The Addictive Potential of Sexual Behavior

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This paper examines the addictive potential of sexual behavior through behavioral and neurophysiological mechanisms analogous to other formalized addictions. Sexual behavior refers to any action or thought performed with the intention of sexual gratification, such as the consumption of explicit material, masturbation, fantasizing of sexual scenarios, and sexual intercourse. Addiction is defined by the presence of tolerance, preoccupation, withdrawal, dependence, and the continuation of behavior despite risk and/or harm. Sexual addiction demonstrates high relapse potential due to the frequency of reward-associated cues encountered in daily life, and the low effort and risk required for sexual pleasure. Currently, sexual addiction lacks a formal diagnosis despite behavioral, psychological, and physiological evidence. An official diagnosis recognized by a governing authority, such as the American Psychological Association, would offer greater access to treatment, funding for research, and exposure and education for the general public about this disorder.

Abbreviations: None

Keywords: Sexual Behavior; Addiction; Sexual Addiction; Neurophysiology; Behavioral Neuroscience

Introduction

“Sexual addiction” is an umbrella term for sexual impulsivity, sexual compulsivity, out-of-control sexual behavior, hypersexual behavior or disorder, sexually excessive behavior or disorder, Don Jaunism, satyriasis, and obsessive-compulsive sexual behavior (Beech et al., 2009; Karila et al., 2014; Rosenberg et al., 2014). For the purposes of this paper, sexual addiction is defined by the continuation of a sexual behavior despite risk or harm, preoccupation, tolerance, withdrawal, dependence, and relapse even after prolonged abstinence (Goodman, 1993, 2008; Robbins and Everitt, 2002; Hyman, 2005; Kafka, 2010; Luo et al., 2013), and must not fall solely under the criteria of a paraphilia (Stein et al., 2000). A paraphilia is defined as atypical sexual interests or behaviors that cause distress to the individual, though not simply as a result of societal standings, or that involves another party who suffers harm or distress as a result of the paraphilic behavior (Association, 2013).

Confusion remains regarding the etiology and nosology of sexual addiction, which has led to the lack of a universally accepted criterion and, more importantly, the absence of a formal diagnosis. A lack of operationalization of the disorder has severe effects on research; due to the use of inconsistent parameters and criteria, results can be difficult, if not impossible, to compare. This results in ambiguous prevalence rates and recovery outlooks. Standardization of diagnostic criteria and conceptualization of this disorder is crucial, as has been done with various other substance use and behavioral disorders (Association, 2013).

The Diagnostic and Statistical Manual of Mental Disorders (DSM-5) recognizes substance use disorders relating to alcohol, caffeine, cannabis, hallucinogens, inhalants, opioids, sedatives, hypnotics, anxiolytics, stimulants (amphetamine-type substances, cocaine, and other stimulants), tobacco, and other (or unknown) substances, and lists
gambling disorder as the sole behavioral addiction (Association, 2013). Though proposed by Martin Kafka in 2010 for admission into the DSM-5 (Kafka, 2010) as “hypersexual disorder”, sexual addiction was rejected on the grounds of “insufficient peer-reviewed evidence to establish the diagnostic criteria and course descriptions needed to identify these behaviors as mental health disorders” (Association, 2013). This position is also held by American Association of Sexuality Educators, Counselors, & Therapists (AASECT) due to a lack of empirical evidence to support the disorder’s clarification and inadequate training, treatment, and education pedagogies relating to sexual addiction (American Association of Sexuality, 2016).

The lack of empirical research regarding sexual addiction is most likely due to negligence of its underlying neurophysiological and behavioral mechanisms. Patrick Carnes is one of the first to introduce the concept of sexual addiction (Carnes, 1994, 2001) but as a practitioner, most of his research is toward classification and the clinical manifestation of the disorder. His prime audience, as with fellow author Gary Wilson (Wilson, 2014), is the general public, not academia. This is not to discredit their work, but instead to illustrate the need for further empirical research regarding this disorder.

The purpose of this paper is to explore the addictive potential of sexual behavior through comparison of neurophysiological and behavioral mechanisms to other recognized addictions. For the purpose of this paper, sexual addiction will be defined by the continuation of the behavior despite risk or harm, preoccupation, tolerance, withdrawal, dependence, and high relapse potential. In doing so, this paper aims to support the argument that sexual addiction should be considered for formal diagnosis, which would aid in establishing a universal criterion that would result in more consistent and reliable research as well as provide greater access to treatment, prevention, and provide exposure and education about this disorder to the general public (Association, 2013).

### Prevalence and Comorbidity

Without universal criteria, determining prevalence and comorbidity rates is difficult. The diagnosis is up to the discretion of the clinician or researcher, which results in various definitions of the disorder and clinical representation. Estimates range from 1-6% of the population, as compared to 1-4% with a pathological gambling disorder, and 8.6% with a substance abuse disorder (Sussman et al., 2011; Villella et al., 2011; Inaba and Cohen, 2014). With a population of over 326 million people in the United States, a 6% prevalence rate equates to almost 19.7 million sexual addicts. Furthermore, comorbidity rates are estimated to be almost 40% for substance use disorders (Sussman et al., 2011) and is correlated with other psychiatric disorders such as anxiety and mood disorders, personality disorders, impulse control disorders, and schizophrenia (Goodman, 1993; Schneider and Schneider, 1996; Black et al., 1997; Kafka and Hennen, 1999; Raymond et al., 2003; Grant and Steinberg, 2005; Berberovic, 2013).

### Sexual Behavior and Natural Reward

For the purpose of this paper, sexual behavior refers to any action or thought preformed with the intention of sexual gratification. This includes, but is not limited to: consumption of explicit material, paying for sex, autoerotic stimulation (masturbation), visiting locations where sexual services are offered, soliciting prostitutes, engaging in sexually driven activities, sexual intercourse, and fantasizing of sexual scenarios. Problematic use is defined as any instance of engaging in sexual behavior when there are immediate or delayed negative consequences to oneself and/or others (Goodman, 1993).

As with all drugs of abuse, sexual reward and behavior is processed through the mesocorticolimbic dopamine system, circuitry that is widely associated with reward (Komisaruk et al., 2004; Robbins et al., 2008; Olsen, 2011). Key structures include the
amygdala, nucleus accumbens (NAc), prefrontal cortex, anterior cingulate cortex, and orbitofrontal cortex which, in conjunction with one another, have been shown to modulate motivated behavior and executive function, regulate emotion, process reward, and assign reward salience (Chao and Nestler, 2004; Hyman, 2005; Olsen, 2011).

Dopamine is a monoamine neurotransmitter known to be released from neurons during rewarding experiences, including the hedonic properties of sexual behavior, drug use, and other natural rewards (Hyman, 2005; Olsen, 2011). Dopamine has been found to play a role in sexual motivation, copulatory proficiency, motor activity, genital reflexes, and copulatory patterns in male rats (Hull et al., 2004). Furthermore, dopamine has been found to modulate synaptic activity in the prefrontal cortex (Otani et al., 1998; Gurden et al., 1999; Gurden et al., 2000; Huang et al., 2004), amygdala (Bissière et al., 2003), and hippocampus (Huang and Kandel, 1995; Otmakhova and Lisman, 1996), areas associated with motivation, executive functioning, and reward processing (Olsen, 2011). Tolerance is defined as the reduced effect of a reward after repetitious use and is associated with a downregulation of dopamine receptors (Hyman et al., 2006). The maladaptive behavioral changes associated with addiction, such as impaired decision making and anhedonia, are believed to be a result of this neuronal plasticity (O’Brien et al., 1992; Majewska, 1996; Bechara, 2005).

Defining Addiction

Major components of addiction are the continuation of a behavior despite risk or harm, preoccupation, tolerance, withdrawal, dependence, and relapse even after prolonged abstinence (Goodman, 1993; Robbins and Everitt, 2002; Hyman, 2005; Goodman, 2008; Kafka, 2010; Luo et al., 2013).

Continuation Despite Risk and Harm

A definitive characteristic of substance use disorders and sexual addiction is the continuation of sexual behavior despite a persistent or recurrent social, financial, psychological, or physical problem caused or exacerbated by the behavior (Schneider, 1991; Goodman, 1993; Association, 2013). Examples of this may be the loss of a job due to inappropriate sexual advances or displays, preoccupation with sexual behavior, or absences caused by engaging in sexual behavior. Additionally, sexual addiction has significant adverse effects on relationships (Schneider, 1991; Carnes, 1994; Schneider and Schneider, 1996; Schneider et al., 1998; Carnes, 2001; Wilson, 2014). Pornography consumption is linked with lower perceptions of attractiveness, warmth, and intelligence in partners, as well as lower ejaculation, orgasm, and satisfaction rates with their partner or spouse (Wilson, 2014). Many experience delayed ejaculation or premature ejaculation rates after periods of prolonged, excessive pornographic use (Wilson, 2014). Financial strain may come from paying for sexual services such as pornography or prostitutes, either digital or in person, or loss of a job due to sexual preoccupation. This could also include the cost of treatment and healthcare fees, or legal costs that result from the individual’s sexual behavior, such as sexual assault, sexual advances and interactions with a minor, and domestic violence (Horvath et al., 2018).

Preoccupation

In substance abuse, preoccupation is best defined by drug taking and seeking behavior, which is mirrored in sexual addiction. This manifests as spending a great deal of time on activities necessary for sexual behavior, engaging in the sexual behavior, or recovering from its effects (Goodman, 1993). Preoccupation may result in a neglect of occupational, academic, domestic, or social obligations. It can also be characterized by fantasizing of sexual scenarios, and “seeking behavior”, or behavior driven by sexual cravings. Like substance abuse, this may take up a significant amount of the addict’s time, resulting in damage to romantic, professional, and platonic relationships. It is important to note
that, though an individual may spend a significant period of time engaging in sexual behavior, so long that it doesn’t detract from any other aspect of their lives, it is not considered an addiction. This is a critical distinction to make, because sexuality rests on a broad spectrum and cannot be standardized.

Tolerance and Sensitization

Tolerance is defined as the necessity to increase drug dosages or behavior intensity/frequency in order to elicit the same effects (Chao and Nestler, 2004). Tolerance in substance abuse disorders is best explained through pharmacokinetic and pharmacodynamics changes that occur with repeated and prolonged drug use (MacRae et al., 1987; Hammer et al., 1997; DuPen et al., 2007). Sexual addiction can generate behavioral tolerance, as consistent, patterned consumption of pornography and other sexually explicit material often leads to behavioral tolerance (Goodman, 1993; Kafka, 2010; Wilson, 2014). Habituation, or the attenuation of a physiological or behavioral response to a stimulus, occurs after repeated exposure to the same erotic material (Zuckerman, 1971). Furthermore, those who regularly view pornography report the persistent need to seek out novel, and often more explicit, material. This might include taboo subjects such as bestiality, “furry” porn, or material that relates to fictional anthropomorphic animal characters, and more intense and violent material such as rape, sadomasochistic displays, child pornography, or incest material (Wilson, 2014). This is comparable to a substance user’s need to increase dosages to maintain the same pharmacological effects.

Sexual behavior also displays physiological tolerance. Sexual responses such as local vasocongestion in the primary and secondary erogenous zones, increased heart rate, and reported mental arousal all decrease with each exposure (Zuckerman, 1971). However, the physiology of erogenous zones is not well understood and is an area that requires future study.

Unlike the hedonic effects experienced with substance abuse, sexual behavior has the unique ability to modify dopamine levels for extended periods of time (Wilson, 2014). ‘Edging’, or masturbating just below the point of orgasm, may last for several hours, elevating dopamine levels for an unnaturally long period of time. As a result, dopamine receptors are downregulated in areas such as the nucleus accumbens (NAc), which could result in desensitization (Wilson, 2014).

Dopaminergic projections of the NAc are hypothesized, often in collaboration with the Ventral Tegmental Area (VTA), to play a large role in the reinforcement, craving, relapse, and self-administration of psychoactive substances (Goeders et al., 1984; Koob, 1992; Caine and Koob, 1994; Breiter et al., 1997; Childress et al., 1999; Bonson et al., 2002; Chao and Nestler, 2004; Hyman et al., 2006; Robbins et al., 2008). Amphetamines, cocaine, heroin, nicotine, cannabis, and alcohol have all been shown to increase dopamine transmission in the NAc shell (Robbins and Everitt, 2002). Consequently, as dopamine desensitizes, the erotic responses and hedonic effects decrease, and tolerance is experienced (Carnes et al., 2005; Kühn and Gallinat, 2014; Wilson, 2014).

Some behavior undergoes a process opposite to tolerance: sensitization. Sensitization is the enhancement of behavioral responsiveness with repeated stimuli exposure. In regards to sexual behavior, this might include cues or behaviors that bring one closer to sexual gratification (e.g., turning on the computer or fantasizing about going home and surfing a pornographic website after work) The NAc has been shown to exhibit hyper-reactivity to reward associated cues in self-identified sexual addicts (Wilson, 2014).

A reduction in brain grey matter is associated with reduced inhibition and decision making. Pornography use has been linked to a reduction of grey matter in the striatum along with a disintegration of the neural pathways between the mesolimbic dopamine system and the prefrontal cortex (Wilson, 2014). The impairment of this circuit may result in a continuation of behavior, regardless of punishment (Inaba and Cohen, 2014). Furthermore, drug- or behavior-associated cues begin to take precedence over even basic drives such as satiation and hydration through a process called incentive salience (Robinson and
Berridge, 1993; Kelley and Berridge, 2002; Hyman et al., 2006). As cues associated with sexual behavior are reinforced, cravings may be triggered at later exposure which could inhibit recovery and increase the likelihood of relapse (Hyman et al., 2006).

**Withdrawal**

Withdrawal is often the result of a reduction or discontinuation of drug/behavioral use and is associated with a significant negative affective state, or dysphoria, characterized by psychosomatic abnormalities and an intense craving for the drug or behavior (Chao and Nestler, 2004). Symptoms vary between individuals, drug class, duration, and intensity. For example, opioid withdrawal is characterized by pupillary dilation, sweating, lacrimation, rhinorrhea, piloerection, tachycardia, vomiting, diarrhea, hypertension, yawning, fever, and tachypnea, opioid craving, restlessness, irritability, increased sensitivity to pain, nausea, cramps, muscle aches, dysphoria, insomnia, and anxiety (Cammarano et al., 1998). Similar to substance abuse, the cessation of sexual behavior results in a wide range of symptoms. These include, but are not limited to: anxiety, depression, cravings for erotic material or actions, the inability to concentrate, and obsessive fantasizing or “erotic activity” seeking, similar to that displayed during substance abuse (Young, 2008; Bhatia, 2009; Wilson, 2014; Grubbs et al., 2015). Most, if not all of these, cease at least temporarily once the behavior resumes.

Wilson (2014) suggests that anxiety, depression, lack of focus, loss of appetite, and loss of libido often occur after a period of abstinence from habituated sexual behavior. However, it is difficult to decipher whether these symptoms fit into the “withdrawal” model of addiction. Withdrawal is defined as a set of symptoms initiated by abstinence, but these symptoms may also occur due to a break in routine, as many addicts experience anxiety when habits are interrupted. Further research is necessary to determine the underlying cause of these symptoms.

**Dependence**

Dependence is difficult to measure, as sexual behavior is considered to be appetitive. It is often established through the presence of withdrawal symptoms that occur during a period of abstinence or attempted cessation of sexual behavior, and tolerance. There are two branches of dependence: psychological and physiological. Psychological dependence is defined by drug or behavior seeking/taking without withdrawal symptoms, and is most often seen in the beginning stages of drug use. Physiological dependence, however, refers to the pharmacological and physiological changes that occur through repetitive drug/behavioral use. This is most often observed via tolerance and the presence of withdrawal symptoms following abstinence.

**Relapse**

Relapse, or the continuation of drug seeking and drug-related behavior after a period of prolonged abstinence, has unconscious, automatic, and habitual influences (Tiffany, 1990; Everitt and Robbins, 2005; Milton and Everitt, 2010). It is often preceded by exposure to environmental stimuli and contexts previously paired or conditioned with drug use. Cues associated with drug use can induce craving and trigger previously activated limbic corticostriatal processes (Ehrman et al., 1992; Grant et al., 1996; Childress et al., 1999; Garavan et al., 2000; Litt et al., 2000; Sinha et al., 2000; Kilts et al., 2001; Bonson et al., 2002; Milton and Everitt, 2010). Research, however, regarding sexual addiction and its relapse potential is scarce, and is yet another area for further study.

That being said, the hedonic state resulting from sexual behavior has shown associative properties (Pfaus et al., 2001). Furthermore, unlike drug use, explicit material is widely available and accessible virtually anywhere due to modern day technology. As such, avoiding such cues may be near impossible, further complicating the treatment process. Though there is a lack of empirical data, the overlap in brain circuitry and the presence of associative properties suggest that sexual addiction could share a comparable relapse potential to substance use.
Without a concrete understanding of the sexual process, it is difficult to determine what biological component underlies relapse and craving. The mechanisms underlying sexual relapse is an area that requires future study.

Discussion

One of the biggest hurdles facing sexual addiction is the lack of peer-reviewed evidence necessary to establish a diagnostic criteria and course of treatment. By examining potential similarities among the neurophysiological and behavioral underpinnings of drug addiction and sexual addiction, a case can be made for a formal diagnosis of sexual addiction. Both categories of disorder demonstrate continuation of the drug or behavior despite risk or harm, preoccupation, tolerance, withdrawal, dependence, and relapse even after prolonged abstinence. Sexual behavior and psychoactive substances are both processed via the mesolimbic dopamine system, an area responsible for mood regulation, motivation, and reward. This shared neurophysiology provides the groundwork for further research regarding sexual behavior and how prolonged, repetitive use affects dopamine regulation and synaptic plasticity in key reward areas of the brain.

Reluctance and clinical hesitation has plagued sexual addiction since its inception. Critics have challenged the diagnosis of sexual addiction, claiming that the “criteria do not adequately distinguish normal range high levels of sexual desire and activity from pathological levels of sexual desire and activity” (Wakefield, 2012). However, by examining sexual addiction as it compares to other DSM-recognized addictions, the distinctions between healthy sexual desire and behavior and sexual addiction become apparent. Sexual addiction carries a wide range of negative consequences to social, financial, psychological, occupational, academic, and physical aspects of the individual’s life (Goodman, 1993; Kafka, 2010). The presence of harm and distress is a key piece of diagnosing a mental disorder, and sexual addiction is no exception (Association, 2013). If the behavior does not result in harm or distress, in general terms, it cannot be categorized as a disorder.

Another hurdle and criticism of sexual addiction is the resulting confusion between “social disapproval and morality with issues of health and disorder” (Wakefield, 2012). A sexual behavior or interest may be contradictory to an individual’s moral standing, such as sex out of wedlock within a Christian or Catholic household, which may cause distress, but would not qualify for sexual addiction. Establishing the criteria for sexual addiction to include related symptoms of drug addiction differentiates moral conflicts with the pathology associated with sexual addiction.

The stigma surrounding sexual disorders is a massive hurdle that both researchers and clinicians alike must battle. Once considered a moral fallacy, it has grown to be a disorder worthy of scientific and public attention. The acceptance of sexual addiction as a formal disorder is invaluable to research, treatment options and availability, teaching paradigms, and education of the general public.

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