

The Emperor Has No Clothes: A Review of the ‘Pornography Addiction’ Model

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Abstract The addiction model is rarely used to describe high-frequency use of visual sexual stimuli (VSS) in research, yet common in media and clinical practice. The theory and research behind ‘pornography addiction’ is hindered by poor experimental designs, limited methodological rigor, and lack of model specification. The history and limitations of addiction models are reviewed, including how VSS fails to meet standards of addiction. These include how VSS use can reduce health-risk behaviors. Proposed negative effects, including erectile problems, difficulty regulating sexual feelings, and neuroadaptations are discussed as non-pathological evidence of learning. Individuals reporting ‘addictive’ use of VSS could be better conceptualized by considering issues such as gender, sexual orientation, libido, desire for sensation, with internal and external conflicts influenced by religiosity and desire discrepancy. Since a large, lucrative industry has promised treatments for pornography addiction despite this poor evidence, scientific psychologists are called to declare the emperor (treatment industry) has no clothes (supporting evidence). When faced with such complaints, clinicians are encouraged to address behaviors without conjuring addiction labels.

Keywords Pornography addiction · Pornography addiction model · Visual sexual stimulus (VSS) · Libido · Sensation-seeking · Erectile dysfunction · Addiction model · Impulsivity · Compulsivity

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Introduction

‘Pornography addiction’ is one label that has been used specifically to describe the high-frequency viewing of sexual images. Related concepts, such as ‘sex addiction’ or ‘internet addiction’ refer to broader constellations of behaviors. These address problem sexual (e.g., financial loss with high involvement with sex workers) or internet (e.g., web browsing in lieu of any family time) behaviors broadly. Competing models of high-frequency viewing of sexual images also have been offered, such as sexual compulsivity [1]. Some have claimed to abdicate models by using terms like ‘hypersexual disorder’, but these authors are still using a model of pathology. In this manuscript, we specifically critique the addiction model of high use of visual sexual stimuli.

Scientists investigating high-frequency sexual behaviors rarely describe these behaviors as an addiction (37 % of articles) [2•]. In fact, most scientists have overtly rejected the addiction model [3, 4]. The recent revision of the Diagnostic and Statistical Manual (DSM) similarly did not include sex addiction, citing “To include this as an addiction would require published scientific research that does not exist at this time” (Charles O’Brien, personal communication, September 19, 2013). Widely cited critiques of addiction models have been leveled against other behaviors as well, including food [5, 6], internet use [7], and gambling [8]. The perseverance of this term in the popular press and by some treatment providers is puzzling. The pseudoscientific practices surrounding the treatment of ‘porn addiction’ compel us to reveal that the emperor is not wearing any clothes [9].

The overwhelming majority of patients seeking help for high-frequency sexual problems report that frequency of viewing sexual stimuli is their main, or primary, problem [10]. The addiction model of visual sexual stimuli (VSS) viewing continues to be popular in the media and appears in the journal name of a clinical society focused on treatment issues (*Sexual Addiction and Compulsivity*). The current

review is specifically critical of addiction as an appropriate model for the high-frequency viewing of VSS, sometimes referred to as ‘pornography addiction’. (Studies of ‘addiction’ to sexual imagery overwhelmingly use the biased term ‘pornography’ [11]. Since many benefits of sexual stimuli also have been identified (see below), we follow the APA recommendation to use less biased language [12••]. The empirically accurate term ‘visual sexual stimuli’ (VSS is used instead of ‘pornography’. Other models for high-frequency VSS viewing are suggested, including non-pathology models.

Some have suggested that easier access to sexual films online is responsible for creating an epidemic of porn addiction [13]. Emotional images with movement significantly increase arousal over still images across a variety of domains [14]. Moreover, motion may be important for generating motivated states, such as generating actual fear to phobic objects rather than mere unpleasant affect [15]. Greater complexity (e.g., number of scene changes) in the films is known to impact posterior, but not anterior, cortical sites on the brain [16]. The more interest a person reports in a film, the greater their frontal alpha suppression during the film [16]. This finding was recently extended in response to sexual films [17]. In summary, sexual films, like other emotional films, engage the brain in ways consistent with high arousal, motivated states. The brain appears to respond similarly with sexual and other emotional films.

VSS use does not appear to be increasing despite increased availability. Fluctuations in VSS formats and legislation in recent decades helps to clarify this issue. VSS viewing in the USA has remained remarkably steady (near 22 %) since 1973, showing the greatest change with the introduction of the VCR after a period of legal prohibition [18]. Of those over age 18, 75 % now have regular internet access with 60 % reporting broadband at home and 55 % accessing the internet wirelessly [19]. In contrast to frequent claims in the popular media about an epidemic of porn use, no change in the last 4 decades has been noted in more detailed longitudinal data since internet access increased [20]. Further, searches for ‘sex’ (Google Analytics) appear stable since data collection started in 2004. It is possible that something about the films has changed over time, altering its effect. For example, those studying video games investigate changing ‘realism’ as predictors of the changing effects of video games [21]. Given that visual erotica has long appeared in film, realism is probably not the best parallel for VSS changes over time. No data have yet been offered to suggest how the VSS format or content may have changed over decades. VSS viewing appears very stable, with a larger change in viewing with the introduction of the VCR, not internet availability.

The prevalence of VSS problems reported is inconsistent. Clinicians frequently cite “up to 6 %” of the US population is sexually addicted. This estimate comes from clinical speculation

in a popular book [22] in which the clinician/authors focusing their practice on these issues do not clearly define the boundaries of this diagnosis. Empirical estimates from nationally representative samples are that 0.8 % of men and 0.6 % of women report out of control sexual behaviors that interfere with their daily lives [23]. If one assumes these individuals might seek treatment, 82 % of treatment seekers report problems with VSS, and clinicians agree that they have a clinical problem in about 88 % of cases [10]. Thus, VSS problems might affect 0.58 % of men and 0.43 % of women in the USA.

Positive Effects of VSS Use

While much has been written about the potential negative effects of VSS, a number of positive effects also have been suggested [24]. Most people who view VSS believe that it improves their attitudes towards sexuality [25] and improves their quality of life [26]. More VSS viewing has been related to greater likelihood of anal and oral sex [27] and a greater variety of sexual behaviors [28]. This increased breadth of sexual behaviors could arise by increasing a person’s feeling of empowerment to suggest new sexual behaviors or by normalizing the behaviors [29]. In any case, sexual novelty can increase pleasure in long-term partners. VSS can also promote pleasant feelings in the moment, such as happiness and joy [30, 31]. Additionally, VSS may provide a legal outlet for illegal sexual behaviors or desires. Increased VSS consumption or availability has been associated with a decrease in sex offenses [32•], especially child molestation [33, 34] and inhibition of aggression [35]. On the other hand, a large longitudinal study controlling for baseline attitudes and behaviors identified that VSS use accounted for only 0–1 % of the variance in gender role attitudes, permissive sexual norms, and sexual harassment in boys or girls [12••]. While much has been written about negative aspects of VSS for the general population, the many possible benefits suggest that VSS use is not problematic de facto.

Addiction Model

What is Addiction?

What should be labeled an addiction in the first place [36•]? ‘Addiction’ is a term that is often reified, when it really is being used as a theoretical construct or a model to describe a cluster of behaviors. The question raised in this review is whether VSS viewing could be described using an addiction construct or model, so it may be helpful to consider how the term ‘addiction’ is being used with substances.

DSM-5 introduced the term ‘addiction’ within the broad category ‘Substance-Related and Addictive Disorders’ over

the objections of the working group [37]. However, the term ‘addiction’ was specifically rejected to describe gambling [38] or substance use despite the section title. This suggests some tension over the utility of the addiction framework even for substances and gambling. Presumably, if ‘addiction’ possessed diagnostic or prognostic value, it would be defined and would distinguish clinical cases. Of course, the DSM is hardly the only consensus rejecting the utility of addictions. Increased modern understanding of the effects of various substances such as cannabis has raised questions about the scientific and clinical applicability of the concept as it has historically been defined. As with many other clinical concepts, addiction has seen significant ‘bleed’ as the term has been broadened to describe a wide range of problematic behaviors. While there seems to be a consensus that addiction is a useful construct to describe opiate dependence [39], the usefulness of ‘addiction’ to describe the excessive use of any drug [40], compulsive gambling [41], and excessive video game playing [42] has raised many concerns.

While we generally reject the usefulness of the term, if one is pressed, some commonalities have been suggested by addictions research. A key feature of addiction is the shift from using the drug for pleasure (liking) to using the drug due to need (wanting) [43, 44]. This transition is characterized by the shift from substance use associated with reward and pleasurable effects to cue-elicited compulsive use associated with cue-elicited craving. In other words, motivation shifts towards relieving craving or withdrawal, while the pleasure once associated with the substance recedes [43–45]. Finally, this pattern is associated with long-term changes in the neural circuits involving dopamine, glutamate, and GABA in the fronto-limbic system involving the interconnectedness of the ventral tegmental area, nucleus accumbens, amygdala, and prefrontal cortex [43, 44, 46]. Such a transition and long-term neural changes have yet to be demonstrated in any studies of ‘porn addiction’.

Porn Addiction?

Many have attempted to generalize the patterns related to problem substance use to explain other behavior problems, including use of VSS [47]. Surprisingly, a clear, falsifiable theoretical model of ‘porn addiction’ has yet to be described. Some use addiction interchangeably with other labels such as hypersexual disorder (HD) – also known as sexual addiction [48]. Others define addiction broadly to refer to any substance or behavior with evidence of excessive appetite: “appetitive behaviour is excessive, at least in the statistical sense” [49]. Simply because a behavior is appetitive and frequently engaged does not mean the behavior is a problem, let alone an addiction. Even when consequences, distress, or dysfunction follow such behaviors, interaction with third variables, such as relationship status or culture, must first be examined.

Research concerning VSS use problems is also unusually weak, making any support for an addiction model necessarily weak. For example, studies usually fail to define the term ‘pornography’, either for participants or operationalized in the manuscript, and do not use psychometrically tested questionnaires to assess the types of VSS consumed [50]. Döring [51••] summarized research on VSS as “one seldom encounters more sophisticated research designs” where “one-shot studies are the rule”, positive effects are rarely assessed, and cross-sectional data cannot establish causality (p. 1098). A review by Mudry et al. [2••] identified that a mere 27 % (13 of 49) of articles concerning high-frequency sexual behaviors contained actual data. In 2013, only a single psychophysiological study on the topic appeared [52]. In other words, most publications that might be relevant for VSS addiction models contain no data, and those that contain data generally are weak scientifically.

Given the absence of a clear model, a substance addiction model is used in this review as a basis to evaluate the sex addiction model. Using a substance addiction model means comparing the extent to which VSS ‘addictions’ resemble features of substance addictions. No doubt some will object to this framework, but no falsifiable alternative has been specified. For example, Griffiths [53] describes “behavioural addictions feature the core components of addiction (i.e., salience, mood modification, tolerance, withdrawal, conflict and relapse)”. Others go so far as to recommend treatment parallel to 12-step interventions [54]. Clearly, the substance addictions model is being applied in pornography addiction.

We specifically review the appropriateness of ‘porn addiction’ with respect to its possible negative consequences, lack of control reported in viewing behaviors, and any neural evidence supporting a shift to wanting/craving rather than liking. Not every aspect of substance addiction models can be discussed. After these comparisons with substance addictions, possible alternative models of high-frequency VSS use are reviewed, including the possibility that no pathology exists.

Negative Consequences of High Use of VSS

High levels of VSS use alone are often alleged to cause negative life consequences, increased health-risk behaviors, as well as social and relational difficulties. These negative consequences are commonly identified as hallmark ‘dysfunction’ criteria to support the diagnosis of porn addiction. However, these negative consequences are not well established, and the causal link with VSS use is not clear.

High VSS Use Associations with Health-Risk Behaviors?

Cross-sectional studies have identified relationships between sex addiction and more unprotected anal sex [55], having

more previously unknown partners [56], and a greater likelihood of having ever paid for sex [57]. However, none of these address VSS use. In fact, some have argued that VSS use and masturbation may *reduce* health-risk behaviors by managing sex drive effectively and safely [58, 59]. Using data from the very large, representative longitudinal General Social Survey, Wright [60•] similarly found VSS use and engagement in casual sex were related only in those who reported unhappiness and low life satisfaction. Similarly, political ideology moderated the apparent relationship between VSS use and casual sex partners [20]. No study has demonstrated a direct, causal link between VSS use and health-risk behaviors.

Erectile Dysfunction and High VSS Use?

While no empirical claims tying erectile function and ‘porn addiction’ were identified, this is a frequent media claim. Two research groups studied erectile dysfunction (ED) specifically in young men. In one study, 26 % of men seeking treatment for first-onset ED were under age 40 [61•]. The main predictors of ED specific to the younger men were smoking and illicit drug use. Another study of men age 18–25 found 30 % reported ED [62]. Again, ED appeared primarily related to illicit drug use, but also depression and poor physical health. Neither study measured or conjectured about VSS use. Considering another study showed no differences during VSS viewing in the brains of men with and without ED [63], it is difficult to find evidence for a rise in ED in young men attributable to VSS use.

VSS viewing is almost always accompanied by masturbation [10], suggesting several mechanisms by which high-frequency VSS viewing could contribute to difficulties getting or sustaining an erection. However, both reflect basic physiology and learning principles, not pathology. First, men exhibit refractory periods. Refractory periods refer to the latency after an orgasm during which subsequent erection and orgasm are more difficult (for review, see Levin [64]). Sperm factors are affected positively by the latency since last ejaculation [65, 66], leading to speculation that refractory periods function to pace reproductive copulation. Increased VSS use means more recent orgasms, thus a male who views VSS more frequently is more likely to be within a refractory period when partnered sex is attempted.

The other non-pathological mechanism by which VSS viewing might contribute to decreased erections is learning. Sexual response can be conditioned to images of a penny jar [67], to specific sexual images using vibratory stimuli [68], and using sexual films as the unconditioned stimulus [69]. Even rodents appear unable to behave sexually in the absence of a conditioned jacket [70•]. Sexual responses also habituate [71–74]. In fact, habituation to sexual stimuli is faster than habituation to negative stimuli [75]. Physiology and learning, not addiction, can explain any links between VSS use and erections. In other words, increasing VSS use could lead to

ED, but the causal mechanism is most parsimoniously explained by processes other than addiction.

Failure to Inhibit VSS Use

Anecdotal reports of addiction often describe individuals reporting difficulty controlling their use of VSS. To parallel substance addictions, VSS use should also be difficult to inhibit. However, a laboratory study did not identify any relationship between the ability to self-regulate sexual arousal to VSS and measures of hypersexual problems [76]. This finding was recently extended to demonstrate that sexual desire levels, not hypersexual problems, predict how well a person up- and down-regulates their sexual responses to VSS [77]. Similarly, sex addiction patients report dysexecutive problems [78], but do not actually exhibit them when tested [79]. If there is not actually any evidence for dysregulation, what might explain their reports of problems regulating VSS use?

Some have cited personal religious values as providing a conflict between their VSS use and feeling unable to stop. Religious conflict was the main reason cited for problems viewing VSS in one study [80]. Those who want treatment for sex addiction are also more likely to be members of organized religion and hold strong religious values [81•, 82]. However, the reverse was not true: religiosity explained little variance (3 %) in the decision to use VSS [83]. Far more people report a feeling of inability to control their VSS use, than actually report life difficulties resulting from their use [23]. Feeling unable to stop may reflect personal value conflicts with normal VSS use. No data currently support the notion that ‘porn addicts’ have difficulty inhibiting their VSS use.

Neuroadaptations to VSS Use

Data consistently demonstrate the ability of substances to shift brain response to craving, rather than liking, states. The same cannot be said of VSS. Sexual images are known to evoke stronger motivation than other pleasant images, manifesting in a variety of physiological indicators [84, 85]. Sexual images and films increase blood flow to many areas of the brain, including those associated with reward, relative to neutral films (for review, see Kühn and Gallinat [86]). VSS also provoke increases in dopamine-tagged ligands in PET [87, 88]. Also, VSS appear pleasant and rewarding to both men and women in fMRI studies [89]. This appears to fulfill the initial liking present in the development of substance addictions [90] and offers some commonalities with substance reinforcement [91], but in no case has a shift away from liking to wanting or craving been demonstrated.

In fact, no data have demonstrated that VSS are different from any other ‘liked’ activity or object [92•]. This is

important, because pathology should be conceptually distinct, not merely those on the high end of a construct like sexual desire [93]. For example, Florida students respond with increased late positive brain potentials to images of their adored Gator team over images of other sports [94]. Similarly, those who have no problems with their eating still exhibit greater frontal alpha asymmetry to images of delicious desserts (EEG [95]) and striatal activity specifically increases to preferred chocolate brands (fMRI [96]). Also, activity in the left nucleus accumbens to delicious foods positively predicts BMI change prospectively [97] in those without any known eating pathology. Those who enjoy extreme sports also show differential modulation of the brain response (P300) not associated with pathology [98]. In summary, stronger neural responses occur to any enjoyed activity that is not pathological [99]. Thus, stronger activation to VSS in those reporting liking VSS more are both expected and non-pathological.

VSS processing can further be associated with state and trait differences, which would be necessary to associate ‘addicts’ responses. Activation of entorhinal cortex activity is lesser in those who report hypoactive sexual desire problems [100]. Left insula and right thalamus activity is lesser to VSS in those with lower levels of sexual desire [101]. Further, frontal alpha asymmetry to sexual films are also related to reported sexual arousal, particularly in women [17]. However, no shift in neural response in ‘porn addicts’ has been demonstrated.

Substance use problems appear heritable, suggesting a biological susceptibility. For example, those with higher genetic risk for alcoholism similarly are more reactive to alcohol cues [102]. Sexual debut and risk behaviors are heritable (for review, see Harden [103]). Sexual sensitivity also appears heritable, such as with orgasm capacity in women [104, 105]. However, heritable components of VSS use have not been demonstrated.

Δ FosB has recently drawn increased interest in substance addictions. This transcription factor is implicated in epigenetic effects in the nucleus accumbens, via direct D1 pathways, that occur in both normal reward learning and drug taking [106]. This is being interpreted as a mechanism by which drugs may chronically decrease dopamine signaling [107]. Similar changes have been demonstrated to food following the administration of high fat diets to rodents [108]. Increased latency to mount and intromission, though not ejaculation, have been observed in sexually experienced male rodents [109]. This was interpreted as evidence of Δ FosB as a “critical mediator for reward reinforcement and natural reward memory”, although sex addiction was not discussed (p. 837). There are serious challenges to measuring Δ FosB in humans, and null results have been reported in humans to date (e.g., in alcoholics in Watanabe et al. [110]). Even more problematic is that the rodent model of

hypersexuality is male on male mounting behaviors [111]. It appears that pathologizing homosexual behaviors would be necessary to test Δ FosB as a mediator in a rodent model of sex addiction. ‘Porn addiction’ languishes without any clear animal model.

Alternative Models

If high-frequency VSS viewing is not usefully described as an addiction, is there a better model to describe those who report problems regulating their VSS viewing and experience negative consequences from it? Several alternative models have been suggested. Before describing the possible pathology models, it is important to note that high-frequency viewing of VSS may not be pathological at all. First, we review several correlates of VSS use that are inconsistent with pathology. Next, we review compulsivity and impulsivity models of these behaviors.

Secondary Gain

The treatment of pornography and sex addiction is a lucrative, largely unregulated industry. The industry makes many claims for treatment and success, with little (to no) published data. Many treatment centers in the USA have emerged claiming to treat sex addiction. The first 20 inpatient facilities advertising on the internet to treat sex and/or porn addiction in the USA were contacted. They averaged a cost of US\$677 ($SD = \403) per day. They required or recommended between 9 days to 9 months minimum of inpatient stay. For example, one center claims their sex addiction treatment is “clinically shown to produce results that are up to 3 times faster and 11 times more effective than traditional treatment methods”, although none of the articles on their website (nor in the literature) actually test sex addiction [112]. The use of medications ‘off-label’ to treat ‘pornography addiction’ also appears common. Drugs originally designed to treat alcoholism, depression, and ED have all been suggested [113, 114]. This therapeutic opportunism is well characterized [115]. Some have advocated for transparency, requiring therapists to inform patients that such therapies are experimental, and have not been tested for sex addiction [116].

Many of the treatment centers and providers also claim religious affiliations, raising questions about the nature of supposed pathology if it is rooted in a particular religion. Some of the most outspoken advocates for an addiction pathology model have publications making explicitly religious arguments against VSS viewing [117–119]. Religiosity is one of the strongest (negative) predictors of problems with internet VSS use [82]. The risk of conflating profit motive and diagnosis in a population vulnerable due to their strong religious beliefs appears high.

VSS Use and Mental Health Problems

VSS use might be elevated due to mental health problems that are not explicitly sexual, such as depression [120]. Those with more frequent use of VSS reported more depressive symptoms, poorer quality of life, lower health status and more days that were diminished due to mental and physical health [121] in addition to more drug and alcohol use [122]. The number of hours one spends viewing VSS also is related ($r=.24$) to the severity of psychological symptoms [123]. These negative relationships appear more common in males. Similarly, those who specifically report problems with VSS were significantly more likely to report current or past psychiatric treatment, mental health therapy, and suicide ideation [124].

Given that positive effects also are common (reviewed above) and the positive and negative effects of VSS use often are even correlated, data are needed to address causality between VSS use and mental health problems. Causality could be supported by demonstrating that (i) the mental health problems occur after the VSS use (or increase with greater VSS use), (ii) third variables do not account for the apparent relationship between mental health problems and VSS use, and (iii) problems increase in a dose-response fashion with greater VSS use. Limited data to date refute each requirement.

When examined over time, mental health problems *do not* follow VSS use. In a large sample of Dutch adolescents, lower life satisfaction predicted greater VSS use at time 2 [125]. This is the reverse of what would be expected if VSS use were causing life dissatisfaction.

VSS use also may be related to a number of other variables that better account for a VSS–mental health relationship. For example, even when loneliness was strongly predicted by overall Internet use, researchers failed to appropriately statistically control for general Internet use and attributed loneliness to VSS use [126]. It is rare that investigators even collect data on such third variables, however, so this study represents a positive step.

Others have reached similar conclusions: “the high comorbidity rates in the present sample call into question the extent to which it is possible to speak of Internet sex addiction as a primary disorder or whether it is more appropriate to view it as a symptom of another underlying mental health problem” [127]. In summary, it is baffling that VSS use is described as ‘comorbid’ with mental health issues (e.g., “comorbid hypersexual behavior and ADHD” in Reid et al. [128]). This language elevates VSS use to disorder status and should be avoided.

VSS Use Explained by Sex Drive

More VSS use is related to higher levels of libido/sexual arousal. Individuals who report being more aroused by VSS

also use VSS more and report higher levels of sexual desire [122, 123, 129, 130]. Two studies directly investigating high desire models found support for these models. In one study, those who desired help regulating their sexual behaviors were only distinguished by a high sexual desire level [81•]. In the second study, neural responses to sexual stimuli were related to sexual desire levels, but not any (of three) measures of sexual addiction [52]. Indirect evidence also comes from a study in which single women looked longer than women in relationships at images of men [131]. Desire discrepancy, rather than low sexual desire, appears central to couples reporting a mismatch of desire [132]. VSS may be blamed for problems really due to a mismatch of sexual needs.

VSS Use Explained by Sensation Seeking

Higher need or desire for sensation is predictive of more frequent use of VSS, in both adolescents and adults [12••, 133, 134]. A higher need for sensation seeking may drive individuals towards forbidden or taboo experiences, may be connected to higher libido, may result from increased VSS use, or may dispose individuals to use exciting sexual stimuli or experiences as a form of emotional coping. Little information exists as to whether sensation seeking acts as a disposing characteristic, is a result of use of VSS and other sexually adventurous behaviors, or is bidirectional. Future research may further elucidate the connections between this variable and problems related to VSS.

VSS Use as Effective Affect Regulation

Individuals report using VSS to cope with negative emotions, and such use is frequently identified as a core symptom of sex addiction. Although this strategy may contribute to relationship conflict [124, 135], VSS are likely effective for regulating emotion. Like other emotional images, VSS capture cognitive resources effectively [136]. Distraction is an effective method for reducing negative affect [137]. Although distraction is relatively less effective for regulating emotions than other strategies [138], distraction also requires less effort than other strategies [139]. Thus, VSS appear likely to be effective in improving mood, possibly in similar ways to pleasant cartoons [55]. Recent experimental evidence suggested that people with problems regulating their viewing of VSS respond with similarly positive emotions while viewing VSS to people without problems [140]. Those with higher sexual compulsivity also appear more prone to respond with increased interest (assessed by attractiveness ratings and gaze direction) to flirtatious faces after a shame induction than those with lower sexual compulsivity [141]. Data have not yet demonstrated that using VSS to regulate mood is ineffective or leads to specific problems.

VSS Use and Sexual Orientation

Studies that examine rates of VSS use consistently find high rates of use in men who self-identify as gay or bisexual. Cooper et al. [142] described overrepresentation of men who have sex with men (MSM) in groups reporting the highest rates of use of VSS. Studies examining rates of VSS use in nationally representative samples find higher rates of VSS use in both adolescents and adults who identify as other than heterosexual [133], as do studies of clinical samples [143]. Trials of DSM-5 hypersexual disorder criteria found that MSM were more than three times as likely to be in such treatment settings, compared with rates of MSM in comparable substance abuse or mental health facilities [144].

Increased use of VSS in these populations may reflect adaptive strategies. MSM may be more likely to seek information and stimuli consistent with their sexual orientation. This may reflect a common component of the ‘coming-out process’ of forming a stable sexual identity [145]. In other words, VSS use could reflect the behaviors of a disenfranchised group seeking safe, anonymous venues to explore their sexual needs, or may reflect unique aspects of homosexual culture. It also may simply reflect the higher sexual drive of men (see above). Studies that examine use of VSS in MSM find that these men overwhelmingly endorse these positive benefits from VSS use [146]. Rates of VSS use in MSM may reflect unique aspects of homosexuality, aspects of male sexuality, or both.

Impulsivity

Impulsivity broadly refers to a sudden urge to respond to a (internal or external) cue with less executive mediation than is probably appropriate. In VSS use, this might mean noticing a sexual cue and beginning to use VSS with little consideration for other immediate time demands. Measures of impulsivity correlate moderately with measures of sexual compulsivity and experiential avoidance [147] and sexual arousal reported to VSS [148]. A pilot study ($N=16$) suggested that patients made more errors on a task indicative of impulsivity than controls [149]. A recent evoked response potential study further supported this model, identifying that those reporting problems regulating their VSS use exhibited decreased neural motivation to sexual images [150]. New fMRI models suggest impulsivity might reflect a greater isolation of prefrontal brain areas from appetitive-associated subcortical structures [151]. A larger body of experimental work appears available to guide future investigations testing an impulsivity model of high-frequency VSS use.

Compulsivity

Compulsivity broadly refers to the perseveration of behaviors, which could characterize repeatedly returning to VSS. Some

have argued that compulsive behaviors are best viewed as a type of impulsivity [114]. However, perseveration is distinguishable from impulsive problems in the brain. Orbitofrontal lesions in rodent models specifically provoke perseveration, separating these from discrimination errors affected by dorsal anterior cingulate cortex lesions [54]. Differences between impulsive and compulsive behaviors also have strong characterization in humans [116•]. Dissociations between impulsivity and compulsivity also have been used to meaningfully differentiate clinical profiles, such as in hair-pulling [152].

Compulsivity has become a very popular term to refer to high-frequency sexual behaviors, although little research exists to clearly support differentiating sexual behaviors as compulsive. Cooper (1998) appears one of the first to use this term. His widely-cited “Triple-A Engine” (Accessibility, Affordability and Anonymity) is cited as driving VSS compulsions, especially to relieve negative affect by ‘positive reinforcement’ [124]. However, no one has directly tested whether compulsivity is a reasonable model for characterizing high-frequency VSS use.

Conclusions

VSS may have a number of links to positive health outcomes, especially through its connection to orgasm. For example, VSS could reduce sexual risk behaviors. In a longitudinal study, those who reported higher sexual sensation seeking engage in more risky sexual behaviors, and sexual sensation seeking is inversely related to VSS viewing [153]. One possibility is that those with higher sexual sensation seeking use VSS at younger ages and broaden the content of their VSS when sexual partners are not available to them to engage in actual sexual risk behaviors [154]. This is consistent with suggestions that masturbation, which almost always accompanies VSS viewing, could reduce risky partnered sexual behaviors [59]. The potential risk in labeling VSS as only addictive, and the role of VSS in regulating emotions as inherently problematic, misses opportunities to take advantage of the positive features of VSS (cp., cognitive retraining in gaming as in Bavelier and Davidson [155]).

Based upon the empirical data reviewed herein, the tenacity and popularity of the porn addiction concept to describe high rates of VSS use appears to be driven by non-empirical forces. Based upon this review, the authors suggest that this popularity reflects several factors. First, the concept of addiction itself is broadly used in the media to describe any high-frequency behavior that can be associated with problems for the individual or society. The lack of specificity makes the term nearly useless to scientists or clinicians. Secondly, the strong desire of most clinicians to be helpful to those in pain has been leveraged into a large, lucrative treatment industry benefitting from the perception that these behaviors are addictive and

require (paid) assistance to change. Finally, the ability to label VSS use as addictive appears to serve sociocultural functions. The label supports moralistic judgments, the stigmatization of sexual minorities, and the suppression of certain sexual expressions and behaviors. The concept of porn addiction is one mechanism to exert social control over sexuality as expressed or experienced through modern technological means. Mere conflict between a person's preferences and social standards should not be used to characterize pathology [156]. Moreover, this label may distract attention from the more likely causes of the negative consequences spuriously correlated with VSS use.

Individuals reporting 'addictive' use of VSS could be conceptualized using the approach outlined here. These individuals may be likely to be male, have a non-heterosexual orientation, have a high libido, tend towards sensation seeking, and have religious values that conflict with their sexual behaviors and desires. They may be using VSS as a means of coping with negative emotional states or decreased life satisfaction. When faced with such complaints, clinicians are encouraged to address these factors without conjuring addiction labels. As better models for high-frequency VSS use are tested, we may yet be able to spin fine cloth as an effective method for assisting these individuals without pathologizing them or their use of VSS.

Compliance with Ethics Guidelines

Conflict of Interest David Ley has received royalties from Rowman & Littlefield Publishers, is a paid blogger/writer for *Psychology Today*, and has had travel expenses covered by various media outlets for appearances on television shows.

Nicole Prause and Peter Finn declare that they have no conflict of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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Papers of particular interest, published recently, have been highlighted as:

- Of importance
- Of major importance

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