Arch Sex Behav (2017) 46:721–733
DOI 10.1007/s10508-015-0606-1

ORIGINAL PAPER

An Online Assessment of Personality, Psychological, and Sexuality Trait Variables Associated with Self-Reported Hypersexual Behavior

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Received: 3 February 2014 / Revised: 9 July 2015 / Accepted: 10 August 2015 / Published online: 26 October 2015

Abstract "Hypersexual" behavior represents a perceived inability to control one's sexual behavior. To investigate hypersexual behavior, an international sample of 510 self-identified heterosexual, bisexual, and homosexual men and women completed an anonymous online self-report questionnaire battery. In addition to age and sex (male), hypersexual behavior was related to higher scores on measures of sexual excitation, sexual inhibition due to the threat of performance failure, trait impulsivity, and both depressed mood and anxiety. In contrast, hypersexual behavior was related to *lower* scores on sexual inhibition due to the threat of performance consequences. Higher neuroticism and extraversion, as well as lower agreeableness and conscientiousness, also predicted hypersexual behavior. Interestingly, interactions among the variables assessed did not significantly predict hypersexual behavior, suggesting the possible existence of multiple and predominantly independent taxa for various persons reporting hypersexual behavior. Core personality features may also be present in persons with hypersexual behavior. Clinical implications and future research directions are discussed.

Keywords Hypersexual behavior · Sexual compulsivity · Sexual excitation · Sexual impulsivity · Sexual inhibition

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Introduction

"Hypersexual" behavior, also known variously as sexual compulsivity, out-of-control sexual behavior, and sexual addiction, is a condition in which individuals feel they are unable to regulate their own sexual behavior. Hypersexual behavior is usually described as a pattern of recurrent, intense, and excessive preoccupation with sexual fantasies, urges, and behaviors that individuals struggle to reduce or eliminate (Kafka, 2010; Kafka & Hennen, 2003; Reid, Garos, & Carpenter, 2011).

Clinically speaking, hypersexual behavior pertains to behaviors that are either conventional (i.e., euphilic, including consensual sex, masturbation, and cybersex) or unconventional (i.e., paraphilic, including exhibitionism, voyeurism, and sexual masochism), with various presentations suggesting different treatment directions and clinical management (Cantor et al., 2013). For clinicians assessing hypersexual behavior, the presentation normally comprises three categories of symptoms: observable (e.g., frequency of orgasm), subjective (e.g., one's personal perspective of his or her problematic sexual fantasies, urges, and behaviors), and consequences associated with out-of-control sexual behaviors (e.g., relationship conflict) (Hook, Hook, Davis, Worthington, & Penberthy, 2010).

The consequences of hypersexual behavior can be adverse and include sexually transmitted infections (including HIV) and unplanned pregnancies (Kalichman & Cain, 2004; McBride, Reece, & Sanders, 2008). Other adverse consequences associated with hypersexual behavior may include relationship dissolution, social isolation, loss of self-esteem, loss of employment, financial indebtedness (e.g., paying for prostitutes), and legal violations (e.g., sexual harassment) (Parsons, Kelly, Bimbi, Muench, & Morgenstern, 2007; Reid, Carpenter, & Lloyd, 2009). Adverse consequences arising from hypersexual behavior are associated with high levels of personal distress and impairment to functioning in one's life. Therefore, it is unsurprising that hypersexual behavior

is highly correlated with depressed mood and anxiety (Black, Kehrberg, Flumerfelt, & Schlosser, 1997; Kuzma & Black, 2008).

Attempts to Understand Hypersexual Behavior

A number of models have been put forth to explain hypersexual behavior. Possibly, the most widely discussed model conceptualizes hypersexual behavior as a sexual "addiction" (Carnes, 1991; Kingston & Firestone, 2008). This model attributes hypersexual behavior to the production of pleasure and reduction of painful affects in a pattern that is characterized by two key features: (a) recurrent failure to control sexual behavior, and (b) continuation of sexual behavior despite substantial harmful consequences (Goodman, 2001).

Three other principal models have been put forth to explain hypersexual behavior (Kafka, 2010). In the first model, hypersexual behavior is conceptualized as an impulse control disorder, similar to other disorders in which affected persons are unable to resist an impulse, drive, or temptation to perform an act that is harmful to that person (Kafka, 2010). It has been argued that sexual impulsivity is primarily motivated by the need to experience pleasure (Giugliano, 2009). In contrast, in the second model, hypersexual behavior is conceptualized as a compulsive behavior—acts which are motivated by the relief of anxiety or distress related to obsessive thoughts, impulses, or fantasies (Bancroft, Janssen, Strong, & Vukadinovic, 2003b; Black et al., 1997; Reid et al., 2009). In this model, it is suggested that these individuals use sexual activity as "self-medication" to aid in the relief of dysphoric mood states (Bancroft & Vukadinovic, 2004; Raymond, Coleman, & Miner, 2003; Reid & Carpenter, 2009; Reid, Carpenter, Spackman, & Willes, 2008). Lastly, the dual control model of sexual response has been suggested as a model for understanding hypersexual behavior. In this model, it is suggested that sexual responses and behavior depend upon a control mechanism in the brain that regulates the balance between inhibitory and excitatory systems (Bancroft, 1999; Bancroft & Janssen, 2000). Research supporting this model has shown that hypersexual individuals are prone to greater sexual excitation and lower sexual inhibition due to threat of performance consequences (e.g., unintended pregnancy, STI exposure) compared with the general population (Bancroft et al., 2003a, 2004; Kafka, 2003; Winters, Christoff, & Gorzalka, 2010).

Preliminary investigations have also linked hypersexual behavior to general personality factors including high neuroticism, low agreeableness, and low conscientiousness (Fagan et al., 1991; Reid et al., 2008). In addition, previous studies have found personality variables to be associated with risky sexual behaviors consistent with hypersexual behavior (Schmitt, 2004; Turchik, Garske, Probst, & Irvin, 2010). As noted by Hoyle, Fejfar, and Miller (2000), there is little research investigating the relationships among general personality domains and hypersexual behavior, although one recent study found that neuroticism and agreeableness both predicted sexual compulsivity (Pinto, Carvalho, & Nobre, 2013). Data such as these could improve our understanding of the personality domains most associated with hypersexual behavior, thereby informing and enhancing clinical assessment and treatment techniques for clinicians working with this population (Costa & McCrae, 1992a).

Current Study

What we call hypersexual behavior is very plausibly the result of a variety of mechanisms and etiologies (Bancroft & Vukadinovic, 2004) more complex than what has been proposed thus far. Further, it has been suggested, although not investigated, that the aforementioned models used to explain hypersexual behavior may not be mutually exclusive, but instead overlap (Rinehart & McCabe, 1997). Thus, the primary objectives of this study were to test whether the models of sexual impulsivity, sexual compulsivity, and dual control predicted, or interacted to predict hypersexual behavior. As such, we explored the validity of these three models in predicting hypersexual behavior by quantifying the sexual traits of sexual inhibition/sexual excitation (dual control), impulsivity (sexual impulsivity), and dysphoric mood states of depression and anxiety (sexual compulsivity).

If the dual control model explained hypersexuality, we hypothesized that hypersexual behavior would negatively correlate with sexual inhibition and positively correlate with sexual excitation (Hypothesis 1). If the sexual impulsivity model explained hypersexuality, we hypothesized that hypersexual behavior would positively correlate with trait impulsivity (Hypothesis 2). If the sexual compulsivity model explained hypersexuality, we hypothesized that hypersexual behavior would positively correlate with depressed mood and anxiety (Hypothesis 3). Lastly, we hypothesized that depressed mood and anxiety (primary components of the sexual compulsivity model) would interact with sexual inhibition and sexual excitation (primary components of the dual control model) and trait impulsivity (the sexual impulsivity model) to predict hypersexual behavior (Hypothesis 4). A further objective of this study was to assess which of the *Big 5* personality domains best predicted hypersexual behavior. Based upon the limited research of hypersexuality and the Neuroticism-Extraversion-Openness Five Factor Inventory-3 (NEO-FFI-3), we hypothesized that the personality domains of neuroticism would positively correlate with hypersexual behavior and agreeableness and conscientiousness would negatively correlate with hypersexual behavior.

Method

Participants

Persons were eligible to participate in the study if they were aged 18 or older. Participation was voluntary and not associated with any compensation. Participants were recruited

online (e.g., Facebook and sexual addiction forums) and from rural and metropolitan psychology and sexual health clinics in Australia. The study was also listed on research participation web pages of universities located in Australia, Spain, United Kingdom, and United States.

Participants identified themselves as being principally recruited online through social media (40.8 %), family, friends, and colleagues (24.3 %), a local Australian university (University of New England) (13.5 %), and other (21.4 %). A one-way ANOVA was conducted to explore whether recruitment influenced hypersexual behavior. The overall ANOVA results indicated a statistically significant difference between these recruitment groups regarding the level of hypersexual behavior $F(3, 506) = 4.54$, $p < .01$, $r = .22$. However, post hoc comparisons using the Tukey HSD test generally found no significant differences between the four recruitment categories in predicting hypersexual behavior, although the mean score for the social media group ($M = 35.08$, $SD = 14.04$) was found to be significantly different from the family, friends, and colleagues group ($M = 40.61$, $SD = 15.00$).

A priori power analysis was conducted using G*Power 3.1.2 (Faul, Erdfelder, Buchner, & Lang, 2009) to ascertain the number of participants required for statistical analyses using multiple regression. Assuming a small-to-medium effect size ($f^2 = .10$), a critical α of .05, directional hypotheses, a target power of .80, and six predictors, G*Power 3.1.2, indicated a minimum of 143 participants were required for the study.

When the participants' data were analyzed, a methodological error was found to exist because the classification of transgender participants was uncertain. However, given the small percentage of transgender persons in general society, we believe it to be unlikely that many transgender individuals (if any) participated in the study. Data were removed for five participants due to age (e.g., under 18 years or undisclosed age), resulting in a final sample of 510 participants (267 males and 243 females; 69 % completion rate). The respective mean age of male and female participants was 36.52 years ($SD = 12.66$) and 30.38 years ($SD = 12.12$). Power was calculated to be .99, based upon a final sample size of 510 participants. Table 1 summarizes participants' demographic characteristics.

The study was approved by the Human Research Ethics Committee of the University of New England and the survey was administered to participants via Qualtrics, a secure online survey platform. Following participants reading the informed consent procedures, they completed the questionnaire during one session, in the same order, and at their own pace.

Table 1 Participant characteristics

Variable	Participants (*n*)	Percent (%)
Gender		
Male	267	52.4
Female	243	47.6
Nationality/cultural identity		
Australian/New Zealand	187	36.7
Asian	27	5.3
United States/Canadian	128	25.1
English/Irish/Welsh/Scottish	72	14.1
European	27	5.3
African	16	3.1
Other	53	10.4
Sexual orientation		
Heterosexual	388	76.1
Bisexual	58	11.4
Homosexual/transgender	64	12.5
Relationship status		
Never married	280	54.9
Married/defacto	167	32.7
Widowed	3	0.6
Divorced/separated	60	11.8
Education level		
High school	194	38.0
Trade certificate or diploma	85	16.7
Undergraduate degree	156	30.6
Postgraduate degree	75	14.7
Employment status		
Employed (full-time)	229	44.9
Employed (part-time)	68	13.3
Unemployed/ill/disability	21	4.1
Home duties	10	2.0
Student (full-time or part-time)	168	32.9
Retired	14	2.8
Mental health status		
Bipolar disorder	21	4.1
Anti-depressants	55	10.8
Child Sexual Abuse	90	17.6

$N = 510$

Measures

Demographic Variables

Participants were queried for their sex, age, nationality/cultural background, sexual orientation, relationship status, employment status, education level, whether they were currently taking anti-depressant medication, and whether they had a history of bipolar disorder and/or suffered childhood sexual abuse. The last two variables were included to assess any potential relationships to observed hypersexual behavior, because previous sexual trauma as well as manic and hypomanic episodes/symptoms is known to be associated with hypersexuality.

Sexual Inhibition/Sexual Excitation

Propensities for sexual inhibition and sexual excitation were measured using the Sexual Inhibition/Sexual Excitation Scales (SIS/SES) (Janssen, Vorst, Finn, & Bancroft, 2002). This study

integrated male and female versions of the scales which involved adjusting four scale items that were specific to the male and female versions of the SIS/SES scales to assess a combined male/female population (e.g., "I need my clitoris to be stimulated/penis to be touched to continue feeling aroused"). The SIS/SES is a 45-item self-report questionnaire comprising three subscales: SIS1, SIS2, and SES. The SIS1 subscale assesses propensity for sexual inhibition due to the threat of performance failure (e.g., loss of erection). The SIS2 subscale assesses propensity for sexual inhibition due to the threat of performance consequences (e.g., unintended pregnancy). The SES subscale assesses an individual's propensity for sexual excitation/arousal. Higher scores on each subscale represent higher propensities for these characteristics. Both SIS subscales have adequate internal consistency, with Cronbach's alphas ranging from .78 to .83 for SIS1 and .69 to .75 for SIS2; the SES subscale has high internal consistency, with Cronbach's alpha ranging from .88 to .89 (Janssen et al., 2002). In the present study, internal consistency for the SIS/SES scales ranged from adequate to high, with Cronbach's alphas of .79 (SIS1), .82 (SIS2), and .93 (SES). The SIS/SES scales exhibit moderate correlations with other sexuality-related scales such as the Sexual Opinion Survey, although most of these other scales measure a mixture of attitudes and behavior including sexual behavior (Bancroft, Graham, Janssen, & Sanders, 2009).

Impulsivity

Trait impulsivity was assessed using the Barratt Impulsiveness Scale (BIS-11) (Patton, Stanford, & Barratt, 1995). The BIS-11 is a 30-item self-report scale that assesses the way people think and act in a variety of situations (e.g., "I do things without thinking"). Higher BIS-11 scores indicate a greater level of trait impulsivity. The BIS-11 scale has demonstrated high internal consistency (Cronbach's alpha = .83) and test–retest reliability of .83 (Stanford et al., 2009). In this study, internal consistency for the BIS-11 scale was also high, with a Cronbach's alpha of .84. The BIS scale also demonstrates high correlation (convergent validity) with similar self-report measures, including the Zuckerman Sensation-Seeking Scale, the Eysenck Impulsiveness Scale, and the Behavioral Inhibition/Activation Scales (Stanford et al., 2009).

Depressed Mood and Anxiety

Depressed mood and anxiety were measured using the Depression Anxiety Stress Scales (DASS-21) (Antony, Bieling, Cox, Enns, & Swinson, 1998; Lovibond & Lovibond, 1995). The DASS-21 is a self-report questionnaire that comprises three seven-item subscales measuring participants' mood, anxiety, and stress over the past week. Higher subscale scores represent greater levels for these characteristics. Researchers using the DASS have reported high concurrent validity coefficients (.87 and .84) and high internal consistency (Cronbach's alpha = .89) (Akin & Cetn, 2007). In the present study, internal consistency for the anxiety and depressed mood subscales ranged from adequate to high, with Cronbach's alphas of .76 and .91, respectively. Furthermore, the DASS-21 scales have been found to exhibit good convergent and discriminant validity with other measures of anxiety and depressed mood (e.g., Hospital Anxiety and Depression Scale) (Henry & Crawford, 2005).

Personality Domains

Personality variables were measured using the NEO-FFI-3 inventory (Costa & McCrae, 1989, 1992b; McCrae & Costa, 2004). The NEO-FFI-3 is a widely used 60-item self-report scale that measures the general description of an individual's personality across five broad domains of neuroticism (*N*), extraversion (*E*), openness to experience (*O*), agreeableness (*A*), and conscientiousness (*C*). Higher subscale scores indicate greater levels of the domains measured. The NEO-FFI-3 exhibits adequate internal consistency with Cronbach's alpha coefficients of $N = .79$, $E = .79$, $O = .80$, $A = .75$, and $C = .83$ (Sherry, Hewitt, Flett, Lee-Baggley, & Hall, 2007). In this study, internal consistency for the NEO-FFI-3 subscales ranged from adequate to high, with Cronbach's alphas for $N = .87$, $E = .80$, $O = .79$, $A = .77$, and $C = .88$. In addition, the NEO-FFI scale has been found to be reliable, valid and useful in a variety of contexts (e.g., predicting personality disorders) and cultures (McCrae & Costa, 2004).

Hypersexual Behavior

Hypersexual behavior was measured by analyzing the total score for the Hypersexual Behavior Inventory (HBI) (Reid et al., 2011). The HBI is a 19-item self-report questionnaire that measures participants' hypersexual behavior in three subscales: coping, consequences, and control. Reid et al. (2011) demonstrated that the HBI scale has strong concurrent validity with theoretically related measures such as the Compulsive Sexual Behavior Inventory (Coleman, Miner, Ohlerking, & Raymond, 2001) ($r = .92, p < .01$) and the Sexual Compulsivity Scale (Kalichman & Rompa, 1995) ($r = .82, p < .01$). The scale also has excellent 2-week test–retest reliability (subscale correlations ranged from .88 to .90) and high internal reliability, with a Cronbach's alpha of .96 based on a sample of 203 persons who sought treatment for hypersexual behaviors (Reid et al., 2011). In the current study, internal consistency for the HBI was high (Cronbach's alpha = .94).

Statistical Analyses

All statistical analyses were conducted with SPSS v. 23. Two hierarchical multiple regressions were used to ascertain

whether mood—depressed mood for regression 1 and anxiety for regression 2—moderated the relationship between sexual traits (i.e., sexual inhibition, sexual excitation, and impulsivity) and hypersexual behavior. Moderation was tested using centered variables to calculate the two-way interaction term (i.e., sexual traits by moderator). To explore the personality domains most associated with hypersexual behavior, a third hierarchical multiple regression was performed to analyze the relationship between participants' NEO-FFI-3 scores and hypersexual behavior. All hierarchical multiple regression analyses were based on 1000 bias-corrected bootstrapped samples.

Age and gender were entered as covariates in all regression analyses, because hypersexual behavior has been found to be more prevalent in males than females and has a higher prevalence in younger adults than in older adults (Kafka & Hennen, 2003; Långström & Hanson, 2006). Sexual orientation was entered as a covariate because on average homosexual males in particular typically report different norms and behavior than heterosexuals regarding their number of sexual partners (Kelly, Bimbi, Nanin, Izienicki, & Parsons, 2009; Yeagley, Hickok, & Bauermeister, 2014). The covariate of sexual orientation compared heterosexual participants (172 males and 216 females) to non-heterosexual participants (bisexual—34 males and 24 females; homosexual—61 males and 3 females).

Child Sexual Abuse (CSA) ($n = 90$) also was entered in as a covariate because empirical evidence has linked CSA to risky sexual behavior and HIV infection (Jinich et al., 1998) and sexual compulsivity/sexual addiction (Carnes, 1991; Katehakis, 2009; Maltz, 2002; Perera, Reece, Monahan, Billingham, & Finn, 2009). The assessment of CSA asked participants "In childhood, did you ever experience what you consider to be sexual abuse?" and their answer was rated on a 2-point yes or no Likert scale. Finally, a diagnosis of bipolar disorder ($n = 21$) was entered as a covariate because manic and hypomanic episodes in persons with bipolar disorder can precipitate hypersexual behavior (American Psychiatric Association, 2013; Kafka, 2010). Bipolar disorder was assessed by asking participants "Have you been diagnosed with bipolar disorder?"

Descriptive statistics indicated large positive skews on several variables (depressed mood, anxiety, and hypersexual behavior). Analyses were repeated using log and square root transformations of these variables yielding the same pattern of significant associations; as such, the results on the untransformed data are reported here. Bootstrapping was performed to correct an observed heteroscedasticity in the residuals for hypersexual behavior.

Results

Reid (2010) suggested an HBI cut-off score of 53 for male participants to identify clinically significant hypersexual behavior. Given an absence of clinically relevant data on women, the same cut-off score was applied to female participants. Based on this cut-off score, 94 participants (18.4 % of total sample) exhibited clinically significant hypersexual behavior. This subsample consisted of 63 males (mean age = 32.70, $SD = 13.61$) and 31 females (mean age = 23.06, $SD = 5.85$). In addition, using the recommended cut-offs for the DASS-21 (depressed mood and anxiety) and BIS-11, 45 participants indicated depressed mood (8.8 %, score ≥ 11), 42 indicated anxiety (8.2 %, score ≥ 8), and 95 indicated trait impulsivity (18.6 %, score > 72).

Descriptive statistics and intercorrelations (one-tailed) for the key variables are provided in Table 2. Given the non-normal distribution of the data for depressed mood, anxiety, and hypersexual behavior, Spearman correlations were used to assess all intercorrelations among the key variables. Correlational analyses indicated that the correlation coefficients for the control variables age and gender were both negatively correlated with hypersexual behavior, $p < .01$. As expected, the predictor variables of sexual excitation and trait impulsivity were both positively correlated with hypersexual behavior, $p < .01$, while SIS2 (threat of performance consequences) was negatively correlated with hypersexual behavior, $p < .01$. Contrary to expectations, SIS1 (threat of performance failure) exhibited a positive relationship to hypersexual behavior, $p < .01$. Depressed mood and anxiety also were both positively correlated with hypersexual behavior, $p < .01$. Thus, the data indicated that hypersexual behavior is more common for males, and those who report being younger in age, more easily sexually excited, more sexually inhibited due to the threat of performance failure, less sexually inhibited due to the threat of performance consequences, and more impulsive, anxious, and depressed.

Depressed Mood, Sexual Traits, and Hypersexual Behavior

For all regression analyses, the covariates of age and gender were forced into the regression as Block 1, and sexual orientation, bipolar disorder and CSA were entered as Block 2. The sexual traits of sexual excitation, SIS1, SIS2, as well as impulsivity and depressed mood, were entered into the regression analysis as Block 3, and four 2-way interactions terms (i.e., sexual traits × depressed mood) were entered into Block 4 (see Table 3).

The omnibus regression model was significant, $F(14, 495) = 23.31$, $p < .001$, collectively explaining 40 % of the variance in hypersexual behavior. Results indicated the five control variables collectively explained 13 % of the variance in hypersexual behavior, $F(5, 504) = 15.68$, $p < .001$. The variables in Block 3 (e.g., sexual excitation, SIS1, SIS2, trait impulsivity, and depressed mood) explained an additional 25 % of the variance in hypersexual behavior, $F(10, 499) = 31.57$, $p < .001$. The interaction terms were not significant.

Thus, results indicated that participants who scored higher on hypersexual behavior were found to have significantly

Table 2 Descriptive statistics and intercorrelations for the key independent variables and hypersexual behavior

Predictor		1	2	3	4	5	6	7	8	9	10	11	12
1.	Age	–											
2.	Gender	−.25**	–										
3.	Sexual orientation	.09*	−.29**	–									
4.	Bipolar disorder	−.03	−.10*	−.02	–								
5.	Child sexual abuse	−.05	−.09*	−.09*	.09*	–							
6.	Sexual excitation	.15**	−.32**	.15**	−.02	.04	–						
7.	SIS1[a]	.05	.02	−.03	−.09*	−.04	.14**	–					
8.	SIS2[b]	−.00	.35**	−.08*	−.02	−.06	−.23**	.27**	–				
9.	Trait impulsivity	−.12**	.03	−.03	−.19**	−.09*	.10*	.08*	−.08*	–			
10.	Depression	−.18**	.10*	.03	−.17**	−.17**	−.03	.20**	.13**	.24**	–		
11.	Anxiety	−.28**	.12**	.05	−.10*	−.16**	−.01	.15**	.13**	.27**	.57**	–	
12.	Hypersexual behavior	−.17**	−.25**	.08*	−.04	−.08*	.41**	.21**	−.23**	.22**	.31**	.23**	–
	M	33.59	–	–	–	–	53.15	33.05	31.06	61.99	3.79	2.63	38.37
	SD	12.77	–	–	–	–	10.09	5.38	5.71	10.69	4.35	2.96	15.05
	Range (min–max)	18–70	1–2	1–2	1–2	1–2	20–80	14–56	11–44	36–97	0–21	0–21	19–95

$N = 510$ (listwise)

[a] Sexual inhibition due to the threat of performance failure

[b] Sexual inhibition due to the threat of performance consequences

Spearman correlation coefficients, * $p < .05$, ** $p < .01$

higher levels of sexual excitation, $p < .001$, and trait impulsivity, $p < .01$, and significantly lower levels of SIS2, $p < .001$ (supporting Hypothesis 1). In contrast to Hypothesis 1, SIS1 was found to positively rather than negatively predict hypersexual behavior, $p < .001$. Hypothesis 2 was supported as depressed mood was found to positively predict hypersexual behavior, $p < .001$. Regarding Hypothesis 3, depressed mood was found not to moderate the relationship between sexual traits and hypersexual behavior.

Anxiety, Sexual Traits, and Hypersexual Behavior

The regression result for the overall model was significant, $F(14, 495) = 20.64$, $p < .001$, and indicated that the set of variables analyzed collectively explained 37 % of the variance in hypersexual behavior. Specifically, the regression results indicated the five control variables significantly explained 13 % of the variance in hypersexual behavior, $F(5, 504) = 15.68$, $p < .001$ (see Table 4). The regression results mostly supported Hypothesis with sexual excitation, SIS1, SIS2, trait impulsivity, and anxiety significantly explaining an additional 23 % of the variance in hypersexual behavior, $F(10, 499) = 28.09$, $p < .001$. In particular, participants who scored higher on hypersexual behavior were found to have significantly higher levels of sexual excitation, $p < .001$, and trait impulsivity, $p < .001$, and significantly lower levels of SIS2, $p < .001$. As in the previous regression analysis and in contrast to Hypothesis 1, SIS1 was found to positively rather than negatively predict hypersexual behavior, $p < .001$. Hypothesis 2 was supported, as anxiety was found to positively predict hypersexual behavior, $p < .001$. Regarding Hypothesis 3, anxiety was not found to moderate the relationship between sexual traits and hypersexual behavior.

NEO-FFI-3 Personality Domains and Hypersexual Behavior

The result for the entire regression model was significant, $F(10, 499) = 17.19$, $p < .001$, and indicated the variables analyzed collectively explained 26 % of the variance in hypersexual behavior. Specifically, participants scoring higher on hypersexual behavior were found to have significantly higher levels of neuroticism, $p < .001$, and extraversion, $p < .01$, and significantly lower levels of agreeableness, $p < .001$, and conscientiousness, $p < .05$. Openness to experience was not found to predict hypersexual behavior (see Table 5).

Discussion

The current study found that sexual traits of sexual excitation, sexual inhibition, and impulsivity were strongly related to hypersexual behavior; higher propensity for sexual excitation, lower propensity for sexual inhibition due to the threat of performance consequences (SIS2), and higher trait impulsivity all positively predicted hypersexual behavior. The prediction that lower SIS1 (inhibition due to the threat of performance failure) would relate negatively to hypersexual behavior was not

Table 3 Hierarchical regression analyses for the interactions between sexual traits and depression

	Bootstrap					
			95 % CI for *b*			
Predictor	*b*	*SE*	Lower	Upper	R^2	*sr*
Step 1					.11***	
Age	−.29***	.05	−.38	−.19		−.23
Gender	−8.94***	1.33	−11.57	−6.28		−.29
Step 2					.02**	
Age	−.30***	.05	−.39	−.20		−.25
Gender	−9.61***	1.44	−12.43	−6.66		−.29
Sexual orientation	−.02	1.16	−2.22	2.32		−.00
Bipolar disorder	−5.34	3.46	−11.88	1.31		−.07
Child sexual abuse	−5.09**	1.86	−9.01	−1.39		−.13
Step 3					.25***	
Age	−.24***	.04	−.32	−.15		−.19
Gender	−5.66***	1.27	−8.18	−3.11		−.16
Sexual orientation	−.04	.91	−1.93	1.73		−.00
Bipolar disorder	2.11	3.44	−4.35	9.33		.03
Child sexual abuse	−2.90	1.56	−6.10	.18		−.07
Sexual excitation	.41***	.06	.28	.53		.24
SIS1[a]	.49***	.12	.26	.72		.15
SIS2[b]	−.47***	.11	−.69	−.25		−.15
Trait impulsivity	.18**	.05	.07	.28		.12
Depression	.90***	.15	.61	1.21		.24
Step 4					.01	
Age	−.23***	.04	−.31	−.14		−.18
Gender	−5.75***	1.29	−8.28	−3.32		−.16
Sexual orientation	−.11	.90	−2.03	1.55		−.01
Bipolar disorder	2.40	3.49	−4.36	9.61		.03
Child sexual abuse	−3.11*	1.56	−6.19	−.05		−.08
Sexual excitation	.40***	.06	.28	.53		.24
SIS1	.50***	.12	.26	.72		.16
SIS2	−.47***	.12	−.70	−.25		−.15
Trait impulsivity	.16**	.06	.05	.27		.11
Depression	.91***	.17	.60	1.24		.22
Sexual excitation × depression	.02	.02	−.01	.05		.05
SIS1 × depression	−.00	.03	−.06	.07		−.00
SIS2 × depression	−.03	.03	−.09	.03		−.04
Trait impulsivity × depression	.01	.01	−.02	.04		.03

$N = 510$

[a] Sexual inhibition due to the threat of performance failure

[b] Sexual inhibition due to the threat of performance consequences

* $p < .05$ (one-tailed), ** $p < .01$ (one-tailed), *** $p < .001$ (one-tailed)

$R^2 = .40$***. Adjusted $R^2 = .38$

supported, although this variable was found to relate positively to hypersexual behavior. Psychological variables of depressed mood and anxiety were strongly related to hypersexual behavior, supporting the hypothesis that higher depressed mood and higher anxiety were related to increased hypersexual behavior. With respect to the interactions tested, neither depressed mood nor anxiety was found to moderate the relationships between the sexual traits assessed and hypersexual behavior.

Although not hypothesized, we subsequently used our hierarchical regression model to examine whether trait impulsivity

Table 4 Hierarchical regression analyses for the interactions between sexual traits and anxiety

	Bootstrap					
			95 % CI for *b*			
Predictor	*b*	*SE*	Lower	Upper	R^2	*sr*
Step 1					.11***	
Age	−.29***	.05	−.38	−.18		−.23
Gender	−8.94***	1.26	−11.50	−6.49		−.29
Step 2					.02**	
Age	−.30***	.05	−.40	−.19		−.25
Gender	−9.61***	1.34	−12.18	−6.93		−.29
Sexual orientation	−.02	1.12	−2.19	2.17		−.00
Bipolar disorder	−5.34	3.58	−12.51	1.62		−.07
Child sexual abuse	−5.09**	1.83	−8.61	−1.78		−.13
Step 3					.23***	
Age	−.22***	.05	−.32	−.13		−.17
Gender	−5.85***	1.29	−8.40	−3.35		−.16
Sexual orientation	−.12	.90	−1.93	1.56		−.01
Bipolar disorder	.14	3.34	−6.07	6.83		.00
Child sexual abuse	−2.93	1.56	−5.93	.29		−.07
Sexual excitation	.39***	.06	.27	.51		.24
SIS1[a]	.53***	.11	.31	.75		.17
SIS2[b]	−.45***	.12	−.68	−.21		−.15
Trait impulsivity	.19***	.06	.08	.30		.13
Anxiety	.96***	.22	.54	1.39		.17
Step 4					.01	
Age	−.23***	.05	−.32	−.14		−.18
Gender	−6.05***	1.27	−8.58	−3.48		−.17
Sexual orientation	−.32	.92	−2.11	1.40		−.01
Bipolar disorder	.02	3.37	−6.35	6.71		.00
Child sexual abuse	−2.94	1.57	−5.89	.31		−.07
Sexual excitation	.39***	.06	.26	.51		.23
SIS1	.51***	.11	.29	.73		.16
SIS2	−.44***	.12	−.69	−.21		−.14
Trait impulsivity	.19***	.06	.08	.30		.13
Anxiety	.86***	.23	.41	1.32		.14
Sexual excitation × anxiety	.03	.02	−.01	.08		.05
SIS1 × anxiety	.01	.04	−.07	.10		.01
SIS2 × anxiety	.01	.04	−.07	.10		.02
Trait impulsivity × anxiety	.01	.02	−.03	.05		.02

$N = 510$

[a] Sexual inhibition due to the threat of performance failure

[b] Sexual inhibition due to the threat of performance consequences

* $p < .05$ (one-tailed), ** $p < .01$ (one-tailed), *** $p < .001$ (one-tailed)

$R^2 = .37$***. Adjusted $R^2 = .35$

moderated the relationships between sexual traits (sexual excitation and sexual inhibition), mood (depressed mood and anxiety), and hypersexual behavior. Similar to the results received for our regression models involving depressed mood and anxiety, trait impulsivity was found not to moderate the relationships between any of the predictor variables assessed and hypersexual behavior. Finally, we also used our previously described regression model to explore separately whether any NEO personality domains moderated the relationships between sexual traits, mood, and hypersexual behavior. The data showed little evidence that

Table 5 Hierarchical regression using the personality domains of the NEO-FFI-3 as predictors of hypersexual behavior

	Bootstrap					
			95 % CI for *b*			
Predictor	*b*	*SE*	Lower	Upper	R^2	*sr*
Step 1					.11***	
Age	−.29***	.05	−.38	−.18		−.23
Gender	−8.94***	1.27	−11.57	−6.65		−.29
Step 2					.02**	
Age	−.30***	.05	−.39	−.19		−.25
Gender	−9.61***	1.34	−12.33	−7.01		−.29
Sexual orientation	−.02	1.15	−2.19	2.21		−.00
Bipolar disorder	−5.34	3.55	−12.46	1.65		−.07
Child sexual abuse	−5.09**	1.79	−8.57	−1.44		−.13
Step 3					.12***	
Age	−.17**	.05	−.26	−.07		−.13
Gender	−8.29***	1.39	−11.21	−5.65		−.24
Sexual orientation	.21	1.05	−1.87	2.30		.01
Bipolar disorder	−1.26	3.58	−7.93	6.51		−.02
Child sexual abuse	−3.52*	1.74	−6.77	−.20		−.09
Neuroticism	.44***	.07	.31	.59		.22
Extraversion	.25**	.09	.06	.42		.10
Openness	.05	.09	−.12	.22		.02
Agreeableness	−.44***	.11	−.65	−.23		−.19
Conscientiousness	−.16*	.08	−.32	−.00		−.08

$N = 510$

* $p < .05$ (one-tailed), ** $p < .01$ (one-tailed), *** $p < .001$ (one-tailed)

$R^2 = .26$***. Adjusted $R^2 = .24$

NEO personality domains interacted with either sexual traits or mood variables assessed and hypersexual behavior.

The results generally support the notion of sexual addiction, specifically those aspects which suggest that individuals we classify as hypersexual may use sexual behavior as a coping strategy, may feel that they have little self-control over their sexual behavior, and may continue to engage in sexual behavior despite substantially harmful consequences to themselves. Additionally, the results are generally consistent with the theories of dual control, sexual impulsivity, and sexual compulsivity as separate entities, given the overall lack of moderation in the regression models. The findings are also consistent with prior literature reports of significant associations between higher sexual excitation, lower SIS2 (Bancroft et al., 2003a, 2004; Winters et al., 2010), and higher trait impulsivity (Barth & Kinder, 1987; Kaplan, 1995) with increased hypersexual behavior. In addition, the results are consistent with literature reports of significant associations between higher depressed mood, higher anxiety, and increased hypersexual behavior (Bancroft & Vukadinovic, 2004; Raymond et al., 2003; Reid & Carpenter, 2009).

Findings were consistent with reports indicating that persons who receive treatment for hypersexual behavior are more likely to be male around 35 years of age (Kafka & Hennen, 2003; Långström & Hanson, 2006). Surprisingly, the study found that females who exhibited significant hypersexual behavior were on average only 23 years of age, which is probably explained by the disproportionate number of female undergraduate participants who completed the survey questionnaire. The control variable of CSA was found to predict hypersexual behavior for depression and personality regression models, $p < .05$. In contrast, the control variables of sexual orientation and bipolar disorder did not predict hypersexual behavior individually across the three regression models analyzed. The non-significant findings for sexual orientation and bipolar disorder were inconsistent with aforementioned literature. However, collectively, the control variables of sexual orientation, CSA and bipolar disorder (entered in block 2 of the regression models) explained 2 % of the variance in hypersexual behavior, $p < .01$.

In this study, bipolar disorder and CSA may not have individually predicted hypersexual behavior because too few participants reported bipolar disorder. In addition, the strength of the association between CSA and hypersexual behavior may have been affected because CSA was measured with a single item on the questionnaire which asked participants whether

they had experienced CSA. It is possible that a single-item measure for CSA might not adequately assess the variety of presentations or subtypes of this construct. Furthermore, these relationships may have been stronger if we had specifically targeted populations with bipolar disorder and/or individuals with a history of CSA.

The finding that higher SIS1 predicted hypersexual behavior seems somewhat counterintuitive; however, some research has found that higher sexual inhibition related to the threat of performance failure is associated with erectile dysfunction and risky sexual behaviors in males (Bancroft et al., 2003a, 2009). Because risky sexual behaviors are common among hypersexual behaviors, it is possible that some hypersexual persons engage in unprotected sex (possibly because of greater genital sensation) to mitigate their sexual dysfunction and associated threat of sexual performance failure. Further, the results of this study found that depressed mood and anxiety were strong predictors of hypersexual behavior, and therefore, some hypersexual participants may be anxious about their sexual performance, as indicated by the higher scores for SIS1.

Collectively, the results suggest that hypersexual behavior is multifaceted; it may be that similar behavior comes about via one of three (or possibly more) taxa: First, hypersexual behavior for some persons is best explained as dysregulated sexual inhibition/sexual exhibition proneness. This finding suggests that these hypersexual persons are more easily sexually aroused when in the presence of an attractive person compared to the general population. Further, such persons are also likely to engage in sexual fantasies, be stimulated by pornography or simply erotic pictures, and interpret neutral social interactions to have a sexual component. Regarding sexual inhibition due to the threat of performance failure, some hypersexual persons are likely to experience sexual performance anxiety and difficulty maintaining arousal during sexual activity. With respect to sexual inhibition due to the threat of performance consequences, some hypersexual persons are likely to be less inhibited about the personal consequences of engaging in sexual behavior—whether this involves being overheard by others or the risk of contracting a sexually transmitted infection, for example. Logically, it also follows that such hypersexual persons are likely to positively reinforce their propensities for sexual inhibition/sexual excitation by spending significant amounts of time and emotional energy thinking, fantasizing, and seeking out sexual stimuli relative to the general population.

Second, hypersexual behavior for another group is best explained as greater trait impulsivity when compared with adults whose sexual functioning is typical. This suggests that for persons whose trait impulsivity is a primary driver of their hypersexual behavior, there exists an underlying need to experience sexual pleasure (Giugliano, 2009), whether that be with another person or persons, or mainly solitary behavior such as masturbation during participation in an anonymous online chat site. Further, such hypersexual persons will probably exhibit little planning or cognitive thought regarding seeking out ongoing sexual experiences. The spontaneous triggering of hypersexual desire in some persons is most likely exacerbated by poor self-regulation of one's sexual desires and little consideration shown for the potential adverse consequences of hypersexual behavior (e.g., relationship breakdown).

Finally, for some hypersexual persons, sexual behavior represents a maladaptive coping mechanism to relieve anxiety and depressed mood. Hypersexual behavior, for these persons, could originate as repetitive sexual thoughts and images that cause considerable personal psychological distress and are relieved through sexual behavior. For other persons, sexual compulsions are most likely driven to mitigate their experience of depressed mood and/or anxiety. In such cases, and for hypersexual persons in general, any improvement in psychological or emotional well-being from engaging in such sexual behavior is likely to be temporary, as subsequent emotional states of guilt and shame can increase following sexual activity (Gilliland, South, Carpenter, & Hardy, 2011). In summary, the results collectively suggest that it may be central for clinicians treating hypersexual behavior to identify which of these potential taxa best explains a particular client's behavior.

NEO-FFI-3 Personality Domains

The results found that NEO personality domains of neuroticism, extraversion, agreeableness, and conscientiousness were related to hypersexual behavior, with higher neuroticism and lower agreeableness being strong predictors of hypersexual behavior. These findings are consistent with the small number of published literature reports (Fagan et al., 1991; Hoyle et al., 2000; Pinto et al., 2013; Reid et al., 2008). Neuroticism was most predictive of the Big 5 personality domains measured in the study. This likely reflects the importance of impulsiveness, anxiety, and depressed mood as personality facets that come under the auspice of negative affectivity related to neuroticism. High scores on these facets thus are consistent with the theories of sexual impulsivity/sexual compulsivity and hypersexual behavior. Perhaps most interestingly is that this was the first study to assess potential interactions between personality and sexuality variables in predicting hypersexual behavior, yet no interactions were found to be significant despite high statistical power. Collectively, the results provide a unique view into non-sexual personality variables associated with hypersexual behavior, but because of the novelty of this study, should be considered somewhat preliminary.

Clinical Implications

The results included 94 participants (18.4 %) who exhibited clinically relevant hypersexual behavior. This rate appears high given the rate of hypersexual behavior is thought to be considerably lower than that in the general population (Kuzma & Black, 2008). However, the high rate of participants found to exhibit clinically relevant hypersexual behavior was most likely

because the study specifically targeted such persons. These results also may suggest that either the HBI scale is liberally interpreting hypersexual behavior, or some participants are overestimating the clinical nature of their sexual behavior. We suggest clinicians be mindful that human sexual behavior is complex and occurs across multiple contexts (e.g., social, cultural, and religious) from which some persons may erroneously judge their sexual behavior to be hypersexual when their sexual functioning is actually within typical parameters (Grubbs, Exline, Pargament, Hook, & Carlisle, 2015).

The Big 5 results from the present data suggest the possibility of a core personality presentation that may predispose a subset of persons toward having or reporting hypersexual behavior. Indeed, clinical knowledge of core personality features may assist clinical conceptualization. The results also suggest that clinicians include personality assessment as part of assessment and treatment planning. For example, persons higher in neuroticism (e.g., depressed mood and hostility) and lower in agreeableness (e.g., trust and compliance) might benefit most from interventions which are different than clients presenting with hypersexual behavior who are low in those features. In addition, clinicians could find that these clients who exhibit high neuroticism and low agreeableness have limited motivation for receiving treatment and are also challenging to engage in treatment (Cantor et al., 2013; Kaplan & Krueger, 2010; Reid, 2007). This is understandable given sex is usually very pleasurable, and clients are often very reluctant to give up these behaviors despite negative consequences (Canning Fulton, 2002). Further, clients who exhibit lower agreeableness may not acknowledge their behavior as problematic. This may be particularly the case for the percentage of hypersexual clients who have committed sexual offenses and for whom the legal system has ordered psychological treatment. Therefore, it is important that clinicians also assess the client's nature and degree of motivation for treatment and develop a plan to address this (Reid, 2007).

The results suggest that some individuals receiving treatment for hypersexual behavior could be clinically depressed and or living with generalized anxiety (Kafka & Hennen, 2002). Further, depressed mood and anxiety may be important risk variables that contribute to the onset, severity, and relapse of hypersexual behavior (Kaplan & Krueger, 2010). Therefore, where applicable and to enhance treatment outcomes, clinicians should consider treating hypersexual clients for depressed mood and anxiety while concomitantly treating hypersexual behavior. This integrated treatment may include referral to a medical practitioner for assessment of clients' dysphoric mood states. Indeed, such clients could benefit from anti-depressant and/or anti-anxiety medications in conjunction with receiving psychological treatment for hypersexual behavior (Giugliano, 2009; Kafka, 1991; Kafka & Prentky, 1992). Finally, with respect to hypersexual persons whose behavior is sexually impulsive, these individuals may be difficult to engage in treatment given the powerful role of positive reinforcement mechanisms (Koob, 2006).

Limitations and Future Directions

These results should be interpreted with caution. It is important to note, that because we specifically targeted sex addiction groups in recruitment, our sample may not be representative of the general population. Regarding future research of hypersexual behavior, further data analysis may be useful because some hypersexual participants recorded high scores (including clinical scores) across several of the sexual traits and mood variables measured, indicating that some of the aforementioned theories/taxa may coexist (although not interact, apparently) in predicting hypersexual behavior. Second, a finer analysis of the NEO personality domains of hypersexual individuals might be able to determine whether a clinical profile exists, which may assist in treating hypersexual behavior. Finally, an exploration of adult sexual functioning (e.g., frequency of masturbation, intercourse, and sexual fantasies) could assist in the development of clinical cut-off scores regarding hypersexual behaviors. In conclusion, this study builds upon relevant literature by exploring multiple theories/taxa and subsequent interactions of hypersexual behavior, as well as examining the existence of a core personality presentation toward such sexual behavior.

Acknowledgments This research received support from the Professor D. R. Grey Research Foundation awarded to Michael T. Walton. The foundation had no role in the research design or in the decision to submit this article for publication.

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