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The Role of Stress in Hypersexual Behavior

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ABSTRACT

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The proposed diagnostic criteria for Hypersexual Disorder included "[r]epetitively engaging in sexual fantasies, urges, or behaviors in response to stressful life events" (Kafka, 2010, p.279) as a symptom, although no data demonstrates a causal relationship between stress and hypersexual behavior. We sought to confirm previous findings while furthering the field's understanding of this relationship by being the first study to assess stress and hypersexual behavior across multiple time points. Specifically, we sought to test three hypotheses within a sample of men seeking treatment for hypersexual behavior: 1) hypersexual individuals report higher stress levels than published norm samples; 2) stress predicts sexual thoughts, urges, and behavior at the same time point and across multiple time points; and 3) among various domains of stress, social and personal forms of stress best predict hypersexual behavior. Thirty men seeking treatment for hypersexual behaviors at residential and intensive outpatient treatment centers participated in the study. Various indices of stress (perceived stress, daily hassles, stressful life domains, and salivary cortisol), affect (boredom, psychological distress, depression, anxiety, alexithymia, and loneliness), and process (psychological inflexibility) were assessed, some across two time points. Across multiple analyses, the study did not find sufficient evidence to support a causal relationship between stress and hypersexual behavior. Supporting previous research, the hypersexual sample demonstrated significant elevations on stress, affect, and process measures compared to published norms, strengthening the assertion that hypersexual individuals experience high levels of stress and psychological distress. The implications of these findings, limitations of the methods used, and future directions for research and treatment are discussed.

Keywords: hypersexual disorder, sexual addiction, stress, psychological inflexibility

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Purpose of the Study

From the conceptualization of Kafka (2010), Hypersexual Disorder (HD) occurs when an adult engages in repetitive and intense sexual thoughts, urges, and/or behaviors that lead to significant personal distress or life impairment. Although the diagnosis demonstrated sufficient sensitivity and specificity (Reid et al., 2012), HD was ultimately not included in the current edition of the Diagnostic and Statistical Manual (DSM-5) due to insufficient research support (Kafka, 2014). One of the HD diagnostic criteria that lacks sufficient research exploration and/or support is the process of "[r]epetitively engaging in sexual fantasies, urges, or behaviors in response to stressful life events" (Kafka, 2010, p.279). One study found that men who self-identify as HD rate their vulnerability to experience stress as significantly higher than a norm sample (Reid, Carpenter, Spackman, and Willes; 2008). Correlational studies among HD patients consistently demonstrate that higher stress proneness is associated with higher levels of hypersexuality (Reid, Bramen, Anderson, & Cohen, 2014; Reid, Carpenter, Spackman, & Willes, 2008; Reid, Stein, & Carpenter, 2011), but none of these studies test the proposed relationship between stress and hypersexual behavior across multiple time periods. Additionally, little is known about the stress that these individuals are experiencing. The current exploratory study seeks to assess the relationship between stress and sexual thoughts, urges, and behavior at two time points among a sample of men who self-identify as HD. Additionally, this study seeks to further the field's understanding of stress and hypersexual behavior by assessing which specific types of stress best predict hypersexual behavior among an HD sample.

Hypersexual Disorder

Hypersexual Disorder (HD) is a newly proposed diagnostic category for excessive and intense sexual fantasies (sexual thoughts and mental images), urges (sexual motivation and physiological excitation in preparation for sexual behavior), and behavior (acts intended to arouse and/or fulfill sexual desire), which are the focus of the five main criteria: (1) excessive amount of time spent seeking out and obtaining sexual activity, (2) sexual activity is repeatedly sought in response to uncomfortable mood states, (3) sexual activity is repeatedly sought in reaction to stressful life events, (4) repetitive failed attempts to control or limit the behavior, and (5) continuing in the behavior in spite of risks for physical or emotional damage to self and others (DSM-5 draft criteria, 2012; Kafka, 2010). In addition, to meet diagnostic criteria for HD the sexual activity must cause clinically significant personal distress or impairment and must occur independent of drugs or alcohol.

Authors have roughly estimated that 3 to 6% of the adult population in the United States meet criteria for hypersexual behavior (Carnes, 1991; Coleman, 1992), although no true epidemiological study has been done. One problem contributing to our lack of understanding the prevalence of hypersexual behavior is the lack of an agreed upon definition of the condition with clear inclusion and exclusion criteria. This is currently being addressed by the criteria proposed by Kafka (2010). Initially, frequency of orgasm per week was suggested as an indicator of hypersexuality. Kafka (1997) proposed that greater than six orgasms per week over six consecutive months could constitute hypersexual behavior. Others have argued that a high frequency of orgasm alone does not indicate pathology and that the distress and impairment that one experiences from their sexual behavior should be indicative of hypersexual behavior (Black, 1998; Kinsey, Pomeroy, & Martin, 1948). A study of sexual behavior among a large,

representative Swedish sample found that people who report having high-frequency sexual behavior with a stable partner also report better psychological functioning compared to the rest of their sample (Långström & Hanson, 2006). They also found that high frequency impersonal sexual behaviors (masturbation, pornography, strip clubs, one-night stands, solicitation of prostitutes, etc.) are associated with comorbid psychopathology and impairment. Thus, the proposed diagnostic criteria incorporate into the diagnosis the frequency of sexual behaviors (opting to label the behavior as excessive rather than impose a specific number of orgasms per week), the distress leading up to and stemming from the behavior, and the types of sexual behavior.

Kafka (2010) specified that "Hypersexual Disorder is conceptualized as primarily a nonparaphilic sexual desire disorder with an impulsivity component" (p. 377). In other words, the diagnostic criteria for HD specifically exclude sexual behaviors that do not "conform to the dictates of custom, religion, and law" (p. 377). One of the difficulties in reviewing and summarizing the previous literature in the field is the fact that such strict definitions were not used in the past, so the previous literature includes a much more heterogeneous population than prescribed in the diagnostic criteria. The literature reviewed commonly includes participants with paraphilias, comorbid substance or alcohol abuse, or does not provide an adequate description of the sample selected. The proposed criteria allow room for paraphilic tendencies or substance/alcohol abuse if the diagnostic criteria for hypersexual disorder are met independently.

Characteristics of hypersexual samples. One of the most consistent findings in the literature on hypersexual behavior is that those seeking treatment for hypersexual behavior often report elevated levels of personal distress (Muench et al., 2007; Reid et al., 2009; Kafka, 2010). Studies among both gay and heterosexual populations found that a subset of their samples

reported an increase in promiscuity and masturbation in connection with dysphoric mood states like anxiety and depression (Bancroft, Janssen, Strong, Carnes, Vukadinovic, & Long, 2003; Bancroft, Janssen, Strong, & Vukadinovic, 2003). Refining their focus, Bancroft and Vukadinovic (2004) reported that self-defined sex addicts were more likely to engage in sexual behavior when anxious or depressed compared to controls.

Consistent with these findings, three studies (Black, Kehrberg, Flumerfelt, & Schlosser, 1997; Kafka & Prentky, 1994; Raymond, Coleman, & Miner, 2003) assessed the rates of comorbid psychiatric disorders among predominantly male hypersexual samples and consistently found high rates of comorbid mood (39%, 81%, and 71% of the respective samples), anxiety (50%,46%, and 71% of the respective samples), and substance use disorders (64%, 46%, and 71% of the respective samples). Similarly, another study found that hypersexual patients often report emotional instability and alexithymia as common symptoms they experience (Reid et al., 2008). These few studies add support to the proposed HD diagnostic symptom that these individuals engage in sexual behavior in response to negative, uncomfortable mood states.

Along with psychological distress, an inability to form close social bonds in interpersonal relationships seems to be common among hypersexual patients. In summarizing his studies of adult attachment among sexual addicts, Leedes (2001) wrote, "although the inability to form close attachments may not be sufficient to explain the etiology of sexual addiction, it is a necessary component…" (p. 218). Several studies have shown a relationship between insecure attachment and hypersexual behavior. Hypersexual men are more likely than non-hypersexual men to relate romantically with avoidant and anxious attachment styles (Zapf, Greiner, & Carroll, 2008). Hypersexual men are also 50% less likely to relate to their partners in a secure manner and 30% more likely to relate in fearful and avoidant manners than non-hypersexual

men. Studies of romantic attachment styles among hypersexual men consistently find that hypersexual men often rate themselves as attaching insecurely to their partners in romantic relationships (Leedes, 2001; Zaph, Greiner, & Carroll, 2008). This finding held true in a recent study that utilized a far larger sample size than any previous study of attachment among hypersexual men (Gilliland, Blue Star, Hansen, & Carpenter, 2015), although Leeds' contention that inadequate attachment was a necessary condition for HD was found to be incorrect. Similarly, men and women who self-reported as engaging in high frequency hypersexual behaviors within a large Swedish community sample also reported significantly higher rates of relationship problems compared to the rest of the sample (Långström & Hanson, 2006).

This pattern of insecure relationship attachment among hypersexual patients may relate to the high incidence of psychological distress within this population. Social support has been shown to improve mental health by reducing stress and by adding meaning and purpose to life (Cohen, 2004; Thoits, 1995). Engaging in high rates of impersonal sexual behaviors as a means of coping with life may be steering hypersexual individuals away from forming close intimate relationships, thus isolating them from the mental health benefits of social support.

Stress

Stress, as a psychological term, is familiar yet difficult to define. In his review of stress research, Monroe (2008, p. 35) concedes that "there remains no universally accepted characterization of the term.". Various aspects of stress are highlighted within the stress literature. For example, some studies focus on the exposure to adverse situations or environments as a means of eliciting stress and view stress as a likely consequence of facing challenges (Dohrenwend, 2000; Keyes, Hatzenbuehler, & Hasin 2011). Animal models study stress by testing the biological responses to changes in the environment (Cole, Mendoza, &

Capitanio, 2009). At its core, stress incorporates the individual experiencing the stress, challenges from the environment, and the changes in those challenges over time. Within the individual, stress applies to the perception and subsequent appraisal of a challenge, the appraisal of his/her resources to meet that challenge, and the bodily activation commensurate with the perceived difficulty of the challenge (Monroe, 2008). Given these distinct elements of stress, researchers persist in considering stress a process rather than purely a demand upon the person or the person's reaction (Aldwin, 2011; Sapolsky, 2004).

Although commonly spoken of in a negative light, stress serves an important function in preparing and activating both mind and body to engage with a challenge. Studies have demonstrated that the right amount of stress can improve performance on a task (leading some to rename this type a demand process), while either too much or too little stress associated with negative effects on performance (Lupien, Maheu, Fiocco, & Schramek, 2007; Yerkes & Dodson, 1908). Following the notion that the stress process is initiated by demands exceeding coping resources (e.g., Lazarus & Folkman, 1984; Sapolsky, 2004), stress is one of the most commonly cited causal factor or precipitant of various negative outcomes, ranging from dysphoric moods states to health to performance deficits (Braveman, Egerter, & Mockenhaupt, 2011; Henderson, Snyder, Gupta, & Banich, 2012; Ozawa, 2010). Stress can be chronic or acute depending on the demands of the situation and the person's capacity to cope (Aschbacher et al., 2012; Brown & Harris, 1978). For the purposes of this study, stress will be conceptualized and measured in multiple ways: the state of feeling overwhelmed; the perception that a situation is more complex, difficult, and/or daunting than a person's ability to cope with or resolve; the amount of challenging situations a person faces within a period of time; and the concentration of stress hormones within the body.

Stress domains. Rather than viewing stress as a single variable, some studies divide stress into a variety of life domains. These domains tend to consist of various forms of stress, including: interpersonal, health, financial, work, and psychological (Hammen, 2005). Research among psychiatric inpatient youth who admitted to suicidal ideation or attempt during the previous week found that three domains of interpersonal stress (close friend, romantic, and family) and one domain of non-interpersonal stress (personal health) were significantly associated with suicidal ideation (Pettit, Green, Grover, Schatte, & Morgan, 2011). Romantic stress was the only stress domain significantly associated with suicide attempts, but this finding was not significant when controlling for covariates. Similar studies focusing on other domains of stress, such as work (Kivimäki et al., 2012) or finances and racial discrimination (Estrada-Martinez, Caldwell, Bauermeister, & Zimmerman, 2012), demonstrate that some domains of stress may co-occur with certain negative behaviors, health risks, or psychopathology while other domains of stress may not.

Stress and Hypersexual Behavior

Although experiencing sexual fantasies, urges, and/or behavior in response to stressful life events is one of the five symptoms proposed to diagnose HD, it is interesting to highlight the paucity of research connecting stress and hypersexual behavior. In his flagship article which proposes and provides the research background for the HD diagnosis, Kafka cites numerous studies which support the connection between mood and hypersexual behavior, then concludes by fusing stress in with mood, stating that "Hypersexual Disorder can be associated with vulnerability to dysphoric affects and the use of sexual behavior in response to dysphoric affects and/or life stressors associated with such affects" (2010, p. 385). Later in the article, Kafka cites two studies in support of the connection between stressful life events and hypersexual behavior

(Miner, Coleman, Center, Ross, & Rosser, 2007; Nelson & Oehlert, 2008). Miner and colleagues (2007) examined the psychometric properties of the Compulsive Sexual Behavior Inventory (CSBI) in a sample of gay Latino men and reported that the question "How often have you used sex to deal with worries or problems in your life?" had the second highest factor loading on the Control Scale, which assesses a lack of control and use of sexual behavior to cope. Nelson and Oehlert (2008) explored the psychometric properties of the Sexual Addiction Screening Test (SAST) in a large sample of veterans in treatment for substance addictions, but made no clear connections between sexual behavior and stressful experiences. Reporting on a more recent measure given to HD men (published after Kafka's review), the Hypersexual Behavior Inventory (HBI), Reid, Garos, and Carpenter (2011) found that the item "Doing something sexual helps me cope with stress" loaded quite highly on the Coping factor. Thus, it is clear that when asked, people report using sex as a coping response, but it is quite something else to suggest that hypersexual behavior arises from stress. The evidence for the use of stress as a factor in the cause and/or maintenance of HD, as presented in Kafka's (2010) review, was not only underwhelming but appeared to be nonexistent.

One of the few articles to empirically address hypersexuality and stress is cited in the Kafka (2010) review, though these specific findings are not discussed within that paper. Reid et al. (2008) found that among the personality characteristics assessed by the NEO Personality Inventory Revised (NEO-PI-R), the depression and vulnerability to stress facets best predicted severity of hypersexuality. Vulnerability to stress was significantly higher in the hypersexual sample compared to the NEO norming sample and correlated strongly with the Sexual Compulsivity Scale (SCS) within the hypersexual sample, $r(118) = .48$, $p < .01$. In addition,

other studies support this link between vulnerability to stress, as assessed by the NEO, and hypersexual behavior (Reid et al., 2014; Reid, et al., 2012; Reid, Stein, & Carpenter, 2011).

The findings from Reid and colleagues (2008, 2011, 2012, 2014) support the use of stress as one of the diagnostic criteria for HD, but the methods used could not adequately assess the causal relationship between stress and hypersexuality inherent in the diagnostic symptom. Specifically, the symptom is, "Repetitively engaging in sexual fantasies, urges or behaviors **in response** to stressful life events" (Kafka, 2010, p. 379; emphasis added). This symptom indicates a time component, that sexual thoughts, feelings, and behavior often follow experiences that are perceived as stressful. Reid et al. (2008, 2011, 2012, 2014) use cross-sectional designs, collecting data at one time period. In order to adequately test the validity of this diagnostic symptom, a study will need to analyze stress and sexual thoughts, feelings, and behavior across multiple time points in order to test this proposed causal relationship.

In addition, if there is a relationship between stress and sexual thoughts, urges, and behavior as indicated by the proposed HD criteria, it would be beneficial to know if specific domains of stress best predict this relationship in order to provide specific direction in treatment. Domain-based measures of stress typically divide stress into categories such as social/interpersonal, work, time, financial, psychological, and health/physical. Two of the commonly reported characteristics of hypersexual samples (high rates of mood and anxiety disorders and difficulties forming secure attachments within interpersonal relationships) indicate that the social/interpersonal and psychological domains of stress are likely the most predictive of hypersexual behavior, although this has not been tested empirically within the HD literature.

The Present Study

The present study seeks to replicate the findings of Reid et al. (2008, 2011, 2012, 2014) while contributing to this area of research by assessing the relationship between stress and sexual thoughts, feelings, and behavior across multiple time periods within a sample of men who self-identify as HD. Specifically, this study seeks to replicate two findings from Reid et al. (2008, 2011, 2012, 2014): a strong, positive correlation between stress and hypersexual behavior and significantly higher levels of stress in a hypersexual sample compared to norm samples. This study builds upon the findings described above and provides unique contributions in the field in three ways. First, the study uses a longitudinal design to empirically test the HD diagnostic symptom that sexual fantasies, urges, and behaviors are engaged in as a response to life stressors. Second, this is the first study to utilize a physiological measure of stress (cortisol) among this population. Third, the specific stress domains that best predict hypersexual thoughts, feelings, and behavior within an HD sample are assessed.

Hypotheses. These study goals gave rise, then, to the following hypotheses.

H1: HD individuals experience more stress than controls.

a. The HD group will have significantly higher self-reported mean stress levels compared to published norms for the measures used.

H2: Stress predicts hypersexual behavior.

a. Among the HD sample, pre-study stress will be associated with pre-study hypersexual behavior.

i. This association remains after accounting for the effects of pre-study negative mood states (anxiety, depression, loneliness, boredom, general distress, and alexithymia).

b. Those with higher stress pre-study (general stress measures) and Time 1 (self-report stress and cortisol levels) will have higher hypersexual behavior at Time 2.

    i. This association remains after accounting for the effects of pre-study negative mood states.

c. Changes in stress from Time 1 to Time 2 will predict changes in hypersexual behavior from Time 1 to Time 2.

    i. This association remains after accounting for the effects of pre-study negative mood states.

    ii. This association will be confirmed by testing the hypothesized cross-lagged panel model (Figure 1).

H3: Social and psychological forms of stress best predict hypersexual behavior.

a. Within the HD group, social (social conflict and social isolation) and psychological stress at pre-study will best predict sexual thoughts, feelings, and behavior at pre-study, as compared to other domains of stress.

Method

Participants

All procedures were approved by the Forrest General Hospital review board. Adult males seeking treatment for hypersexual behavior were recruited to participate in the study. The majority of the sample were attending a residential treatment program while a small portion of the sample were attending an intensive outpatient program after completing residential treatment. Of the 55 males who consented, 5 did not meet criteria for the study (below 53 on the HBI) and 20 did not return the initial materials.

The finalized sample who met criteria was composed of 30 men, ages 23 to 59 ($M =$ 41.90, $SD = 10.41$), who were predominantly Caucasian and heterosexual. Because this was a cross-sectional study of people in treatment, participants varied in their current length of treatment ($M = 3.50$ weeks, $SD = 3.30$ weeks), ranging from 1 to 11 weeks. Eleven participants (37%) reported no previous mental health diagnosis, 18 participants (60%) reported a previous diagnosis of a mood, anxiety, or attention-deficit disorder, and 1 reported a previous personality diagnosis (narcissistic and borderline), though they did not report who made these diagnoses. Included in the above group were 5 participants (16%) who indicated that they had a previous diagnosis of a paraphilia (exhibitionism, frotteurism, voyeurism, and pedophilia). The participants were mostly educated, with two-thirds having a college degree or an advanced college degree, and had some sort of religious affiliation (80% Christian). All other demographic information is reported in Table 1. No location information was collected.

Procedure

The HD sample was a convenience sample seeking treatment for HD behaviors. The sample was recruited from either a residential facility treating sexual addictions or an intensive outpatient program for impaired professionals. For the latter, only patients who struggled with HD behaviors were recruited for the study. The study was announced to the treatment programs as a whole, and patients were recruited for the study on an individual or small group basis. Testing only occurred after participants read through and signed the consent form. Participants were then given an initial questionnaire that included a demographics measure, a screener for comorbid conditions, the *Brief Overall Anxiety Severity and Impairment Scale (OASIS)*, *Patient Health Questionnaire Depression Scale (PHQ-9)*, *Perceived Stress Scale (PSS-10)*, *Hypersexual Behavior Index (HBI-19)*, *Outcome Questionnaire-45 (OQ-45)*, *Toronto Alexithymia Scale*

Table 1

Participant Demographics

Category	Subcategory	N Treatment Sample	% Treatment Sample
Gender	Male	30	100
Race	African-American	1	3
	Hispanic	1	3
	White	27	90
	Native American	1	3
	Other	0	0
Sexual Orientation	Heterosexual	27	90
	Bisexual	1	3
	Gay	2	7
Income	Less than $10,000	2	7
	$10,000-$19,999	1	4
	$20,000-$39,999	4	14
	$40,000-$59,999	2	7
	$60,000-$79,999	2	7
	$80,000-$100,000	1	4
	more than $100,000	16	57
Marital Status	Single, never married	8	27
	Married	15	50
	Separated	4	13
	Divorced	3	10
	Widowed	0	0

Note. Demographic characteristics of the sample.

(TAS-20), *Boredom Proneness Scale (BPS)*, *UCLA Loneliness Scale (Version 3)*, *Brief Stress Domain Scale (BSDS)*, *Sexual Thoughts, Urges, and Behavior (STUB)*, *Adult Hassle Scale of Daily Stressors*, and the *Acceptance in Action Questionnaire - II (AAQ-II).* As incentive for participation, a summary report of their scores on the initial survey was provided to the participants.

Upon completion of the initial questionnaire, participants who did not meet criteria for the study (52 or less on the HBI) were discontinued from the study. Those who met criteria (53 or above on the HBI) were given two bags of five salivettes, two surveys, instructions for collecting saliva, and two checklists indicating the times of saliva collection. Those surveys were identical and included a shorter version of the *Brief Stress Domain Scale (BSDS)*, *Sexual Thoughts, Urges, and Behavior (STUB)*, and a checklist of HD behaviors. Participants began saliva collection on the following Thursday and again the next Tuesday, so that the data collection would be 5 days apart. This timeframe was arbitrarily chosen by the committee. Due to scheduling issues, some participants had to collect on different weekdays, but maintained the same 5-day spacing. Participants collected saliva 5 times throughout the day (immediately upon waking, 30 minutes after waking, before lunch, before dinner, and bedtime) and completed the survey at night. Materials were then returned in exchange for a summary sheet of their responses to the initial survey.

Instrumentation and Measures

Demographics. Demographic questions, including age, gender, relationship status, socioeconomic status, sexual preference, and ethnicity were part of this section.

Screener for preexisting/comorbid conditions. Any history of traumatic brain injury, Parkinson's disease, Alzheimer's disease, substance abuse, previously diagnosed mental disorders, and current medications were assessed.

Hypersexual Behavior Inventory (HBI). The Hypersexual Behavior Inventory (HBI; Reid, Garos, & Carpenter, 2011) is a 19-items self-report measure assessing the extent to which respondents find their sexual thoughts, feelings, and behaviors to be beyond their own control, is used as a coping strategy for emotional discomfort, and the extent to which sexual behavior results in negative consequences. Statements are rated by the respondent on a Likert scale ranging from 1 "never" to 5 "very often." Items are summed to yield a total HBI score, with scores of 53 and above estimated to indicate the respondent has significant problems with hypersexuality (Reid, Garos, & Carpenter, 2011). A HBI score of 53 or above served as the inclusion criteria for the study.

Brief Overall Anxiety Severity and Impairment Scale (OASIS). The OASIS (Norman et al., 2011) is a 5-item self-report measure of anxiety severity over the previous week. Participants rate each item on a 5-point scale ranging from 0 to 4. The points are then totaled, with higher scores indicating more severe anxiety symptoms. The brief OASIS demonstrated strong correlations with other anxiety measures and good internal consistency (Cronbach's α = .89; Norman et al., 2011).

Patient Health Questionnaire Depression Scale (PHQ-9). The PHQ-9 (Kroenke & Spitzer, 2002) is a 9-item self-report measure of severity of depression symptoms over the past 2 weeks. Participants rate the severity of each symptom on a scale of 0 (not at all) to 3 (Nearly every day). The points are then totaled and the scores can range from 0 to 27, with scores above

10 indicating a possible diagnosis of major depressive disorder. The measure demonstrated good internal consistency (Cronbach's α = .89; Kroenke, Spitzer, & Williams, 2001).

Perceived Stress Scale (PSS-10). The PSS-10 is a 10-item measure of general stress over the past month. Six questions assess negative aspects of stress (e.g, "how often have you felt difficulties were piling up so high that you could not overcome them?") and four items assess positive aspects of stress (e.g., "how often have you felt that things were going your way?"). Each item is rated on a scale from 0 (never) to 4 (very often). The positive items are reverse scored and added to the scores of the negative items, with larger scores indicating greater stress. The PSS-10 demonstrates good internal reliability (Cronbach's α = .84-86; Cohen, Kamarck, & Mermelstein, 1983).

Outcome Questionnaire-45 (OQ-45). The OQ-45 is a 45-item general measure of distress typically used to measure how clients are progressing through therapy. The measure provides a total score and 3 subscales: symptom distress, interpersonal relations, and social role. A total score of 63 or above has been estimated to distinguish a clinical sample from a non-clinical sample. Adequate internal consistency has been reported (Cronbach's α = .93; Ellsworth, Lambert, & Johnson, 2006).

Toronto Alexithymia Scale (TAS-20). The 20-item TAS-20 is a widely used measure developed to assess difficulties in identifying and describing emotions (Bagby, Parker, & Taylor, 1994; Bagby, Taylor, & Parker, 1994). Items on the TAS-20 are presented in a five-point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree). The scale yields a total score and three factor scores of alexithymia: difficulty identifying feelings (DIF), difficulty describing feelings (DDF), and externally oriented thinking (EOT). Studies using this measure have correlated alexithymia with a number of psychiatric disorders and physical illnesses (Luminet,

Bagby, Wagner, Taylor, & Parker, 1999; Taylor, Bagby, & Parker, 1997). Internal consistency for the scale total score is $\alpha = .79$, with the factor scales producing alpha coefficients of .78 (DIF), .73 (DDF), and .64 (EOT), respectively (Bagby, Taylor, Parker, & Loiselle, 1990; Parker, Bagby, Taylor, Endler, & Schmitz, 1993).

Boredom Proneness Scale (BPS). The BPS is a 28-item measure aimed at assessing the susceptibility that a person has to feeling bored. The original version utilized a true-or-false format for responses, while most recent versions of the measure use the 7-point Likert response used in the presnet study. The initial study reports moderate levels of internal consistency (Cronbach's $\alpha = .79$; Farmer & Sundberg, 1986).

UCLA Loneliness Scale (Version 3). The UCLA Loneliness Scale (Version 3) is a 20-item measure of how lonely a person is feeling. The measure includes 11 negatively-worded items and 9 positively-worded items. The positive items are reverse-scored and higher scores reflect greater severity of loneliness. High internal consistency (Cronbach's $\alpha = .89-94$; Russell, 1996) has been reported.

Adult Hassle Scale of Daily Stressors. The Adult Hassle Scale of Daily Stressors (Maybery, Neale, Arentz, & Jones-Ellis, 2007) is a 46-item measure of both frequency and intensity of daily hassles. The frequency and intensity of each item is rated on a 5-point scale. Moderate levels of internal consistency have been reported on the scale as a whole (Cronbach's $\alpha = .80$; Maybery et al., 2007).

Sexual Thoughts, Urges, and Behavior (STUB). The STUB was created for this study to assess the relationship between sexual thoughts, feelings, and hypersexual behavior that parallels the proposed diagnostic criteria (Kafka, 2010). Participants' daily sexual thoughts, feelings, and behavior will be assessed by the STUB, a brief questionnaire modeled after the

Gambling urges questionnaire (Elman, Tschibelu, &Borsook, 2010), the Sexual Concerns Outcome Questionnaire (Gilliland, South, Carpenter, & Hardy, 2011), and the proposed HD criteria (Kafka, 2010). As seen in Table 2, the STUB provided high levels of internal consistency across each of the 3 administrations for this study (Cronbach's α = .86-90) while the coefficient of stability was low (.38-.42; which might be expected from a measure designed to assess change). A copy of the STUB is available in the appendix.

Acceptance in Action Questionnaire – II (AAQ-II). The AAQ-II (Bond et al., 2011) is a brief 7-item measure of psychological inflexibility and experiential avoidance, both of which have been associated with hypersexual behavior. Responses range from 1 (never true) to 7 (always true). Answers for the seven items are summed up. Higher scores indicate higher levels of psychological inflexibility. An acceptable range of internal consistency has been reported (Cronbach's α = .78-.88; Bond et al., 2011).

Brief Stress Domain Scale (BSDS). The BSDS is a 14-item measure developed for this study to assess which life domains are most stressful for our participants. Questions assess the frequency and intensity of stress over the past month across 7 domains (work/school, time pressure, finances, health, personal, social conflict, and social isolation). Participants respond to each domain using a scale from 1 (Never) to 5 (A Great Deal). The full BSDS was administered in the initial survey, while a shorter 8-item version was administered for Time 1 and Time 2. The shorter version asked participants to rate their stress over the past 24 hours. As seen in Table 3, the full BSDS provided moderate internal consistency (Cronbach's α = .80) while the shorter version provided similar internal consistency across both administrations (Cronbach's α = .71-79), with moderate stability across time (.71). Copies of both versions of the BSDS are available in the appendix.

Salivary cortisol. Participants collected their saliva in salivette tubes at 5 time points throughout the day (immediately upon waking, 30 minutes later, before lunch, before dinner, before bed) on 2 separate days. These tubes were then frozen and shipped to the Dresden Lab Service to analyze the cortisol concentration of the saliva. Salivary cortisol is a stable and easy to collect indicator of stress hormones in the body. Since each salivette tube provides a one-time indicator of cortisol concentration, the 5 time points are then analyzed using an Area Under the Curve (AUC) formula to distill measurements across time into a single metric. Two formulas for the AUC provided in the literature (Pruessner, Kirschbaum, Meinlschmid, & Hellhammer, 2003) are commonly used: AUC with respect to ground (AUC_G), which is "related to 'total hormonal output'"; and AUC with respect to increase (AUC_I), which is "related to the sensitivity of the system, pronouncing changes over time" (p. 928). Our AUC estimates are scaled in minutes, hence the size of the descriptive statistics listed in Table 3.

Behavior. Participants indicate what types of hypersexual behavior, if any, that they engaged in over the previous 6 months (during the initial survey) and the previous 24 hours (on days that they collected saliva).

Statistical Analyses

Data from the surveys was entered into an online survey database (qualtrics.com) and exported into an SPSS Statistics database. Composite variables for the HBI-19, OASIS, PHQ-9, PSS-10, TAS-20, OQ 45, BPS, UCLA Loneliness Scale, Adult Hassle Scale of Daily Stressors, STUB, and AAQ-II scales were calculated based on recommendations in the literature. Cortisol AUC_I and AUC_G were calculated based on the formulas outlined by Pruessner, Kirschbaum, Meinlschmid, and Hellhammer (2003). Descriptive statistics, correlations, regression coefficients, and reliabilities for each scale will be completed using SPSS.

Hypotheses. The statistical analyses for each hypothesis are as follows:

H1: HD individuals experience more stress than controls.

    a. An independent samples *t*-test was used to test PSS-10 scores between the HD group and published norms.

H2: Stress predicts hypersexual behavior.

    a. This hypothesis was tested using regression analyses, first without, and then with mood variables (PHQ-9, OASIS, and BPS scores) as covariates:

        i. A regression analysis was run to assess the predictive ability of PSS-10 scores and hassles on HBI scores.

        ii. A regression analysis was run to assess the predictive ability of Time 1 BSDS and AUC Change scores on STUB Change scores.

        iii. A two-wave, two-variable cross-lagged panel model was used to test the effects of stress (BSDS and AUC scores) and the STUB on each other at Time 1 and Time 2. This tested the effects of the complete model as well as the causal relationship between stress (BSDS and AUC scores) and the STUB using the neo-classical strategy of cross-lagged modeling where two fully saturated regression models are used. The model is illustrated in Figure 1.

H3: Social and psychological forms of stress best predict hypersexual behavior.

    a. The individual BSDS domains were correlated with HBI scores to determine which domains had a significant relationship with HBI scores. They were also regressed onto HBI scores to determine which were most predictive
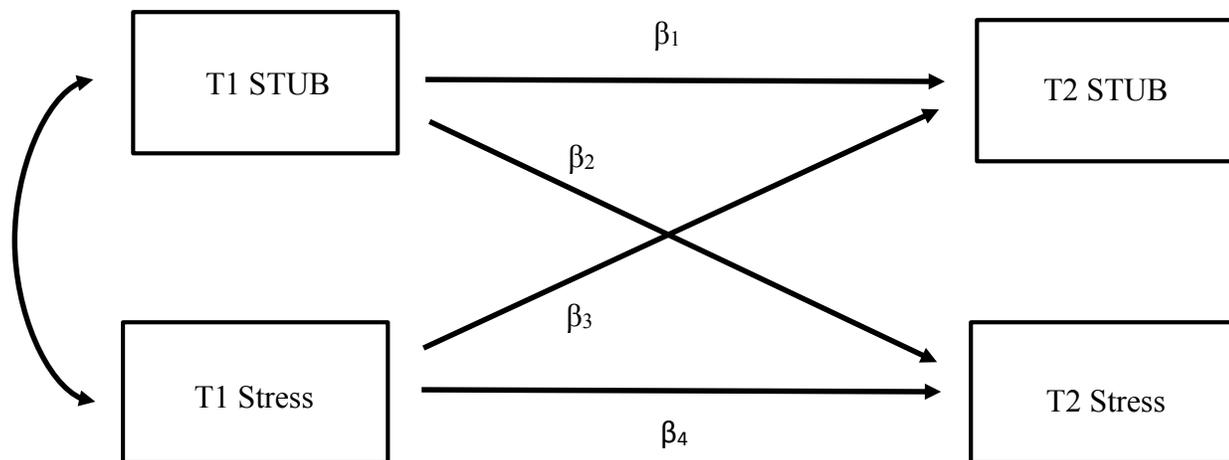
Figure 1. *Hypothesized cross-lagged panel model testing the causal relationships between stress and hypersexual behavior at Time 1 and Time 2.*

Results

Participants were recruited over the course of 12 months. Means and standard deviations for study variables are displayed in Tables 2, 3, and 4. Correlations and reliability coefficients for the treatment sample can be found in Tables 2 and 3. Any missing data was left blank. Most of the missing data occurred with the Time 1 ($n = 27$) and Time 2 ($n = 23$) variables.

After calculating the data displayed in Tables 1 through 4, we utilized the SPSS Explore function to examine the scales for individual outliers. Study variables were examined for outliers; on a few variables a single individual had somewhat more extreme scores than others, but in no case did the difference appear large enough to meaningfully impact aggregate results, nor was it ever the same case across variables. It was concluded that the sample distributions were sufficiently normal that the sample size ($n = 30$) was sufficient to yield sampling distributions that meet the assumption of normality required for tests of significance.

Table 2

Intercorrelations and Descriptive Statistics of Hypersexuality Indices

Hypersexuality Indices	1	2	3	4	5	6	7
1. Hypersexual Behavior Inventory	–						
2. HBI Control	.89***	–					
3. HBI Cope	.83***	.55**	–				
4. HBI Consequences	.88***	.75***	.60***	–			
5. Pre-test STUB Composite	-.15	-.03	-.25	-.12	–		
6. Time 1 STUB Composite	.14	.17	.15	.00	.31	–	
7. Time 2 STUB Composite	.06	-.06	.12	.14	-.02	.48*	–
M	74.80	33.70	27.16	13.93	14.40	5.29	6.61
SD	10.88	4.84	4.31	3.40	7.29	3.12	4.34
α	.91	.89	.77	.81	.90	.86	.90

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 3

Intercorrelations and Descriptive Statistics of Stress Indices

Stress Indices	1	2	3	4	5	6	7	8	9
1. Perceived Stress	–								
2. Hassles	.30	–							
3. Pre-test Stress Dimension	.46**	.57***	–						
4. T1 Stress Dimensions	.13	.39*	.65***	–					
5. T2 Stress Dimensions	.08	.20	.59**	.71***	–				
6. T1 Cortisol AUC_G	.01	.07	-.21	-.31	-.14	–			
7. T2 Cortisol AUC_G	-.37	.06	-.29	-.09	-.11	.56**	–		
8. T1 Cortisol AUC_I	-.01	-.21	.16	.23	.12	-.64***	-.52**	–	
9. T2 Cortisol AUC_I	.25	.25	.51*	.47*	.38	-.62**	-.65***	.68***	–
M	23.20	77.10	31.70	9.15	9.48	4822.98	3738.49	-7067.79	-7630.88
SD	5.76	44.72	9.54	4.51	5.67	2161.41	1714.77	5993.99	4483.53
α	.85	.95	.82	.71	.79				

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 4

*Study's Hypersexual Subjects (*N = 30) Compared to Published Norms*

Variable	Current Study		Published Norms		
	M	*SD*	*M*	*SD*	*t*
Hypersexuality					
HBI[a]	74.8	10.9	66.3	15.6	2.88**
HBI[b]	74.8	10.9	34.2	14.5	14.59***
Stress					
Perceived Stress[c]	23.2	5.8	17.4	6.1	4.32***
Hassles[d]	37.7	21.7	18.7	10.5	5.48***
Emotional Distress Measures					
Loneliness[e]	49.9	8.8	40.1	9.5	5.51***
Boredom Proneness[f]	99.8	20.2	97.9	20.8	.05
General Distress (OQ-45)[g]	67.1	20.5	83.1	22.2	-3.81***
General Distress (OQ-45)[h]	67.1	20.5	45.2	18.6	6.31***
Alexithymia[i]	53.0	12.5	45.6	11.4	3.52***
Anxiety (OASIS)[j]	8.0	2.9	6.6	4.0	1.83
Process Measure					
Psych. Inflex. (AAQ-II)[k]	27.3	8.0	18.5	7.1	6.74***

Note. [a]Clinical male sample, *n* = 203 (Reid, Garos, & Carpenter, 2011). [b]Male student sample, *n* = 165 (Reid, Garos, & Carpenter, 2011). [c]Male student sample, *n* = 60 (Roberti, Harrington, & Storch, 2006). [d]To remain consistent with the what the comparison sample used, estimates from the Hassles Frequency scale are reported. Because of this, the means and standard deviations for the Hassles scale in this table are different from other tables. Emerging adult smokers, *n* = 56 (Conrad, Wardle, King, & de Wit, 2013). [e]Student sample, *n* = 487 (Russell, 1996). [f]Student sample, *n* = 279 (Melton & Schulenberg, 2007). [g]General outpatient sample, *n* = 342 (Lambert et al., 2004). [h]Non-clinical adult community sample, *n* = 815 (Lambert et al., 2004). [i]Adult community sample, *n* = 1933 (Parker et al., 2003). [j]Student sample, *n* = 171 (Norman et al., 2011). [k]Non-clinical US students and UK employees, *n* = 2526 (Bond et al., 2011).
* *p* < .05, ** *p* < .01, *** *p* < .001.

Correlations of Study Variables

      Hypersexuality indices. As shown in Table 2, the HBI and STUB, although internally

consistent within each index, may measure different elements of hypersexuality given the lack of

correlation between the two. Admittedly, the correlations will likely be constrained due to less

variability within each variable, but especially the STUB, for this sample in which all

participants met criteria for hypersexuality but were assessed while in a protected, therapeutic

environment. Further, the HBI represents a broader range of symptoms across time, while the

STUB intends to measure the proposed diagnostic criteria across a shorter time frame, such that

pre-study STUB composite scores are unassociated with Time 1 and Time 2 STUB composite

scores (though, that correlation would likely have been significant with a larger sample), and

STUB composites across the two study times (separated by only five days) are moderately

correlated. These weak stability coefficients reported by the STUB (.38-.42) were likely due to

the specific nature of the measure (attempting to capture problematic sexual thoughts, urges, and

behavior over a 24 hour period) and the environment where the study took place (treatment

programs where participants were motivated to reduce those problematic experiences) and may

influence the analyses below.

      Stress indices. Mean cortisol levels across the 5 time points for Time 1 and Time 2 are

presented in Figure 2. Intercorrelations of the stress variables are found in Table 3. Similar to

the hypersexuality measures, the various indices of stress (e.g., hassles, perceived stress,

hormone response) relate somewhat when measured at the same time point or when the

methodology is similar, but lack a relationship when the methodology is different. One notable

exception is that Time 2 Cortisol AUC_I is moderately associated with Time 1 and Time 2 ratings

the BSDS. Interestingly, this association may be relevant to the cross-lagged panel analysis
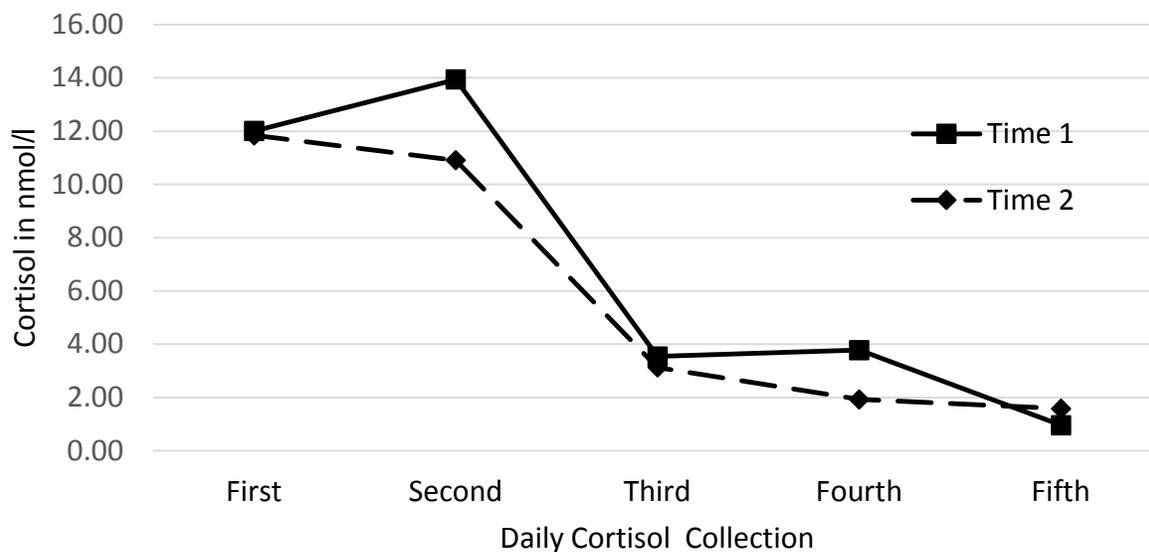
	First	Second	Third	Fourth	Fifth
Time 1 *M*	12.00	13.94	3.54	3.78	.96
Time 1 *SE_M*	1.60	1.52	.48	.64	.13
Time 2 *M*	11.84	10.90	3.13	1.93	1.58
Time 2 *SE_M*	1.28	1.44	.39	.29	.61

Figure 2. Mean cortisol levels for Time 1 and Time 2 at each of the five daily measurements. Measures are in nanomoles per liter (nmol/l).

below. These data do not provide sufficient evidence that stress is causal of hypersexual thoughts, urges, or behavior, or that stress predicts the severity of hypersexuality.

Clinically Significant Elevations

Table 4 offers a comparison of the sample's mean performance on the hypersexuality, stress, and other measures to mean performance of groups in published studies using these scales. The treatment sample mean for the HBI (74.80, *SD* = 10.88) fell well above the established cut-off of 53 and differed significantly from the means of the published hypersexual sample [$t(193) = 2.88, p < .01$] and non-hypersexual sample [$t(193) = 14.59, p < .001$]. It is clear that the study sample, relative to other groups, endorsed significant hypersexuality. Similarly, they showed elevated perceived stress levels, and they were elevated on several of the other

variables, most notably psychological rigidity, loneliness, hassles, non-clinical community psychological distress, and alexithymia. It is evident, then, that the study sample reports both greater hypersexuality, stress, and psychological distress.

Though they still fell in the clinically distressed range and significantly above the non-clinical norms, our sample demonstrated significantly lower distress scores compared to the general out-patient clinical norm sample for the OQ-45.

Based on the PHQ-9 cutpoints outlined by Kroenke et al. (2001), 6 participants (20%) reported no significant depression symptoms, while 12 (40%) reported mild depression, 6 (20%) reported moderate depression, and the remaining 6 (20%) reported severe depression. Additionally, 16 participants (53%) may meet criteria for an anxiety disorder based on the established cutoff for the Brief OASIS (Norman et al., 2011). These data provides general support for the notion that hypersexual subjects report significant levels of stress and emotional distress.

Correlations Between Stress and Hypersexuality Measures

The associations between stress and hypersexuality were explored using zero-order correlations presented in Table 5. The overall lack of relationships between the stress and hypersexualty measures generally point to the conclusion that, within the current sample, the two are independent of each other. Although two correlations achieved significance, chance findings are possible due to the amount of analyses performed. In spite of this chance, the significant relationship between Time 1 stress (T1 BSDS) and Time 2 hypersexuality (T2 STUB) raises the possibility that earlier stress may have a causal relationship with later hypersexuality (which is also tested in the cross-lagged panel analyses below). However, other measures of earlier stress (all other stress variables except T2 BSDS) were not significantly associated with later hypersexuality (either T1 or T2 STUB).

Table 5

Zero-Order Correlations between Stress and Hypersexuality Indices

Stress Indices	Hypersexuality Indices			
	HBI Total Score	Initial STUB	Time 1 STUB	Time 2 STUB
Perceived Stress	.28	.29	.24	-.07
Hassles	.21	.30	.24	.25
Initial BSDS	.16	.24	.42*	.18
Time 1 BSDS	.18	-.11	.37	.42*
Time 2 BSDS	-.07	-.30	.15	.30

Note. * $p < .05$.

Stress as a Causal Factor of Hypersexual Behavior

To explore the causal effect that stress has on hypersexuality, a cross-lagged panel analysis of the Time 1 and Time 2 measures was run using regression. Three different models were tested, each using a different stress variable. The model utilizing self-reported stress (BSDS), shown in Figure 3, lacks a significant relationship between Time 1 stress and Time 2 hypersexual behavior. Thus, this model does not support stress as a causal influence.

Similarly, no causal relationship was observed when stress is operationalized using salivary cortisol. Figure 4 displays the model with AUC_I as the stress variable. The model using AUC_G was equivalent and thus not displayed. In each of these analyses, stress at Time 1 significantly predicted stress at Time 2.

Relationships with Emotional Distress and Process Variables

Several of the emotional distress variables were significantly correlated with one another: general distress (as measured by the OQ-45) was correlated with loneliness, $r = .37, p < .05$, with depression, $r = .58, p < .001$, with boredom proneness, $r = .36, p < .05$, with alexithymia, $r = .49$,
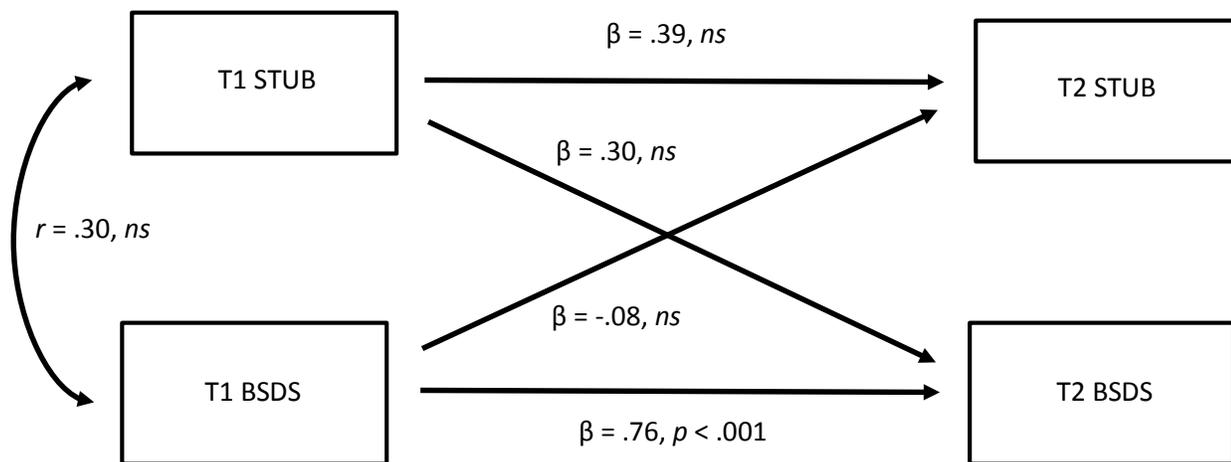
Figure 3. *Regression analysis of cross-lagged panel model, STUB and BSDS.*
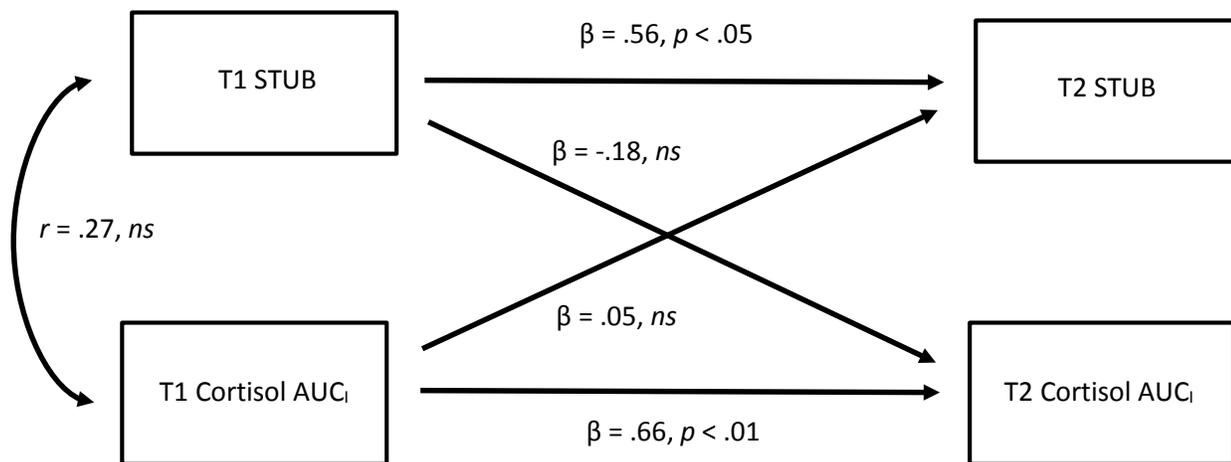
Figure 4. *Regression analysis of cross-lagged panel model, cortisol AUC$_I$.*

$p < .01$, and with psychological inflexibility (as measured by the AAQ-II), $r = .48$, $p < .01$;

depression was correlated with anxiety, $r = .54$, $p < .01$; and psychological inflexibility was

correlated with both boredom proneness, $r = .68$, $p < .001$, and alexithymia, $r = .46$, $p < .05$.

Table 6 presents the zero-order correlations between these emotional distress and process

variables with the stress and hypersexuality measures. Of the affect variables, general

psychological distress, loneliness, and depression correlate with various stress measures, though

none demonstrated a significant relationship with cortisol. Surprisingly, hypersexuality

demonstrated inconsistent relationships with the emotional distress and process measures. Two

exceptions were the relationships between Time 2 hypersexual behavior with general

psychological distress and alexithymia. It is possible that other relationships (most notably

between the HBI, loneliness, and depression measures) would have been significant with a larger

sample size.

Stress-Hypersexuality Relationships Controlling for Emotional Distress Variables

A number of stress-hypersexuality associations, with affective variables controlled for,

were planned for examination. In the first set of analyses, HBI scores were regressed onto, first,

various emotional distress variables, and then onto perceived stress. No suppressor effects were

noted, with the partial correlations of perceived stress with hypersexuality being essentially

unchanged to somewhat lower, all non-significant, after accounting for the affective variables.

The overall regressions were not significant. For example, the partial correlation of PSS with

HBI scores, after accounting for general psychiatric distress, depression, and anxiety, was .19, p

$= .34$ (compared to $r = .28$ for the zero-order correlation), the overall regression formula was

non-significant, $F = .80$, $p = .54$, and for PSS as a predictor, $\beta = .21$, $t = .97$, $p = .34$. In general,

all such analyses using various emotional distress variables were similar, and so are not

presented further.

Table 6

Zero-Order Correlations of Affective and Process Variables with Hypersexuality and Stress Indices

Variables	Distress OQ-45	Loneliness UCLA LS	Depression PHQ-9	Anxiety OASIS	Boredom Proneness	Alexithymia TAS-20	Inflexibility AAQII
Hypersexuality Indices							
HBI	.09	.34	.27	.15	.20	.04	.09
pre STUB	.17	-.02	.38*	.38*	-.04	.03	.07
T1 STUB	.35	.20	-.03	-.14	.12	.17	.19
T2 STUB	.63***	.34	.08	-.04	.23	.66***	.26
Stress Indices							
Perceived Stress	.29	.17	.46*	.30	-.08	-.20	.09
Hassles	.35	.06	.63***	.13	-.19	.00	.00
pre BSDS	.47**	.28	.48**	.04	-.13	.11	.28
T1 BSDS	.45*	.52**	.39*	-.19	.07	.40*	.31
T2 BSDS	.60**	.40	.19	-.18	.14	.28	.38
T1 Cortisol AUC$_G$	-.29	-.34	.03	-.03	-.32	-.26	-.24
T1 Cortisol AUC$_I$	.32	.02	-.08	-.03	.08	.06	.08
T2 Cortisol AUC$_G$	-.36	-.08	-.21	-.25	-.07	.09	-.27
T2 Cortisol AUC$_I$	.39	.27	.13	.01	-.12	.15	.28

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Second, Time 2 STUB scores and STUB change scores (Time 2 – Time 1) were regressed onto, first, various affective variables, and then onto either Time 1 BSDS composite scores or the 2 Time 1 cortisol AUCs. As with HBI and PSS analyses above, no suppressor effects were noted, and new associations between the hypersexuality and stressor indices were noted. As an example, the partial correlation of Time 1 BSDS and Time 2 STUB, after accounting for general psychiatric distress, depression, and anxiety, was .15, $p = .54$ (compared to $r = .42$ for the zero-order correlation). Thanks to the predictive contribution of the OQ-45, the overall regression formula was significant, $F = 3.6$, $p = .03$, although the R^2 change from adding Time 1 BSDS to the final equation was not significant, R^2 from .66 to .67, $p = .54$, and for Time 1 BSDS as a predictor, $\beta = .16$, $t = .62$, $p = .54$. This was a "best case" analysis, as the zero-order correlation of Time 1 BSDS and Time 2 STUB was significant, but the affective variable of general psychiatric distress (OQ-45) accounts for much of that relationship and ends up being the only predictive variable in the final regression. Relative to the predictive capacity of stress indices, including cortisol, the results for other regressions were similarly non-significant, with partial correlations of stress with STUB scores being similar to or somewhat lower than their zero-order correlations.

Stress Domains

The final analysis involved a correlation matrix between the stress domains assessed by the pre BSDS and a regression analysis using the same variables. As seen in Table 5, the BSDS produced weak correlations overall with the HBI. These initial correlations paralleled our analyses of the individual BSDS domains, with none of the BSDS domains significantly correlating with the HBI. Additionally, the regression analysis provided similar results, with none of the domains significantly predicting hypersexual behavior.

Discussion

Although previous studies highlight elevations of stress within hypersexual samples (Reid et al., 2014; Reid, et al., 2012;Reid, Stein, & Carpenter, 2011) no study to date provides sufficient causal evidence to include "[r]epeated, excessive sexual thoughts, urges, and behavior in response to stressful life events" (Kafka, 2010, p.379) as a potential diagnostic symptom of HD. The present study sought to support these previous findings and explore this causal relationship by making 3 hypotheses: 1) the HD sample would self-report higher levels than published norms on measures of stress, 2) self-report and physiological measures of stress would predict hypersexual behavior across time, and 3) social and personal domains of stress would better predict hypersexual behavior compared to other forms of stress.

The results from this sample provided mixed support for the hypotheses. Of the three, hypothesis 1 found the strongest support. The sample demonstrated significant elevations on self-report measures of perceived stress compared to published norms, indicating that they appraise their life situations to be significantly more stressful than others'. New research provides evidence that hypersexual samples may release more stress hormones (cortisol) when exposed to stressors compared to non-hypersexual samples (Chatzittofis et al., 2015). Additionally, as seen in Table 4, the sample's mean self-report on measures of hypersexuality, loneliness, general distress, alexithymia, and psychological inflexibility were also significantly elevated compared to published norms. Similar to previous research (Reid, Stein, & Carpenter, 2011; Reid, et al., 2012; Reid et al., 2014), these data support the notion that hypersexual individuals report high levels of stress and distress compared to others. Unlike previous research (Reid et al., 2008), though, we did not find a significant correlation between the stress and hypersexuality measures used. It is interesting to note that this sample, who were attending

residential or intensive outpatient services, fell significantly below the psychiatric sample norms published for the OQ, though 63.3% of the sample scored above the clinically distressed range based on the OQ cutoffs.

The present study is the first to examine that stress may lead to later hypersexual behavior among men who struggle with hypersexuality. In fact much of the data does not support a causal role for stress, although general elevations in stress indices still imply some potentially important role. These findings are tentative, as the multiple analyses which utilized both broad and specific measures of hypersexuality and stress only provided two significant correlations. When tested further in a path analysis, these correlations were not significant, providing no proof that self-reported stress leads to hypersexual behavior. No relationship occurred between physiological stress (cortisol) and hypersexual behavior. Some of the small to moderate correlations in the analyses above would possibly be significant with a larger sample, though a general insufficient relationship between stress and hypersexual behavior was observed. In other words, a larger sample will likely not lead to significant findings in the areas important to the focus of the study. Our use of an unvalidated measure (the STUB) may have affected these results. The last hypothesis also provided surprising results, with none of the stress domains correlating with hypersexual behavior and thus no specific domain standing out at the strongest predictor.

This exploratory study highlights the boundaries of our understanding within the field of hypersexual behavior. Hypersexual individuals often self-report high levels of stress, loneliness, and interpersonal difficulties. Elevations on the HBI indicate that individuals see their hypersexual behaviors as something that occurs after experiencing the stresses of life (e.g. question 1 "I use sex to forget about the worries of daily life", question 13 "Doing something

sexual helps me cope with stress"). Though, as the present study attempted to do, there is yet to be a clear understanding of how this distress relates to sexual thoughts, urges, and behaviors among these individuals.

This study sought to measure stress from a variety of angles: perceived stress, daily hassles, life domains that are stressful, and physiological stress (salivary cortisol). The study intended to clarify how stress is showing up in hypersexual individuals, though the stress and hypersexuality measures generally did not correlate with each other. This is still an important question to explore and answer in this area given the levels of stress and distress evidenced within hypersexual samples in this and other studies.

Implications

One implication that the present study raises is the possibility that the causal relationship between stress and hypersexual behavior actually occurs earlier on during the developmental phases of the condition. Our sample consisted of individuals who have struggled with this condition for years. It is possible that stress may have less of a causal nature when the pattern of hypersexuality is further developed, such as within this sample.

The findings from this study can guide those interested in treating hypersexual behaviors. The significantly elevated stress levels of the participants add support to others who suggest the use of mindfulness or other stress reduction techniques in the treatment of HD (Reid et al., 2014). In furthering our understanding of intrapersonal processes which may lead to hypersexual behavior, this study was one of the first to explore psychological inflexibility among a hypersexual sample. Increasing psychological flexibility is a core mechanism of change within Acceptance and Commitment Therapy, which already has some demonstrated support in the treatment of hypersexual behaviors (Twohig & Crosby, 2010). As seen in Table 4, compared to

all other measures used, our sample produced its second largest elevation compared to a norming sample on a measure of psychological inflexibility (the AAQ-II). A rigid, inflexible mindset may be contributing to the struggles faced by hypersexual patients and may be an important focus of treatment. From these findings, further exploration of psychological inflexibility among hypersexual samples is warranted.

The third largest elevation reported in Table 4 had to do with general distress scores on the OQ-45 compared to a non-clinical community sample. The OQ-45 breaks down into 3 subscales: symptom distress (measuring difficulty with mood, anxiety, or stress-related symptoms), interpersonal relations (measuring interpersonal concerns), and social role (measuring difficulty with social roles). Within the sample, 40% met or exceeded the clinical cutoff for symptom distress, 36.7% met or exceeded the cutoff for social role, while 73.3% of the sample met or exceeded the cutoff for interpersonal relations. Within the OQ, the majority of the sample endorsed significant distress from interpersonal difficulties or the lack of interpersonal connection. Similarly, the fourth largest elevation reported in Table 4 occurred on a measure of loneliness. Although this study found no significant relationships between interpersonal stress and hypersexual behavior, the broader construct of interpersonal dysfunction, as reflected by loneliness and interpersonal distress among hypersexual individuals, did find support and is a common finding in the literature deserving further exploration (Reid et al., 2014; Reid, et al., 2012; Reid, Stein, & Carpenter, 2011).

Our analysis of daily hassles also leads to some interesting implications. Over three decades ago, Kanner, Coyne, Schaeffer, and Lazarus (1981) reported their findings that daily experiences of hassles better predict negative psychological and physical health outcomes compared to major life events. As reported in Table 4, our sample reported a highly significant

elevation in frequency of daily hassles compared to published means. The other measures in that table assessed perceptions of distress while the hassles measure (as reported in that table [see note]) assessed the frequency of daily distressing events. Both perception of distress and perception of frequency were highly elevated in this sample. This finding provides an interesting "chicken or the egg" causality dilemma; are hypersexual individuals more sensitive to distress and are thus perceiving more of their daily experiences as hassles? Or, do they actually experience more hassles than others, which leads to greater distress? The moderating effect of hypersexual behavior adds an additional level of complexity to the questions above, which will require sound research to untangle.

Lastly, few studies have tested the outcomes of therapy with hypersexual individuals (Hook, Reid, Penberthy, Davis, & Jennings, 2014). Within the majority of those studies, the outcome variable is usually some form of hypersexuality measure. As evidenced by this and other studies, hypersexual individuals are often elevated on multiple domains, some of which do not correlate with each other. Utilizing other measures as pre- and post-therapy outcome variables in concert with hypersexuality measures can help the field better understand and improve the process of therapy in the treatment of hypersexuality.

Limitations and Future Research

Several aspects of the study limited the validity and generalizability of the findings. One of the main limitations of the study was the use of the STUB and BSDS, both of which, although face valid and closely following other approaches for assessing these phenomena, were not validated previously. Both measures were intended to be sensitive enough to detect changes in daily sexual thoughts, urges, and behavior along with stress, though no formal testing indicated sufficient sensitivity within the measures.

Data was collected from participants seeking treatment for hypersexual behaviors in a residential and/or intensive outpatient program. The majority of the participants came from out of state in order to attend the programs and lived in a different, protected environment where they were motivated to restrain from sexual thoughts, urges, and behaviors. Because such treatment is both expensive and not typically covered by insurance, it is not surprising that the sample is, on average, well-educated and with above average financial resources. More importantly, the structured environment of treatment limited the variability within all of the measures (e.g., fewer opportunities to engaged in hypersexual behavior, less exposure to daily stressors, more homogenous situational factors across participants), thus limiting our ability to find relationships among the variables tested. The causal relationship between stress and hypersexual behavior may be better tested within an outpatient or community sample who are living in a naturalistic setting, or even with a sample who are not in treatment.

The initial literature review did not reveal an ideal timeframe between initial stress and sexual thoughts, urges, and behavior. Because of this, the 5-day timeframe between Time 1 and Time 2 was arbitrary and decided during a discussion with the dissertation committee in order to provide adequate time between measurements that would hopefully allow variability between the two days. It is possible, then, that this relationship between stress and hypersexual behavior is occurring, but the selected timeframe was not the right time to capture it.

Major Conclusions

The present study sought to further our understanding of stress within hypersexual individuals and specifically sought to shed light on the process that occurs when hypersexual patients experience stress. Although no causal relationship between stress and hypersexual behavior, even when different forms of stress were accounted for (perceived stress, physiological

stress, daily hassles, and stress within various life domains), the study still contributed to a growing body of research that demonstrates that hypersexual individuals experience significant stress and distress across a variety of intrapersonal and interpersonal domains. This pattern of elevated distress has been consistently reported across multiple studies and clearly plays a role in the etiology and maintenance of the issue. If we are to adequately understand and treat hypersexual individuals, illuminating the process between distress and behavior will be an important responsibility of future research.

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Appendix

Sexual Thoughts, Urges, and Behavior

(STUB)

The following items ask you to rate your sexual thoughts, urges, and behavior. ***Sexual thoughts*** refer to mental fantasies and images that are sexual. ***Sexual urges*** refer to increases in motivation to have sex and physiological excitation in preparation for sexual behavior. ***Sexual behavior*** refers to the engagement in acts with the intention to arouse and/or fulfill sexual desires (feel sexual feelings and/or achieve orgasm).

1) Rate how often you had sexual thoughts over the past month:

○ Never
○ Rarely
○ Sometimes
○ Often
○ All the time

2) Rate how often you had sexual urges over the past month:

○ Never
○ Rarely
○ Sometimes
○ Often
○ All the time

3) Rate how intense your sexual thoughts were over the past month:

○ Not intense at all
○ Somewhat intense
○ Moderately intense
○ Very intense
○ Extremely intense

4) Rate how intense your sexual urges were over the past month:

○ Not intense at all
○ Somewhat intense
○ Moderately intense
○ Very intense

❍ Extremely intense

5) Rate how often you engaged in sexual behavior with a committed partner over the past month:

❍ 0 times
❍ 1-3 times
❍ 4-6 times
❍ 7-9 times
❍ If 10 or more times, please enter an estimated amount: _____

6) Rate how often you engaged in sexual behavior by other means (pornography, masturbation, hooking up, one-night-stands, etc.) over the past month:

❍ 0 times
❍ 1-3 times
❍ 4-6 times
❍ 7-9 times
❍ If 10 or more times, please enter an estimated amount: _____

7) During the past month, **how much time** was consumed by sexual fantasies, urges, and/or behavior which caused you personal distress (feelings of shame, sadness, anxiety, regret, etc.), got in the way of you completing important tasks (work, school, etc.), and/or was potentially damaging to a relationship with a committed partner, close friend, or another person (could have led to a loss of trust in the relationship)?

❍ No time
❍ Up to 30 minutes on an average day
❍ 30-59 minutes on an average day
❍ 1-3 hours on an average day
❍ If more than 3 hours on an average day, please enter an estimated amount:

_____

8) During the past month, **how many times did you engage** in sexual behavior which caused you personal distress (feelings of shame, sadness, anxiety, regret, etc.), got in the way of you completing important tasks (work, school, etc.), and/or was potentially damaging to a

relationship with a committed partner, close friend, or another person (could have led to a loss of trust in the relationship)?

○ 0 times
○ 1-3 times
○ 4-6 times
○ 7-9 times
○ If 10 or more times, please enter an estimated amount: _____

Behavior

Please indicate the sexual behaviors you engage in which cause you problems or that have been used excessively to cope with difficult feelings or stress. Check all that apply.

❑ Masturbation by itself or during other sexual activities
❑ Telephone sex
❑ Cybersex (e.g., Internet-related sexual talk or behavior associated with web-cams, other 'virtual' sexual behaviors; the general distinction here is that Cybersex is relational or interactive in some manner)
❑ Pornography (e.g., Internet video, images and webcasts, magazines, DVDs/videos, X-rated TV and films).
❑ Strip clubs
❑ Sexual behavior with consenting adults (direct contact). Examples include use of escort services, prostitutes, repeated "one-night stands", anonymous brief sexual encounters, repeated affairs, massage parlor visits that include sex)
❑ Please write any other forms of sexual behavior you engage in which cause you problems or have been used excessively to cope:

Brief Stress Domain Scale Full (BSDS)

Please indicate the frequency and amount of stress you have experienced over the past month in each of the following areas of your life:

Work/School Stress: Any dissatisfaction or disinterest in the work you are doing; you feel overwhelmed by demands at school or work; or you don't quite feel challenged enough by school or work.	Never/None	Little	Somewhat	Much	A Great Deal
Over the past month, how often did you feel stress from work, school, or career?	○	○	○	○	○
Over the past month, how stressed did you feel due to work, school, or career?	○	○	○	○	○

Time Stress: Not enough time to fulfill your responsibilities, not enough personal/leisure time.	Never/None	Little	Somewhat	Much	A Great Deal
Over the past month, how often did you feel stress from time pressure?	○	○	○	○	○
Over the past month, how stressed did you feel due to time pressure?	○	○	○	○	○

Financial Stress: Difficulty making ends meet; investment and/or credit difficulties; burdened with bills to pay.	Never/None	Little	Somewhat	Much	A Great Deal
Over the past month, how often did you feel financial stress?	○	○	○	○	○
Over the past month, how stressed did you feel due to finances?	○	○	○	○	○

Health Stress: Personal illness; sleep difficulties; not taking care of self.	Never/None	Little	Somewhat	Much	A Great Deal
Over the past month, how often did you feel stress from health issues?	○	○	○	○	○
Over the past month, how stressed did you feel due to health issues?	○	○	○	○	○

Personal Stress: Dissatisfaction with yourself or your abilities. Not feeling good enough or capable.	Never/None	Little	Somewhat	Much	A Great Deal
Over the past month, how often did you feel personal stress?	○	○	○	○	○
Over the past month, how stressed did you feel due to personal stress?	○	○	○	○	○

Social Conflict: Interpersonal conflicts with friends, family, coworkers, or significant other.	Never/None	Little	Somewhat	Much	A Great Deal
Over the past month, how often did you feel stress from social conflict?	O	O	O	O	O
Over the past month, how stressed did you feel due to social conflict?	O	O	O	O	O

Social Isolation: Lacking social support, not feeling socially connected, or feeling ignored/rejected by others.	Never/None	Little	Somewhat	Much	A Great Deal
Over the past month, how often did you feel stress from social isolation or rejection?	O	O	O	O	O
Over the past month, how stressed did you feel due to social isolation or rejection?	O	O	O	O	O

Brief Stress Domain Scale, Short Version

Over the past 24 hours, how stressed out did you feel?

- ❍ None
- ❍ Little
- ❍ Somewhat
- ❍ Much
- ❍ A Great Deal

Please indicate how much you felt of each of the following types of stress over the past 24 hours:	None	Little	Somewhat	Much	A Great Deal
Work/School: Any dissatisfaction/ disinterest in the work you are doing (this can include therapy)	❍	❍	❍	❍	❍
Time Pressure: Not enough time to fulfill your responsibilities, not enough personal/leisure time	❍	❍	❍	❍	❍
Finances: Difficulty making ends meet, investment and/or credit difficulties, burdened with bills to pay	❍	❍	❍	❍	❍
Health: Personal illness, sleep difficulties, not taking care of self	❍	❍	❍	❍	❍
Personal: Dissatisfaction with yourself or your abilities. Not feeling good enough or capable.	❍	❍	❍	❍	❍
Social Conflict: Interpersonal conflicts with friends, family, coworkers, or significant other	❍	❍	❍	❍	❍
Social Isolation: Lacking social support, not feeling socially connected, or feeling ignored/rejected by others	❍	❍	❍	❍	❍