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Should Hypersexual Disorder be Classified as an Addiction?

Ariel Kor,
Interdisciplinary Center Herzliya Teachers College, Columbia University

Yehuda Fogel,
Teachers College, Columbia University

Rory C. Reid, and
Department of Psychiatry and Biobehavioral Sciences University of California, Los Angeles

Marc N. Potenza
Departments of Psychiatry, Neurobiology and Child Study Center, Yale University School of Medicine

Abstract

Hypersexual behavior has been documented within clinical and research settings over the past decade. Despite recent research on hypersexuality and its associated features, many questions remain how best to define and classify hypersexual behavior. Proposed diagnostic criteria for Hypersexual Disorder (HD) have been proposed for the DSM-5 and a preliminary field trial has lent some support to the reliability and validity of the HD diagnosis. However, debate exists with respect to the extent to which the disorder might be categorized as a non-substance or behavioral addiction. In this article, we will discuss this debate in the context of data citing similarities and differences between hypersexual disorder, drug addictions, and pathological gambling. The authors of this paper conclude that despite many similarities between the features of hypersexual behavior and substance-related disorders, the research on HD at this time is in its infancy and much remains to be learned before definitively characterizing HD as an addiction at this time.

Keywords

sex; hypersexual disorder; behavioral addictions; gambling; substance abuse

For more than a century, hypersexual behavior has been described and assigned different labels such as sex addiction or sexual compulsivity/impulsivity by diverse bodies of clinicians (Barth & Kinder, 1987; Coleman, 1987; Garcia & Thibaut, 2010; Goodman, 2001; Kingston & Firestone, 2008; Schreiber, Odlaug & Grant, 2012; Stein, 2008). Hypersexual disorder (HD) has recently been proposed for consideration as a formal diagnostic entity in the DSM-5 (Kafka, 2010). A greater awareness of hypersexual behavior in both clinical and

Correspondence concerning this article should be addressed to Ariel Kor, School of Psychology, Interdisciplinary Center Herzliya, Israel. Tel: +972 9 960 2888; Fax: +972 9 960 2845; kor.ariel@gmail.com.

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non-clinical populations has led to an increase in research, although the clinical relevance and possible etiologies for HD have yet to be established. Existing research suggests putative risk factors, developmental pathways, and pathophysiologies and has identified HD-related clinical characteristics (Grov, Parsons, Bimbi, 2010; Raymond, Coleman, & Miner, 2003; Reid, Carpenter, Gilliland, & Karim, 2011; Winters, Christoff & Gorzalka, 2010).

In proposing the name HD for the DSM-5 criteria, Kafka intended to avoid language such as "sex addiction" that might suggest a possible etiology (Kafka, 2010; Kafka, this issue). Although some evidence has recently been advanced to support the reliability and validity of the DSM-5 proposed criteria for HD (Reid et al., 2012), questions remain about how to best classify hypersexuality as a psychiatric condition. At this juncture, the empirical science is not available to establish causality or pathogenesis for psychiatric disorders (Caine, 2003), including sexual disorders (Winters, Christoff & Gorzalka, 2010). Despite this limitation, data exist describing similarities between hypersexual behavior and substance addictions (Garcia & Thibaut, 2010), suggesting that an addiction model might apply to a disorder characterized by hypersexuality. However, alternate conceptualizations exist, given links between hypersexual behavior and internalizing disorders like anxiety and depression and phenomenological and theoretical similarities with compulsive disorders like obsessive-compulsive disorder (OCD). Furthermore, given the focus of the excessive behavior, HD may be best considered a sexual disorder and categorized with other sexual disorders in DSM-5 as it has currently been proposed (Kafka, 2010). As further research evolves, it will be important to consider data from co-occurring disorders, clinical characteristics, genetic contributions and central and peripheral biologies in determining how best to characterize HD.

Several authors have suggested that HD might constitute a behavioral addiction and be considered for inclusion in the DSM-5 within a category of Addictions and Related Disorders (Schreiber, Odlaug & Grant, 2012; Winters, Christoff & Gorzalka, 2010). Historically, the extent to which non-substance or behavioral addictions exist has been questioned (Holden, 2001). The word addiction derives from the Latin *addicere* meaning "bound to" or "enslaved by" and was not originally linked to substance-use behaviors (Maddux & Desmond, 2000). However, for several centuries, the term addiction has become increasingly linked to excessive patterns of alcohol and drug use so that by the time of DSM-III-R, the Substance-Use-Disorder workgroup identified addiction as reflecting compulsive drug use (O'Brien, Volkow & Li, 2006). However, the extent to which non-substance disorders, particularly gambling, might be considered within an addiction framework has been given greater consideration, in large part due to research identifying similarities between pathological gambling (PG) and substance-use disorders (SUDs; Potenza, 2006; Petry, 2006). These data involve frequent co-occurrence of PG and SUDs, shared phenomenological features (high rates in adolescents and young adults, lower rates in older adults, telescoping patterns of progression in women versus men whereby women versus men who develop problems with the behaviors tend to demonstrate problems more rapidly following initial engagement), genetic contributions, neurobiologies, and efficacious treatments (Potenza, 2008; Leeman & Potenza, 2012).

Although limited, several alternate conceptual models have been explored but do not demonstrate the same degree of empirical data supporting a close relationship (Potenza, Koran & Pallanti, 2009; el-Guebaly et al., 2012). For example, if one considers PG as an obsessive-compulsive-spectrum disorder, then one might expect similarities with obsessive-compulsive disorder (OCD) with respect to co-occurrence, phenomenology, genetics, neurobiology and treatments, and such similarities are not observed to the same degree as with PG and SUDs (Potenza, Koran & Pallanti, 2009; el-Guebaly et al., 2012). The idea that

PG and SUDs might be both categorized as addictions also reflects shared common elements that have been proposed as central to addictive disorders: 1) continued engagement despite adverse consequences; 2) an appetitive urge or craving state prior to engagement; 3) diminished self-control over behavioral engagement; and 4) compulsive engagement (Shaffer, 1999). Taken together, the data have been used by the SUD Workgroup to propose grouping PG with SUDs in DSM-5. Collectively, the history of research linking PG to SUDs might serve as a template to consider whether HD should be classified as an addictive disorder. However, at the present time, research on HD is lacking, particularly in the areas of neurobiology, genetics, and treatment efficacy (Hook, Reid, Penberthy, Davis, & Jennings, in press). Subsequently, it is unclear whether HD might show similar or distinct findings with SUDs (or PG). Below we describe existing data, beginning with a description of HD, its formulation in the DSM, clinical characteristics associated with HD, and the neurobiological underpinnings of the disorder. In these descriptions, we highlight similarities to and differences with addictive disorders including SUDs and PG. We next describe alternate non-mutually-exclusive conceptual frameworks (including obsessive-compulsive-spectrum and impulsivity/compulsivity models) before summarizing data on HD's conceptualization within an addiction framework. We conclude by describing briefly existing gaps in understanding and the relevance of appropriate classification of HD.

Defining Hypersexual Behavior

In defining hypersexual behavior, it is important to consider “normal” sexual behavior, from an adaptive evolutionary perspective. Sex is fundamental for the survival of species, requiring an instinctual drive and reward-based reinforcement to ensure perpetuation of the species (Frascella, Potenza, Brown & Childress, 2010). When this drive becomes intensive and leads to “out-of-control” sexual activity despite negative consequences and risk of harm to ones emotional and physical health, its protective and evolutionary values are diminished. Similarly, if sexual activity hinders completion of non-sex-related vital tasks, this evolutionarily positive drive has become negative and arguably turned addictive. Males often engage in sexual activity for pleasure and esteem reasons (Impett & Paplau, 2003). The pleasure related to sexual activity has been described to be as basic as eating, fulfilling the basic drive of hunger (Codispoti, 2008). Thus, if sexual behaviors are to be viewed within an addiction framework, one should consider whether, or the extent to which, abstinence (as promoted by many clinicians and 12-step programs) represents a reasonable goal for individuals with HD.

Both the DSM-III-R and DSM-IV include criteria for a sexual disorder not otherwise specified that can be used to diagnose patterns of hypersexuality; however, the diagnostic criteria lack specificity beyond the general notion that an individual feels distress about patterns of sexual behavior. Hypersexual behavior has been described as poorly controlled, excessive sexual behaviors that intrude on an individual's thoughts and feelings, and distract the individual from focusing on other objectives (Garcia & Thibaut, 2010; Bancroft, 2008). These sexual thoughts and behaviors involve functional impairment and distress, and may evolve into impulsive or habitual patterns of sexual behavior that are poorly controlled (Scheirber, Odlaug & Grant, 2012; Tepper, Owens, Coleman, & Carnes, 2007; Black et al., 1997; Gerevich et al., 2005; Bancroft 2008).

Many manifestations of hypersexual behavior are considered legal and morally acceptable; it is the excessiveness of hypersexual behavior combined with risks and associated consequences that may lead to functional impairment and distress. Excessive masturbation and behavioral interactions with multiple partners are two examples of behaviors that are most often reported as being poorly controlled and leading to functional impairment (Kafka, 2010; Bancroft, 2008). Internet pornography also represents a significant problem for some

individuals (Bancroft, 2008) and was the most widely endorsed manifestation of hypersexual behavior in a DSM-5 field trial (Reid et al., 2012). There is no uniformly agreed-upon definition or level of sexual behavior that is excessive, interfering or out of control. Although population-based surveys suggest the presence of persistent and increased frequency rates of enacted sexual behaviors and thoughts in individuals with hypersexual behavior as compared to those without (as one might anticipate given the groupings), it is are important to consider the extent to which these behaviors are distressing and interfering when conceptualizing HD (Kafka, 2010; Garcia & Thibaut, 2010).

Current proposed diagnostic criteria for HD have been based on ways in which recurrent or intense sexual thoughts and behaviors might lead to impairment or distress (Kafka, 2010). The proposed diagnostic criteria for HD are exclusive of being induced by exogenous substances, mania, or a medical condition that would otherwise explain sexual activity. Inclusionary criteria include the presence of recurrent and intense sexual fantasies, sexual urges, or sexual behaviors for a period of at least six months. Four or more of the following five criteria must also be present: (a) excessive time consumed by sexual fantasies, urges or behaviors repetitively interferes with other important (non-sexual) goals, activities and obligations; (b) repetitively engaging in sexual fantasies, urges or behaviors in response to dysphoric mood states (e.g., anxiety, depression, boredom, irritability); (c) repetitively engaging in sexual fantasies, urges or behaviors in response to stressful life events; (d) repetitive but unsuccessful efforts to control or significantly reduce these sexual fantasies, urges or behaviors; and, (e) repetitively engaging in sexual behaviors while disregarding the risk for physical or emotional harm to self or others (Kafka, 2010). There must also be clinically significant personal distress or impairment in social, occupational or other important areas of functioning associated with the frequency and intensity of these sexual fantasies, urges or behaviors. Also, individuals must be 18 years of age or older. Specifications include: masturbation, pornography, sexual behavior with consenting adults, cybersex, telephone sex, strip clubs, and other (Kafka, 2010).

Clinical Characteristics

As with other psychiatric disorders (including PG and substance abuse and dependence), individuals with HD appear to comprise a heterogeneous group (Reid, Carpenter, & Lloyd, 2009, Reid & Carpenter, 2009). Large-scale, population-based epidemiological studies assessing the prevalence of hypersexual behavior are lacking. Some researchers have suggested the prevalence of hypersexual behaviors or disorder in approximately 3-6% of the general population (Carnes, Green, Merlo, Polles, Carnes, & Gold, 2011; Coleman, 1992; Garcia & Thibaut, 2010), although no original research data have been published to support these estimates. Psychological differences between hypersexual and non-hypersexual groups have also been reported (Reid, Carpenter & Lloyd, 2009; Reid & Carpenter, 2009). The psychological aspects of groups displaying hypersexual behavior show both similarities with and differences from SUDs and PG, as described in greater detail below. As with SUDs and PG, males constitute the majority of treatment-seeking individuals for hypersexual behavior, with onset typically occurring during late adolescence (Reid et al., 2012). Treatment-seeking individuals report experiencing preoccupation with sexual fantasies or being overly sexually active, with difficult-to-control and distressing sexual urges. “Triggers” inducing sexual urges may include sadness and depression, happiness, loneliness, and shame (Schreiber, Odlaug, & Grant, 2012). These urges and triggers observed in association with hypersexual behaviors are similar to those reported for SUDs and PG (Grant & Kim, 2002; Baker, Piper, McCarthy, Majeskie & Fiore, 2004; Edwards & Koob, 2010).

As in SUDs and PG, significant marital, occupational, and financial difficulties have been documented, particularly in relation to sexual urges and behaviors (Coleman et al., 2003;

McBride, Reece, & Sanders, 2008; Muench, et al., 2007; Reid, Garos, & Fong, 2012). Hypersexuality has also been related to difficulties in developing healthy attachments among romantic partners (Reid & Wooley, 2006; Zapf, Greiner, & Carroll, 2008). The most common behaviors reported are masturbation, compulsive use of pornography, compulsive cruising and multiple relationships (Black et al., 1997; Briken et al., 2007; Kafka & Hennen, 1999; Raymond, Coleman, & Miner, 2003; Wines, 1997; Reid et al., in press). Compulsive fixation on an unattainable partner, compulsive autoeroticism, compulsive use of erotica, compulsive use of Internet for sexual purposes, and compulsive sexuality in a relationship are other common behaviors (Coleman, 1992; Coleman et al., 2003). As in SUDs and PG, these preoccupations and behaviors typically interfere significantly with other areas of life functioning including work and social (spousal, familial) relations (Reid et al., 2012; American Psychiatric Association, 2000).

As is the case for SUDs and PG, certain clinical populations may be at a higher risk of exhibiting hypersexual behavior. Some of the “high-risk” groups for HD may include individuals with drug addictions, perhaps acting through shared mechanisms. For instance, methamphetamine has been found to increase sexual desire and sensation while decreasing sexual inhibition (Degenhardt & Topp, 2003; Semple et al., 2002). Medications such as levodopa and dopamine agonists (pramipexole, ropinirole and others) used in the treatment of Parkinson's disease and other conditions have also been associated with hypersexuality and other impulse-control behaviors (Pontone et al., 2006; Uitti et al., 1989; Weintraub et al., 2010a,b; Voon et al., 2011). In uncontrolled trials, hypersexuality has been reported to diminish when dopamine-replacement medications like dopamine agonists were stopped and/or different medications were added (Klos et al., 2005). In a case series, individuals taking pro-dopaminergic medications were reported to have increased sexual interest, and an earlier mean age of Parkinson's disease onset (approximately 10 years earlier) has been described for patients with hypersexual behavior (Uitti et al., 1989). However, multiple other features (e.g., geographic location, marital status, impulsivity, family history of addiction and personal history of impulse control disorders or behaviors prior to the onset of Parkinson's disease) have also been associated with hypersexuality and other impulse control behaviors and disorders, suggesting that the precise etiology of hypersexual behavior in Parkinson's disease is poorly understood and likely multi-factorial in nature (Potenza et al., 2007; Weintraub et al., 2010; Leeman & Potenza, 2011; Leeman et al., 2012). Moreover, under the current proposed criteria for HD, substance-induced hypersexual behavior would not satisfy symptom endorsement towards an HD diagnosis. Thus, more research is needed to understand the mechanisms underlying hypersexual behaviors and their relationships to drug and other addictive behaviors in multiple clinical contexts.

Psychiatric co-morbidities

Many individuals with hypersexual behavior suffer from psychiatric disorders. Being able to confidently identify and treat hypersexual behavior may relieve features of both hypersexual behavior and the co-occurring disorders and help affected individuals lead improved lives. In one report, 72% of patients with hypersexual behavior reported mood disorders, 38% reported anxiety disorders, and 40% reported substance abuse (Kafka & Hennen, 2002). Other reports indicate a range from 80% (Black et al., 1997) to 100% (Raymond, Coleman, & Miner, 2003) of comorbidity with Axis I DSM disorders such as anxiety, substance-use, or mood disorders, sexual dysfunction, and impulse-control disorders. Axis II disorders including paranoid, passive-aggressive and narcissistic personality disorders have also been reported in association with hypersexual behavior (Black et al., 1997; Raymond, Coleman, & Miner, 2003). Amongst individuals with Parkinson's disease, those with hypersexual behavior show both similarities to those with PG (both associated with depression) as well as differences (lower impulsivity and sensation-seeking), with PG tending to show greater

similarities with compulsive buying than with hypersexual behavior (Voon et al., 2011). Thus, the patterns of co-occurrence with hypersexual behavior are not exclusively or predominantly with SUDs, nor are the clinical characteristics necessarily similar to PG, raising questions as to whether HD might be best categorized as an addiction.

Studies have reported "some level of classic" attention deficit hyperactivity disorder (ADHD) in 67% of their subjects reporting hypersexual behaviors (Blankship & Laaser, 2004, p.14). Other data suggest lower estimates; e.g., 23% of individuals with hypersexual behaviors were found to meet criteria for adult ADHD (Reid, 2007; Reid, Bruce, Carpenter, Gilliland & Karim, 2011). Recently, hypersexual behavior was not found to be strongly influenced by impulsivity and hyperactivity characteristics among individuals diagnosed with ADHD. These findings share some similarities and show some differences with what is understood regarding the relationships between ADHD and PG. For example, PG was not associated with elevated odds of ADHD in the general population (Kessler et al., 2008). However, young adults with childhood ADHD that persists into adulthood, as compared with young adults with childhood ADHD that remits or young adults no history of ADHD, have been found to have greater problem gambling severity (Breyer et al., 2009). In a separate study, adults with PG and childhood ADHD, as compared to non-ADHD groups with and without PG, have been found to report high levels of self-reported impulsivity, have diminished capacities or willingness to delay gratification, and exhibit less inhibitory control (Rodrigues-Jimenez et al., 2006). Together, these findings suggest a role for ADHD in relation to PG, particularly when considering ADHD from a developmental perspective.

Other characteristics might also show similar relationships with HD and as those reported with PG and SUDs. For example, low self-esteem was found as an influencing variable in severity of hypersexual behavior (Reid, Bruce, Carpenter, Gilliland & Karim, 2011). Analogously, low self-esteem has also been reported in association with PG (Kaare, Mottus & Konstabel, 2009) and SUDs (Silverstone & Mahnaz, 2003). However, the extent to which these findings support the classification of HD as an addiction is questionable as low self-esteem has been associated with a broad range of psychiatric conditions, particularly depression (Silverstone & Mahnaz, 2003).

Neurobiological Basis

Research investigating neurobiological pathways relating to hypersexual behavior is at an early stage. Potential similarities to substance and behavioral addictions have been preliminarily extended to neurobiological pathways (Brewer & Potenza 2008; Leeman & Potenza, 2012; Leeman & Potenza, in press). Sexual pleasure has been described as a "primal non-drug reward process" (Frascella, Potenza, Brown & Childress, 2010), and neural systems involved in pleasure and reward (e.g., the mesolimbic dopamine pathway) have been implicated in sexual behaviors (Balfour, Yu & Coolen, 2003). Brain imaging studies indicate sexual arousal and orgasm affect the mesolimbic reward system including the striatum, medial prefrontal cortex, and the orbitofrontal cortex (Frascella, Potenza, Brown & Childress, 2010). These regions, particularly the ventral striatum and ventromedial prefrontal cortex, have been implicated in both SUDs and PG (Leeman & Potenza, 2012). However, the extent to which individuals with and without hypersexual behavior differ in mesolimbic dopamine function has not been investigated systematically. Furthermore, such relationships tend to support the notion that sexual behavior is rewarding, not necessarily addictive per se, and direct investigation into potential relationships between mesolimbic dopamine function and severity of HD, for example, may help in ascertaining the extent to which mesolimbic dopamine function relates to potentially addictive aspects of HD.

White matter integrity, relevant to the efficient communication of information within neural circuits, can be investigated using diffusion tensor imaging. Individuals with specific SUDs have shown poorer white matter integrity, with disorders like alcohol dependence showing diffuse patterns of poorer integrity that may in part reflect the effects of the abused substance on brain substrate. However, PG and impulse control disorders like kleptomania have been shown to have poorer white matter integrity in the genu of the corpus collosum and in frontal cortical regions (Yip et al., in press; Grant, Correia & Brennan-Krohn, 2006), suggesting poorer white matter integrity relating to impaired impulse control independent of abused substances. However, individuals with hypersexual behavior have shown significantly lower mean diffusivity (suggesting better white matter integrity) in the superior frontal region of the prefrontal cortex (Miner et al., 2009), suggesting that HB might differ from substance and non-substance addictions. However, this latter study of hypersexual patients involved a small sample and did not control for other important pathologies (e.g., alcohol abuse or dependence or adult ADHD). Thus, additional research is needed to examine the extent to which there exist differences in white matter integrity as related to hypersexual behaviors, and the extent to which such possible differences are similar to or distinct from those in SUDs.

Correlates between hypersexual behaviors and deficits in executive functioning have been hypothesized (Reid, Karim, McCrory, & Carpenter, 2010) including: difficulties controlling sexual behaviors and inhibition impulse control; motivational deficits to change behavior and motivation, task initiation, sustained attention; alexithymia, emotion dysregulation, rumination and emotional control; cognitive flexibility, inhibition; choose sex despite negative consequences and decision making, judgment, inhibition, impulse control; and preoccupation and rumination about sex, and attention, behavior inhibition, cognitive flexibility. Features that might reflect poor executive functioning, such as impulsivity, poor judgment and planning, and impoverished concentration, have been reported amongst individuals with SUDs and PG (Giancola & Mezzich, 2003; Gonzalez, Bechara, & Martin, 2007; Ihara, Berrios, & London, 2000; Leeman & Potenza, 2012). Using the Behavior Rating Inventory of Executive Function—Adult Version (BRIEF-A), hypersexual behavior was related to deficits in executive functioning (Reid, Karim, McCrory, & Carpenter, 2010). Specifically, in a patient group compared with control comparison participants, deficits in a majority of executive-function domains were reported, particularly those involving shifting (assessing function relating to making transitions and solving problems), emotional regulation or control, initiation (assessing function relating to initiating tasks, generating ideas and solving problems) and planning and organizing (Reid, Karim, McCrory, & Carpenter, 2010). Higher scores on self-report measures of executive functions were also positively related to hypersexual behavior. However, when executive deficits in hypersexual patients have been assessed through objective neuropsychological tests, hypersexual patients failed to exhibit executive deficits when compared to healthy controls (Reid, Garos, Carpenter, & Coleman, 2011). Collectively, these mixed findings suggest that further research is need to determine whether brain-behavior relationships and executive deficits observed among individuals with SUDs can be generalized to hypersexual individuals.

PG studies which have gained greater acceptance as an “addictive” disorder have reported neurobiological pathways paralleling those found among individuals with SUDs (Leeman & Potenza, 2012). For example, similar to findings in alcohol-dependent individuals, the ventral striatum and ventromedial prefrontal cortex have been identified as showing diminished activation associated with the processing of monetary rewards in a manner that differs from individuals with OCD (Wrase et al., 2007; Beck et al., 2007; Balodis et al., 2012; Choi, 2012). Studies demonstrating these types of relationships are needed among hypersexual individuals in order to ascertain the extent to which hypersexual behavior might share these features with substance and other addictive behaviors such as those noted among

PG. Reward-related brain regions may also link SUDs and hypersexual behavior. For example, the amygdala was activated in cocaine-dependent individuals when drug and sex cues were presented and is implicated in sexual arousal, orgasm, romantic love and cocaine use (Frascella, Potenza, Brown & Childress, 2010). Patients with prefrontal lesions and bilateral lesions of the temporal lobe regions have been found to demonstrate hypersexual behavior (Rees, Fowler, & Maas, 2007). Positron emission tomography scans assessing regional cerebral blood flow in healthy men during orgasm and ejaculation indicated activation of the ventral tegmental area (Holstege et al., 2003), a brain region innervating the ventral striatum and implicated in studies of substance addictions. However, the extent to which the amygdala and these other brain regions show similar or distinct patterns of activation in HD as compared to SUD groups has not been examined directly. Such studies may help better understand the extent to which from a neurobiological perspective hypersexual behavior might be considered within an addiction framework, particularly if the biological measures relate to excessive or interfering patterns of sexual behaviors.

Obsessive-Compulsive Spectrum Model

The obsessive-compulsive model is based on parallels between hypersexual behavior and OCD. Sexual obsessions are described as increasing and time-consuming sexual fantasies associated with compulsive sexual behavior, and these may be supplementary to underlying OCD (Garcia & Thibaut, 2010). High rates of comorbidities between hypersexual behavior and anxiety disorders, including OCD, have been reported in clinical samples, although population-based studies are lacking (Black et al., 1997; Raymond et al., 2003). As in OCD, compulsive behaviors may be successful in reducing anxiety by refocusing one's concerns and avoiding depressive or anxious thoughts (Black et al., 1997; Kafka & Pretenky, 1997). This may be the case for individuals with hypersexual behavior. Fantasizing about sexual activity may provide individuals with even more distraction than sexual experiences and may help negate negative emotions through intense focus on pleasure present during sexual arousal and orgasm. As in OCD, obsessive and intrusive thoughts may be managed through performing ritualistic behaviors; hypersexual behavior may serve in this capacity. This may be true as the complexities and inherent problems of being with a partner are not present (Reid, Carpenter, Spackman & Willes, 2012). However, the extent to which repetitive and compulsive hypersexual behaviors are ego-dystonic or considered not to make sense, as is typically the case in OCD, is not clear and may represent an important difference between hypersexual behavior and OCD.

There may exist similarities between hypersexual behavior and OCD with respect to the reinforcement model hypothesized and used in cognitive behavioral treatments for individuals suffering from OCD (Schreiber, Odlaug & Grant, 2012). This model suggests that both positive and negative reinforcement are likely involved in maintaining compulsive behaviors. Similarly, positive and negative reinforcement motivations have been described for substance addictions (Sinha, 2008). The use of Internet pornography (IP) may provide both psychological and physiological reinforcement (e.g., sexual arousal and/or sexual gratification) at a high schedule of reinforcement, thus encouraging maintenance of IP use (Mick & Hollander, 2006) and other addictive behaviors (Putnam, 2000; Griffiths, 2001).

Notably, OCD behaviors may differ from hypersexual behavior in that behaviors associated with OCD, such as washing and checking, may not be pleasurable and are typically performed to reduce anxiety. There may be no ego-syntonic motivations to perform compulsions in OCD as there are typically for sexual behaviors. One's sexual behavior may not be specifically anxiety-reducing as is the case with OCD. Individuals with OCD do not necessarily act on their obsessions due to their hedonic desire for the behavior. In many instances, they may not act on their obsessions at all as their obsessions may be considered

even by themselves to be irrational. Individuals with hypersexual behavior typically act on their sexual fantasies because they desire the pleasure associated with the sexual behavior (Aboujaoude & Koran, 2008). Together, the findings provide some support for conceptualizing hypersexual behavior within an obsessive-compulsive-spectrum framework.

Impulsivity/ Compulsivity

Impulsivity and compulsivity have been proposed as intermediary phenotypes or potential endophenotypes relevant to multiple psychiatric disorders including SUDs, PG and OCD. Impulsivity has been defined as, “a predisposition toward rapid, unplanned reactions with diminished regard to the negative consequences of these reactions to the impulsive individual or others” (Moeller et al, 2001; Potenza & deWit, 2010). Compulsive behavior has been described as involving repetitive behaviors without apparent adaptive function (Leeman & Potenza, 2012). The impulsive component of hypersexual behavior such as pleasure and arousal may be related to the initiation of the disorder, while a compulsive component could be involved in the persistence of the behavior (Garcia & Thibaut, 2010; Brewer & Potenza, 2008).

In one small study, individuals with hypersexual behavior were found to be more impulsive than a control group using the Compulsive Sexual Behavior Inventory and the Barratt Impulsiveness Scale (Miner, Raymond, Mueller, Lloyd & Lim, 2009). Other studies have also noted positive relationships between impulsivity and hypersexual behavior (Reid, Garos, & Carpenter, 2011; Reid, Stein, & Carpenter, 2011). These findings are similar to those in PG and SUDs in which both groups have been found to be more impulsive on both self-report and behavioral measures of impulsivity (Leeman & Potenza, 2012). However, these findings might not hold consistently for a range of impulse-control behaviors and disorders. For example, amongst individuals with Parkinson's disease, significant differences in temporal discounting patterns were observed across groups with and without impulse-control problems (Voon et al., 2011). Specifically, individuals with PG and compulsive shopping demonstrated steeper discounting (reflecting greater impulsivity) as compared to those with compulsive sexual behaviors and those without impulse-control problems (Voon et al., 2011). Additionally, amongst groups with impulse-control problems (relating to gambling, shopping, sex and eating), the group with compulsive sexual behaviors reported the lowest mean score on the Barratt Impulsiveness Scale, although all groups demonstrated higher mean scores as compared to individuals without impulse-control problems (Voon et al., 2011). A similar pattern was observed with measures of compulsivity using the obsessive-compulsive inventory (Voon et al., 2011). Thus, although problematic sexual behaviors have been conceptualized as being related to characteristics of both impulsivity and compulsivity (Coleman, Raymond, & McBean, 2003; Mick & Hollander, 2006), additional studies of impulsivity and compulsivity in HD (particularly in non-Parkinsonian groups) are needed, particularly as existing data suggest that these constructs may be more relevant to conditions like PG than to HD.

Addiction Model

As described above, addictions typically consist of activities conducted repeatedly, habitually and compulsively and interfere in major areas of life functioning (Miller, Forcehimes & Zweben, 2011; Potenza, 2006). Both substance and non-substance addictions may involve chronic relapsing, feelings of tension or arousal before committing the act (e.g., gambling or substance use), and subsequent pleasure, gratification, or relief at the time of committing the act. Behaviors often become less pleasurable and more habitual over time. They may be driven by negative reinforcement and involve craving states (Grant, Potenza, Weinstein, & Gorelick, 2010).

Hypersexual behaviors may parallel substance addictions in various ways (Orford, 1978; Gold & Heffner, 1998; Garcia & Thibaut, 2010; Black et al., 1997; Kafka & Hennen, 2002; Maranda et al., 2004; Raymond et al., 2003; Valois et al., 1999; Wines, 1997). Patients often report an escalation in sexual behaviors as HD develops and progresses (Reid, et al., 2012). Other features including withdrawal-like states (e.g., the development of anxiety and depression when not engaging in sexual behavior – see Wines, 1997), ruminating about sex, and feelings of guilt and remorse related to a reduction of sexual activities may also share similarities with SUDs, although more research is needed in this area (Garcia & Thibaut, 2010). HD patients also report it to be difficult when attempting to stop or reduce the frequency of sexual activities. HD patients may spend excessive amounts of time seeking potential partners, and they may increase the amount of time as the disorder develops. They may simultaneously reduce the time they engage in other non-HD-related goal-directed activities. They may maintain this pattern of sexual behavior despite the knowledge that they are at risk of potential adverse consequences such as contracting sexually transmitted diseases, having marital or legal problems, or being subjected to physical violence (Reid, Garos, & Fong, 2012).

The proposed criteria for HD share some features with those for substance dependence (Goodman et al., 1992; Kafka, 2010). Proposed changes for the DSM-5 include categorizing PG as a non-substance-related addictive disorder. Although some data suggest that HD might be considered as an addiction, further research is needed to identify potential similarities and differences across multiple phenomenological, clinical and biological domains to provide support for categorizing HD as an addiction. Studies investigating neurobiological mechanisms, genetics, and treatment response to hypersexual behavior will be helpful in evaluating whether HD should be characterized as an addictive disorder.

Perhaps more so than for other models, an addiction model suggests a development pathway that might be particularly applicable to HD. Both SUDs and HD may initiate with a drive for pleasure either through sexual behavior or the euphoria brought about through the ingestion of a rewarding substance. The feelings of sexual or drug-related pleasures may then be reinforced and lead to addictive engagement. Sexual addiction and impulsivity models are sometimes criticized in that they may fail to clearly distinguish between healthy sex and hypersexuality (Gold & Heffner, 1998; Moser, 1992). However, such a criticism may apply similarly to alcohol consumption and alcohol abuse/dependence and gambling and PG, suggesting this consideration may be important and debatable for addictions more broadly.

One may argue that behavioral addictions, including HD if it is viewed within an addiction framework, may be particularly hazardous due to ease of access. Masturbation and IP viewing, two of the most common hypersexual behaviors, can both be done anonymously and in private. Given current technologies, one may access pornography from just about anywhere for free. In contrast, certain substances may be more difficult to attain as they may be illegal, more costly and may not be obtained without the help of a supplier. However, addictive substances may have initial and cumulative effects, potentially adding to their negative impact on health. Recent estimates indicate that substance addictions are amongst the most costly illnesses to society (Uhl & Grow, 2004). Similar studies should investigate the health impact of HD, and such efforts would be facilitated by uniformly agreed-upon criteria for the disorder.

Conclusion

Although many gaps exist in knowledge in our understanding of HD, available data suggest that considering HD within an addiction framework may be appropriate and helpful. However, the data for considering other behaviors, particularly gambling, within an

addiction framework appear stronger than do the data for considering HD within an addiction framework, perhaps in part reflecting differences between HD and PG and/or less HD-related research having been conducted. Although some authors (e.g., Peele, 2000) argue that the definition of addiction may have lost meaning due to its broad inclusion, the proposed inclusion of PG as a non-substance or behavioral addiction in DSM-5 strengthens the argument that an addiction need not be defined based on the ingestion or consumption of a substance. The consideration of PG as an addiction has helped not only with research, but also with clinical treatments. For example, cognitive behavioral therapies for substance addictions have been modified and shown to be efficacious for PG (Petry et al., 2006). Additionally, the conceptualization of PG as an addiction without the drug in part led to the testing in PG of medications indicated for SUDs (e.g., opioid antagonists like naltrexone) or other promising compounds (e.g., the glutamatergic agent n-acetyl cysteine) rather than medications with indications for OCD (e.g., serotonin reuptake inhibitors) that have shown mixed results in PG and substance addictions (Bullock & Potenza, 2012). However, more research is warranted to determine the extent to which HD shares features with addictions across multiple domains, and the extent to which therapies effective for addictions may be adapted for HD. Although investigators are inclined to focus on addictive models to explain HD, it will be important for other models such as those mentioned in this article to be studied in order to understand the most parsimonious explanation for hypersexuality.

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