2.19 (240)	.029
CON	45.1	6.3	46.5	4.2	—	NS
BIS	15.0	2.1	14.8	2.3	—	NS
BAS-D	8.4	2.4	8.6	2.3	—	NS
BAS-F	7.8	2.1	7.9	2.1	—	NS
BAS-RR	8.0	1.6	7.9	1.9	—	NS
SES	60.5	8.5	58.8	7.4	—	NS
SIS1	32.2	6.8	30.9	6.6	—	NS
SIS2	27.7	4.3	28.6	4.6	—	NS
CSBI Control	40.1	10.0	28.4	8.1	−9.96 (240)	<.001
SSAS	19.6	8.8	10.4	8.6	−8.05 (240)	<.001
BIS-A	19.5	3.3	19.0	3.6	—	NS
BIS-M	28.1	4.7	27.0	4.1	−1.95 (240)	.053
BIS-No Plan	25.3	3.9	23.7	3.7	−3.29 (240)	.001
DUDIT	12.6	10.9	6.8	7.3	−4.53 (144.4)*	<.001
ASRS-PtA	17.3	3.7	16.6	3.9	—	NS
ASRS-PtB	33.2	7.6	31.2	6.1	−2.44 (164.1)*	.012

ASRS-PtA = Adult ADHD Self-Report Scale—Inattention subscale; ASRS-PtB = Adult ADHD Self-Report Scale—Hyperactivity and Impulsivity subscale; BAS-D = Behavioral Activation Scale—Drive; BAS-F = Behavioral Activation Scale—Fun Seeking; BAS-RR = Behavioral Activation Scale—Reward Responsiveness; BIS = Behavioral Inhibition Scale; BIS-A = Barratt Impulsivity Scale—Attentional subscale; BIS-M = Barratt Impulsivity Scale—Motor subscale; BIS-No Plan = Barratt Impulsivity Scale—Lack of Planfulness subscale; CON = constraint; CSBI Control = Compulsive Sexual Behavior Inventory Control subscale; DUDIT = Drug Use Disorders Test; NEM = negative emotionality; NS = not significant; PEM = positive emotionality; SES = Sexual Excitation Scale; SIS1 = Sexual Inhibition Scale 1; SIS2 = Sexual Inhibition Scale 2; SSAS = Sexual Symptom Assessment Scale.

*Degrees of freedom adjusted for unequal variance across groups.

significantly related to hypersexuality group membership ($\chi^2 = 21.57$, $df = 3$, $P < .001$) after controlling for age. Further hierarchical analyses indicated that the BIS-No Plan subscale significantly added to the prediction and increased the -2 log likelihood by 2.96 ($\chi^2 = 8.96$, $df = 1$, $P = .003$). The addition of the BAS-D, BAS-F, BAS-RR, and BIS did not make a significant contribution to the model. Similarly, the addition of the SES, SIS1, and SIS2 did not add significantly to predicting group membership. After controlling for age, an association was found between hypersexuality group membership and the Hyperactivity subscale of the ASRS (ASRS-PtB; odds ratio = 1.06, $P = .045$). However, when NEM and CON were added to the equation, the contribution of ASRS-PtB was no longer significant (Wald = 2.26, $df = 1$, $P = .133$). Table 3 presents the final model ($\chi^2 = 28.80$, $df = 4$, $P < .001$), which accounted for approximately 15% of the variance in hyperactivity.

To better explore the lack of control that characterizes all conceptualizations of hypersexuality, we conducted a multiple regression analysis to assess how sexual excitation and sexual inhibition were related to the CSBI Control scale. Because we found an association between the CSBI Control scale and drug abuse ($r = 0.31$, $P < .001$), we controlled for DUDIT scores. The resultant regression equation was significant ($F_{5,236} = 13.25$, $P < .001$) and accounted for 22% of the variance in CSBI Control scale score. As presented in Table 4,

this deficit in sexual behavioral control was related to higher scores on the SES and SIS1 and lower scores on the SIS2. A similar analysis looking at the three BAS scales (BAS-A, BAS-F, and BAS-RR) and the BIS showed no significant contribution in predicting CSBI Control. Entering PEM, NEM, and CON into a regression analysis resulted in neither PEM nor CON entering, but NEM was a significant predictor ($\beta = 0.16$, $t = 2.55$, $P < .012$), and the addition of NEM, after controlling for SIS1, SIS2, and SES, significantly added to the variance in CSBI Control ($\Delta R^2 = 0.021$, $F_{1,236} = 6.48$, $P = .012$). As presented in Table 2, higher NEM was related to less control.

DISCUSSION

This study explored the underlying personality structures and mechanisms that characterize hypersexuality. Our findings associated hypersexuality with two broad personality factors: NEM and CON. NEM can be considered a higher-order factor that encompasses neuroticism and the inverse of agreeableness.¹⁷ Thus, our findings are consistent with those of Pinto et al¹⁴ who found that hypersexuality was associated with high neuroticism and low agreeableness. Thus, hypersexuality group membership is associated with a personality structure indicative of negative affect activation, susceptibility to negative emotional states, and motivation to avoid or escape such emotions.

Table 3. Final model: hypersexuality disorder predicted by broad personality constructs and indications of sexual urges and perceived sexual behavior control

	B	SE	Wald	df	Significance	OR	95% CI
Age	0.033	0.012	7.92	1	0.005	1.03	1.01–1.06
NEM	0.047	0.020	5.50	1	0.019	1.05	1.01–1.09
CON	−0.075	0.029	6.79	1	0.009	0.93	0.88–0.98
BIS-No Plan	0.111	0.038	8.47	1	0.004	1.12	1.04–1.20

BIS-No Plan = Barratt Impulsivity Scale–Lack of Planfulness Subscale; CON = constraint; NEM = negative emotionality; OR = odds ratio; SE = standard error.

In addition, consistent with Skegg et al,¹² we found hypersexuality to be associated with the CON factor, which indicates that hypersexuality also is characterized by impulsivity, risk taking, and a tendency not to adhere to traditional values (eg, religion, academic or occupational achievement, etc). This combination of findings is consistent with the notion of an underlying externalizing dimension, as described by Krueger et al,⁵⁰ and with bulimia⁵¹ and borderline personality disorder.⁵²

It has been suggested that the connection between impulsivity and hypersexuality might be indicative of a comorbid ADHD.³¹ Our findings do not support this. Specifically, although we found a first-order association between hypersexuality group membership and the Hyperactivity subscale of the ASRS, this association became non-significant after we corrected for NEM and CON. Thus, it appears that rather than symptoms of ADHD accounting for the impulse-like symptoms observed in hypersexual individuals, the lack of planfulness, risk taking, and unconventional attitudes indicated by low CON scores account for what appear to be aspects of hyperactivity. However, it should be pointed out that we assessed ADHD using a self-report measurement, not a clinical diagnosis.

Tellegen¹¹ related the CON factor to the behavioral inhibition system described by Gray.⁵³ Thus, because hypersexuality is associated with CON, we would expect that some combination of the BIS and BAS also would be associated with hypersexuality. However, in contrast to previous findings,^{25,26} we did not find an association between BIS and BAS. The previous research indicates that measurements of sexual excitation (SES) and sexual

inhibitory systems (SIS1, SIS2) have a stronger association with hypersexuality than the more general behavioral activation and behavioral inhibition systems.²⁵ However, we did not find significant associations between hypersexuality group membership and the SIS-SES.

The combined effects of NEM and CON lead to the conclusion that hypersexuality is related to excessive reactions to negative emotions and impulsive risk-taking strategies to escape or avoid such emotions. It has been suggested that, to characterize hypersexuality, it is necessary to identify which internal functions are failing to operate and advance some theory implicating the mechanisms of action that lead to the dysfunction.¹⁰ Lack of sexual behavior control is a major defining aspect of hypersexuality⁹ and a content analysis of the CSBI Control scale indicates that it measures the individual’s perception that the sexual behavior is out of control. Thus, the CSBI Control scale could provide an operationalization of behavioral mechanisms influencing sexual behavior associated with high NEM and low CON. We found that the CSBI Control scale was positively associated with the SES and SIS1 and negatively associated with the SIS2. Further, we found no associations between the CSBI Control scale and the BIS-BAS. This would indicate that lack of sexual behavior control is related to specific sexual excitation and inhibitory mechanisms and not to more general behavioral activation and inhibitory mechanisms. This would seem to support conceptualizing hypersexuality as a dysfunction of sexuality as proposed by Kafka.⁹ Further, it does not appear that hypersexuality is a manifestation of high sex drive,^{22,23} but that it involves high excitation and a lack of inhibitory control, at least with respect to inhibition owing to expected negative outcomes.

Two possible biases might have affected our failure to find associations between hypersexual group membership and the SIS-SES. It is possible that the use of group assignment, and the resultant relatively small sample of hypersexual participants, instead of relying on dimensional, continuous measurements of hypersexuality, negatively affected our ability to uncover links between the BIS-BAS and SIS-SES and hypersexuality. In addition, the CSBI and the SIS-SES are self-report questionnaire measurements, whereas the data used for group assignment were collected in a face-to-face structured interview. Most of the previous research on hypersexuality has relied on self-report measurements.^{25,26,54,55} Thus, the possibility should be

Table 4. Final model: regressing sexual excitation, sexual inhibition, and negative emotionality on sexual behavioral control as measured by the Compulsive Sexual Behavior Inventory Control subscale

	B	SE	β	t	P value
DUDIT	0.188	0.071	0.166	2.667	.008
SES	0.281	0.081	0.211	3.988	.001
SIS1	0.302	0.098	0.191	3.091	.002
SIS2	−0.468	0.140	−0.201	−3.353	.001
NEM	0.230	0.090	0.159	2.546	.012

DUDIT = Drug Use Disorders Test; NEM = negative emotionality; SE = standard error; SES = Sexual Excitation Scale; SIS1 = Sexual Inhibition Scale 1; SIS2 = Sexual Inhibition Scale 2.

considered that the failure to find associations with group membership, but the significant associations with the CSBI Control scale, at least in part, might be due to common method variance.

Hypersexuality was defined in this study using criteria for compulsive sexual behavior used in our previous research.^{40,46,48} These criteria were derived from the criteria used for paraphilias in the *Diagnostic and Statistical Manual for Mental Disorders, Fourth Edition*, understanding that the sexual interests and behaviors involved were non-paraphilic. Although these criteria are similar to those proposed for the *DSM-5*,⁹ they are not exactly alike and our criteria require more clinical judgment than the proposed criteria used in the *DSM-5* field trials.⁵⁶ We have used the SCID-type interview in several studies, and we began this study before completion of the *DSM-5* field trials and decisions about inclusion of hypersexuality in the *DSM-5*. However, we asked questions in our structured interview that would allow us to replicate the field trial categorization. These data will be discussed in detail in another article.

The most prominent limitation of this study is that it is a cross-sectional study of a convenience sample of men who have sex with men. Thus, we cannot assume that the personality constructs and mechanisms identified are causal. In addition, it is not clear to what extent our findings are generalizable to the broader community of men who have sex with men or a more general population of individuals with hypersexuality. We assume that some of the observations would be similar in other populations of men who do not have sex with men but this would need to be tested in a larger and comparative study. One study that compared hypersexual men and women found that the only difference in personality structure was that women scored lower than men on the Big-Five conscientiousness facet and higher than men on the NEO excitement-seeking scale.⁵⁶ Conscientiousness has been found to be a component of CON,¹⁷ which characterized hypersexuality in this study. However, it would be highly speculative to make any assumptions about the relations between hypersexuality and the variables explored in this study in heterosexual women because there is such scant literature on this population.

Despite these limitations, this study represents one of the more extensive and in-depth explorations of the links between hypersexuality and more general and specifically sexual personality traits. Our findings suggest that the broader construct of hypersexuality is related to personality factors indicating emotional reactivity, risk taking, and impulsivity. Further, these personality factors are manifest, not in general behavioral control deficits, but specifically in deficits to sexual behavior control. Future research is needed to fine-tune the construct of hypersexuality, which might be a manifestation of a number of etiologic and mechanistic pathways, including impulse control, affect management, or compulsive behavior. Differences in clinical presentation have been found,⁵⁷ which could provide useful subtypes for further investigation.

ACKNOWLEDGMENTS

We thank Cathy Strobel-Ayres, the project coordinator, without whom this project would never have been completed. We would also thank Ann Person, our research assistant, who conducted much of the data collection.

Corresponding Author: Michael H. Miner, PhD, Program in Human Sexuality, Department of Family Medicine and Community Health, University of Minnesota, 1300 S Second Street, Suite 180, Minneapolis, MN 55454, USA; E-mail: miner001@umn.edu

Conflicts of Interest: The authors report no conflicts of interest.

Funding: National Institute of Mental Health, National Institutes of Health (award number R01MH094229).

STATEMENT OF AUTHORSHIP

Category 1

(a) Conception and Design

Michael H. Miner; Rebecca Swinburne Romine; Nancy Raymond; Erick Janssen; Angus MacDonald III; Eli Coleman

(b) Acquisition of Data

Rebecca Swinburne Romine; Angus MacDonald III

(c) Analysis and Interpretation of Data

Michael H. Miner; Rebecca Swinburne Romine; Angus MacDonald III

Category 2

(a) Drafting the Article

Michael H. Miner

(b) Revising It for Intellectual Content

Michael H. Miner; Rebecca Swinburne Romine; Nancy Raymond; Erick Janssen; Angus MacDonald III; Eli Coleman

Category 3

(a) Final Approval of the Completed Article

Michael H. Miner; Rebecca Swinburne Romine; Nancy Raymond; Erick Janssen; Angus MacDonald III; Eli Coleman

REFERENCES

1. Carnes P. *Out of the shadows: understanding sexual addiction*. Center City, MN: Hazelden Publishing; 1983.
2. Coleman E. Sexual compulsivity: definition, etiology, and treatment considerations. *J Chem Depend Treat* 1987;1:189-204.
3. Coleman E. Treatment of compulsive sexual behavior. In: Rosen RC, Leinblum SR, eds. *Case studies in sex therapy*. New York: Guilford Press; 1995. p. 333-349.
4. Quadland MC. Compulsive sexual behavior: definition of a problem and an approach to treatment. *J Sex Marital Ther* 1985;11:121-132.
5. Barth RJ, Kinder BN. The mislabeling of sexual impulsivity. *J Sex Marital Ther* 1987;13:15-23.
6. Coleman E. Impulsive/compulsive sexual behavior: assessment and treatment. In: Grant JE, Potenza MN, eds. *The Oxford*

- handbook of impulse control disorders. New York: Oxford University Press; 2011. p. 375-388.
7. Kafka M. Paraphilia-related disorders—common, neglected, and misunderstood. *Harv Rev Psychiatry* 1994;2:39-40.
 8. Braun-Harvey D, Vigorito MA. Treating out of control sexual behavior: rethinking sex addiction. New York: Springer Publishing; 2015.
 9. Kafka M. Hypersexual disorder: a proposed diagnosis for DSM-V. *Arch Sex Behav* 2010;39:377-400.
 10. Reid RC, Kafka MP. Controversies about hypersexual disorder and the DSM-5. *Curr Sex Health Rep* 2014;6:259-264.
 11. Tellegen A. Structures of mood and personality and their relevance to assessing anxiety, with an emphasis on self-report. In: Tuma A, Maser J, eds. Anxiety and the anxiety disorders. Hillsdale, NJ: Lawrence Erlbaum Associates; 1985. p. 681-706.
 12. Skegg K, Nada-Raja S, Dickson N, et al. Perceived “out of control” sexual behavior in a cohort of young adults from the Dunedin Multidisciplinary Health and Development Study. *Arch Sex Behav* 2010;39:968-978.
 13. Digman JM. Personality structure: emergence of the five-factor model. *Annu Rev Psychol* 1990;41:417-440.
 14. Pinto J, Carvalho J, Nobre PJ. The relationship between the FFM personality traits, state psychopathology, and sexual compulsivity in a sample of male college students. *J Sex Med* 2013;10:1773-1782.
 15. Reid RC, Carpenter BN, Spackman M. Alexithymia, emotional instability, and vulnerability to stress proneness in patients seeking help for hypersexual behavior. *J Sex Marital Ther* 2008;34:133-149.
 16. Reid RC, Stein JA, Carpenter BN. Understanding the roles of shame and neuroticism in a patient sample of hypersexual men. *J Nerv Ment Dis* 2011;99:263-267.
 17. Church AT. Relating the Tellegen and five-factor models of personality structure. *J Pers Soc Psychol* 1994;67:898-909.
 18. Janssen E, Bancroft J. The dual-control model: the role of sexual inhibition and excitation in sexual arousal and behavior. In: Janssen E, ed. The psychophysiology of sex. Bloomington, IN: Indiana University Press; 2007. p. 197-222.
 19. Bancroft J, Janssen E. The dual control model of male sexual response: a theoretical approach to centrally mediated erectile dysfunction. *Neurosci Biobehav Rev* 2000;24:571-579.
 20. Janssen E, Vorst H, Finn P, Bancroft J. The Sexual Inhibition (SIS) and Sexual Excitation (SES) Scales: I. Measuring sexual inhibition and excitation proneness in men. *J Sex Res* 2002;39:114-126.
 21. Bancroft J, Vukadinovic Z. Sexual addiction, sexual compulsivity, sexual impulsivity, or what? Toward a theoretical model. *J Sex Res* 2004;41:225-234.
 22. Moser C. Hypersexual disorder: just more muddled thinking. *Arch Sex Behav* 2011;40:227-229.
 23. Steele V, Staley C, Fong T, et al. Sexual desire, not hypersexuality, is related to neurophysiological responses elicited by sexual images. *Socioaffect Neurosci Psychol* 2013;3:20770.
 24. Gray J. Brain systems that mediate both emotion and cognition. *Cogn Emot* 1990;4:269-288.
 25. Rettenberger M, Klein V, Briken P. The relationship between hypersexual behavior, sexual excitation, sexual inhibition, and personality traits. *Arch Sex Behav* 2016;45:219-233.
 26. van Lankveld J, Platteau T, van Montfort K, et al. The predictive validity of SIS/SES and BIS/BAS scores for sexual and non-sexual risk behavior. *Pers Individ Dif* 2015;79:7-12.
 27. Carver C, White T. Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: the BIS/BAS Scales. *J Pers Soc Psychol* 1994;67:319-333.
 28. Parsons JT, Rendina HJ, Ventuneac A, et al. Hypersexual, sexually compulsive, or just highly sexually active? Investigating three distinct groups of gay and bisexual men and their profiles of HIV-related sexual risk. *AIDS Behav* 2016;20:262-272.
 29. Bancroft J, Graham C, Janssen E, et al. The dual control model: current status and future directions. *J Sex Res* 2009;46:121-142.
 30. Parsons JT, Kelly BC, Bimbi DS, et al. Explanations for the origins of sexual compulsivity among gay and bisexual men. *Arch Sex Behav* 2008;37:817-826.
 31. Reid RC, Carpenter BN, Gilliland R, et al. Problems of self-concept in a patient sample of hypersexual men with attention-deficit disorder. *J Addict Med* 2011;5:134-140.
 32. Lloyd M, Raymond N, Miner M, et al. Borderline personality traits in individuals with compulsive sexual behavior. *Sex Addict Compulsivity* 2007;14:187-206.
 33. Miner MH, Raymond N, Mueller BA, et al. Preliminary investigation of the impulsive and neuroanatomical characteristics of compulsive sexual behavior. *Psychiatry Res* 2009;174:146-151.
 34. Black DW, Kehrberg LLD, Flumerfelt DL, et al. Characteristics of 36 subjects reporting compulsive sexual behavior. *Am J Psychiatry* 1997;154:243-249.
 35. Morgenstern J, Muench F, O’Leary A, et al. Non-paraphilic compulsive sexual behavior and psychiatric co-morbidities in gay and bisexual men. *Sex Addict Compulsivity* 2011;18:114-134.
 36. Raymond NC, Coleman E, Miner MH. Psychiatric comorbidity and compulsive/impulsive traits in compulsive sexual behavior. *Compr Psychiatry* 2003;44:370-380.
 37. Scanavino MT, Ventuneac A, Abdo CHN, et al. Compulsive sexual behavior and psychopathology among treatment-seeking men in São Paulo, Brazil. *Psychiatry Res* 2013;209:518-524.
 38. Redish AD, Jensen S, Johnson A. A unified framework for addiction: vulnerabilities in the decision process. *Behav Brain Sci* 2008;31:415-437.
 39. Patrick C, Curtin J, Tellegen A. Development and validation of a brief form of the Multidimensional Personality Questionnaire. *Psychol Assess* 2002;14:150-163.
 40. Miner MH, Coleman E, Center BA, et al. Compulsive Sexual Behavior Inventory: psychometric properties. *Arch Sex Behav* 2007;36:579-587.

41. Raymond NC, Lloyd M, Miner M, et al. Preliminary report on the development and validation of the Sexual Symptom Assessment Scale. *Sex Addict Compulsivity* 2007;14:119-129.
42. Patton JF, Stanford MS, Barratt ES. Factor structure of the Barratt Impulsiveness Scale. *J Clin Psychol* 1995;51:768-774.
43. Kessler R, Adler L, Ames M, et al. The World Health Organization adult ADHD self-report scale (ASRS): a short screening scale for use in the general population. *Psychol Med* 2005;35:245-256.
44. Berman AH, Bergman H, Palmstierna T, et al. "DUDIT Manual." The Drug Use Disorders Identification Test. Stockholm: Karolinska Institute, Department of Clinical Neuroscience; 2005.
45. Coleman E. Is your patient suffering from compulsive sexual behavior? *Psychiatr Ann* 1992;22:320-325.
46. Coleman E, Gratzner T, Nesvacil L, et al. Nefazodone and the treatment of nonparaphilic compulsive sexual behavior: a retrospective study. *J Clin Psychiatry* 2000;61:282-284.
47. Coleman E, Raymond N, McBean A. Assessment and treatment of compulsive sexual behavior. *Minn Med* 2003;86:42-47.
48. Raymond NC, Grant JE, Kim SW, et al. Treatment of compulsive sexual behaviour with naltrexone and serotonin reuptake inhibitors: two case studies. *Int Clin Psychopharmacol* 2002;17:201-205.
49. Raymond NC, Grant JE, Coleman E. Augmentation with naltrexone to treat compulsive sexual behavior: a case series. *Ann Clin Psychiatry* 2010;22:56-62.
50. Krueger RF, Hicks BM, Patrick CJ, et al. Etiologic connections among substance dependence, antisocial behavior and personality: modeling the externalizing spectrum. *J Abnorm Psychol* 2002;111:411-424.
51. Cassin S, von Ranson KM. Personality and eating disorders: a decade in review. *Clin Psychol Rev* 2005;25:895-916.
52. Lenzenweger MF, McClough JF, Clarkin JF, et al. Exploring the interface of neurobehaviorally linked personality dimensions and personality organization in borderline personality disorder: the Multidimensional Personality Questionnaire and Inventory of Personality Organization. *J Pers Disord* 2012;26:902-918.
53. Gray J. The psychology of fear and stress. Cambridge: Cambridge University Press; 1987.
54. Grov C, Parsons J, Bimbi D. Sexual compulsivity and sexual risk in gay and bisexual men. *Arch Sex Behav* 2010;39:940-949.
55. Parsons J, Grov C, Golub S. Sexual compulsivity, co-occurring psychosocial health problems, and HIV risk among gay and bisexual men: further evidence of a syndemic. *Am J Public Health* 2012;102:156-162.
56. Reid RC, Dhuffar MK, Parhami I, et al. Exploring facets of personality in a patient sample of hypersexual women compared with hypersexual men. *J Psychiatr Pract* 2012;18:262-268.
57. Cantor JM, Klein C, Lykins A, et al. A treatment-oriented typology of self-identified hypersexuality referrals. *Arch Sex Behav* 2013;42:883-893.