

Examining Correlates of Problematic Internet Pornography Use Among University Students

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Background and aims: The phenomenon of Internet pornography (IP) addiction is gaining increasing attention in the popular media and psychological research. What has not been tested empirically is how frequency and amount of IP use, along with other individual characteristics, are related to symptoms of IP addiction. **Methods:** 105 female and 86 male university students (mean age 21) from Calgary, Canada, were administered measures of IP use, psychosocial functioning (anxiety and depression, life and relationship satisfaction), addictive propensities, and addictive IP use. **Results:** Men reported earlier age of exposure and more frequent current IP use than women. Individuals not in relationships reported more frequent use than those in relationships. Frequency of IP use was not generally correlated with psychosocial functioning but was significantly positively correlated with level of IP addiction. Higher level of IP addiction was associated with poorer psychosocial functioning and problematic alcohol, cannabis, gambling and, in particular, video game use. A curvilinear association was found between frequency of IP use and level of addiction such that daily or greater IP use was associated with a sharp rise in addictive IP scores. **Discussion:** The failure to find a strong significant relationship between IP use and general psychosocial functioning suggests that the overall effect of IP use is not necessarily harmful in and of itself. Addictive use of IP, which is associated with poorer psychosocial functioning, emerges when people begin to use IP daily.

Keywords: Internet pornography, addiction, video game addiction, masturbation

INTRODUCTION

There exist a growing number of reports of individuals who claim their Internet pornography (IP) use has become problematic. The symptoms reported by these individuals, both men and women, include dysfunctions in sexual arousal and achieving orgasm (Schneider, 2000), loss of libido or sexual interest in a real partner, and loss of interest in one's romantic partner (Poulsen, Busby, & Galovan, 2013). Symptoms also include a variety of problems in psychosocial functioning, such as depression, the risk of losing career and relationship opportunities, and a lack of motivation (Philaretou, Mahfouz, & Allen, 2005; Young, 2004). Many individuals describe feeling a strong compulsion to view IP even at times when it is highly inappropriate to do so, such as at work, in a room where children are present, or on a computer that is not their own (Griffiths, 2012). Others also report developing rash misconceptions of sexuality and sexual practice, such as beliefs that certain sexual acts (e.g., anal sex) are more socially normative than they actually are. Other misconceptions may also reinforce racial and gender stereotypes and potentially increase violence toward women (Peter & Valkenburg, 2007; Zillmann & Bryant, 1986).

Qualitative research on problematic IP use has shown that some users have difficulty in attempting to stop or cut down on their use (Delmonico & Miller, 2003; Orzack & Ross, 2000). Other personal and anecdotal accounts from problematic IP users describe positive changes associated with cessation of their pornography use. These changes

include return of libido, a rise in creativity and sense of self-worth, and higher life and relationship satisfaction (Wilson, 2014). Many of these individuals also indicate in retrospection that they had been unaware of how negatively IP use had been affecting their lives.

While these reports suggest that IP use is harmful, IP has also been correlated with favorable effects as well. There are reports of various positive impacts on sexuality, happiness, and reductions in anxiety and depression, especially for marginalized populations, such as the disabled (Kaufman, Silverberg, & Odette, 2007). The vast majority of IP users regard it positively, claiming that it has improved their personal lives as well as their intimate sex lives (Hald & Malamuth, 2008). Many individuals report having discovered and asserted aspects of their own sexuality while using IP and the liberating effect this has had on their sense of identity (Kingston & Malamuth, 2010). Use of IP has allowed for more sexual exploration and validation for homosexual (McLelland, 2002; Correll, 1995), bisexual (Koch & Schockman, 1998), and transgendered people (Broad, 2002). The privacy and anonymity, which the Internet provides, presents less physical and social danger than direct personal interaction, allowing support and communication about sexuality to flourish. Finally, women who

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use IP report having better sex lives than those who do not (Poulsen, Busby, & Galovan, 2013).

IP is a relatively recent phenomenon (Leiner, 2009), and therefore, research in this area is limited. Moreover, the topic is extremely sensitive and fraught with many misconceptions and moral biases. Yet the pervasiveness of IP cannot be understated. Its use has become increasingly widespread in recent years, not only among adults but also among underage populations (Sabina, Wolak, & Finkelhor, 2008). We are beginning to see the societal effects of IP use as well. The media and other elements of mainstream culture have been described as undergoing a rapid “pornographication” in recent years (Attwood, 2006; Kinnick, 2007). For such a contemporary phenomenon to have so large an impact on society and the individual should be reason enough warrant further research on this topic.

History and popularity of Internet pornography

A vast amount of pornography exists on the World Wide Web. It is estimated that 12% of the Internet is composed of pornography, which equates to roughly 24.6 million websites (Twohig, Crosby, & Cox, 2009) or 156 billion gigabytes. Twenty-five percent of all searches on the Web are for pornography (Ropelato, 2006). As of 2007, annual income for all pornographic websites was estimated at 20 billion dollars, but the Free Speech Coalition has estimated a 50% reduction in pornography revenues between 2007 and 2011 due to the amount of free pornography available online (Barrett, 2012). It should also be noted that numerous individuals have reported having accidentally accessed pornographic material on the Internet despite efforts to avoid doing so (Mitchell, Finkelhor, & Wolak, 2003).

Cooper (1998) describes the popularity of IP as driven by the effect of three characteristics, which he labels as the Triple-A engine: access, affordability, and anonymity. Prior to the creation of the World Wide Web in 1991, transfer of pornography via computer networks or peer-to-peer file sharing was quite limited. Almost all pornography was disseminated among the public in print and video format. Acquisition of pornography required physically purchasing it from an adult store or theatre, and these businesses often carried negative stigma and reputation. Since the inception of the World Wide Web, and the subsequent creation of pornographic websites, public usage of pornography has exploded. Access to pornography has never been easier, and this is especially true due to the creation of mobile smartphones that ostensibly allow access to the Internet anywhere on the globe (Silver, 2012). The vast majority of pornography on the Internet may also be accessed at no additional cost to the user, and the user may view this pornography without ever having to identify themselves or leave their homes.

Expanding on Cooper, there is a fourth characteristic of IP that is particularly salient to understanding how its use can become problematic: the characteristic of “novelty.” Novelty here refers to the immense amount and diversity of erotic imagery available on the Internet. Individuals who identify as having problematic IP use report having spent hours at a time searching for hundreds of different images and videos but never feeling satisfied (Orzack & Ross,

2000). Others have also admitted to collecting thousands of pornographic files but never revisiting any of them (Delmonico & Miller, 2003). This behavior shows similarities to the tolerance and habituation effects of substance addictions, as well as the obsessive “search and acquire” behaviors and procrastinatory behaviors of Internet addiction disorder (Davis, Flett, & Besser, 2002).

Can we become addicted to Internet pornography?

Sexual desire in the brain begins with the arrival of sexually stimulating sensory signals at the medial preoptic area, which is the hub of the telodiencephalic reproductive complex (Kim et al., 2013). This complex also incorporates the neural network of the mesolimbic reward center, the network most involved in addiction (Roxo, Franceschini, Zubaran, Kleber, & Sander, 2011). Neuroimaging has demonstrated that viewing images of sexually available partners (i.e., pornography) has the same effect on the medial preoptic area as viewing actual sexual partners. Upon viewing either stimuli, subjects become aroused and tend to desire more of it (Hilton & Watts, 2011; Voon et al., 2014). What is different is that the Internet provides access to a vast surplus of erotic imagery, and the novelty of this imagery is practically unending. The preference for novelty in sexual partners has been well documented in animal and human test subjects: a phenomenon often referred to as the Coolidge effect (Fiorino, Coury, & Phillips, 1997; Wilson, 1997). It has been suggested that the unbridled access to a large quantity of novel sexual images on the Internet has an effect on the mesolimbic reward center that is similar to the effect of addictive substances (Pitchers et al., 2013; Barrett, 2010).

A recent study using fMRI imaging found a common neural network between drug-cue reactivity in subjects with drug addictions and sexual-cue reactivity in subjects with problematic pornography use (Voon et al., 2014). Problematic pornography users displayed a similar neural responsiveness to cues of pornography that drug addicts display for drug cues. These participants also reported cravings to view more pornography when not viewing it, but then reported not enjoying the experience when they were viewing it. This disparity found between “liking” and “wanting” is consistent with theories of incentive motivation in addiction research (Robinson & Berridge 1993; Voon et al., 2014).

It is also possible that the biological structure of the brain itself can be altered due to frequent IP use (Kühn & Gallinat, 2014). Magnetic resonance imaging scans have shown that gray matter volume of the right caudate of the striatum is negatively associated with reported IP use. Functional activation of left putamen, as well as functional connectivity of the right caudate to the left dorsolateral prefrontal cortex, was also negatively associated. This suggests that frequent exposure to IP causes downregulation and “wearing” of the underlying brain structure. The individual must then seek out a stronger external stimulation leading to a search for novel and more extreme pornographic material. This behavior shows strong similarities to the tolerance and habituation effects of addiction. However, Kühn and Gallinat (2014) note that this association with IP and gray matter volume and functional connectivity may indicate a precondition

already present in the brain, rather than a consequence of frequent IP use.

Despite these findings, classification of problematic IP use as an addiction has been controversial. Historically, it has been labeled either as a type of impulse control disorder (Morahan-Martin, 2005), as a subtype of hypersexuality and sex disorders (Kafka, 2010), or as a subtype of Internet addiction disorder (Young, 2004). As of yet, no formal diagnostic criteria for problematic IP use exist, which limits research considerably. Of the few scales that assess pornography use, only two target IP directly: the Internet Sex Screening Test (Delmonico & Miller, 2003) and the Cyber-Pornography Use Inventory (CPUI) (Grubbs, Sessoms, Wheeler, & Volk, 2010). Both of these scales have demonstrated promising psychometric properties in assessing the addictive nature of IP.

Present study

Evidence has accumulated to suggest that one's IP use may become addictive. Addiction to IP has been associated with symptoms of poor psychosocial functioning, including depression, anxiety, and dissatisfaction with one's life and relationships, as well as the urge to use more IP despite negative consequences. The goal of the present study is to explore these correlates of problematic IP use and, more specifically, discern how different patterns of behavior and IP use are associated with addiction and psychosocial functioning. Assessment of these relationships may allow us to pinpoint a general threshold at which frequency and volume of use coincides with the emergence of negative effects. Moreover, determining whether frequency and volume of IP use are related to harmful effects could help make distinctions between recreational users of IP and problematic IP users. This understanding could allow users of IP to gauge their use and curtail it to a less harmful level. As stated earlier, some problematic users have indicated they did not know that their use was causing them difficulties until they had stopped. Additionally, assessing individual factors that are highly correlated with problematic or addictive IP use (e.g., demographics, addictive propensities, etc.) may help to identify at-risk populations.

The hypothesis of the present study is that high frequency and volume of IP use will correlate negatively with measures of psychosocial functioning and positively with degree of addiction. We will explore the linearity of these relationships to assess whether levels of use are associated with the emergence of symptoms of addiction. Finally, we will explore the association of IP addiction with problematic use of alcohol, cannabis, video gaming, and gambling, which are relatively common among university students.

METHODS

Participants

The sample ($N = 191$) was recruited through the University of Calgary Research Participation System, whereby students enrolled in psychology courses receive bonus credit in exchange for their research participation. Potential

participants were informed that the study would entail inquiry into their IP use, masturbatory behaviors, and measurements of addiction and behavioral functioning, by completing a battery of questionnaires.

Procedure

The questionnaire was administered online through Qualtrics and was completed by each participant on a private personal computer in small groups. Before beginning the questionnaires, participants were briefed as to the nature of the study, the potential of personal or sensitive questions being asked, and then assured of their anonymity in the experiment. Measures assessing psychosocial functioning were administered first, as to avoid the issue of priming the participants with questions addressing IP and masturbation, should they experience any initial distress from these questions.

Measures

Demographics questionnaire. A brief demographic survey was administered, assessing information of age, gender, area of residence, relationship status, sexual orientation, education, employment status, household income, ethnicity, and religious affiliation.

Brief Symptom Inventory 18. The abbreviated version of the Brief Symptom Inventory (BSI-18) was used to measure psychological symptoms of distress: somatization, depression, and anxiety (Derogatis, 2001). Reported internal consistency estimates for the total score of the BSI-18 are very good ($\alpha = .89$).

Satisfaction with life scale. Overall life satisfaction was assessed with the five-item satisfaction with life scale (SWLS) (Diener et al., 1985). This scale is used to narrowly measure global life satisfaction and has favorable psychometric properties including good internal consistency ($\alpha = .79$) and temporal reliability ($r = .80$). The scale also correlates highly with other measures of subjective well being, including the BSI-18.

Relationship assessment scale. Participants currently in relationships completed the seven-item relationship assessment scale (Hendrick, Dicke, & Hendrick, 1998), to measure their general level of satisfaction with their current relationship. This scale was chosen due to its high correlation with feelings of boredom in relationships, a commonly reported occurrence with high IP use (Poulsen, Busby, & Galovan, 2013). Higher scores represent a greater satisfaction with one's partner. Temporal reliability for the relationship assessment scale (RAS) is very good ($r = .85$) and the internal consistency is acceptable ($\alpha = .73$).

Problematic gambling, alcohol, and cannabis use. The alcohol use disorders identification test (AUDIT; Babor, Higgins-Biddle, Saunders, & Monteiro, 2001), the cannabis use disorders identification test – revised (CUDIT-R; Adamson et al., 2010), and the problem gambling severity index (PGSI; Wynne, 2003) were included as alcohol, cannabis, and gambling, which are three common addictive entities present in student life. The AUDIT shows good internal consistency ($\alpha = .80$), the CUDIT-R shows excellent internal consistency ($\alpha = .94$), and the PGSI shows

good internal consistency ($\alpha = .84$). Any correlations between these measures and the addictive measures of IP (see below) may show that problematic IP use may belong to a cluster of addictive tendencies and practices. Scores of 8 or higher on the AUDIT are considered an indication of hazardous and harmful alcohol use. Hazardous cannabis use is indicative of a score of 13 or higher on the CUDIT-R. Scores of 5+ on the PGSI are considered moderate, whereas scores of 8+ are considered indicative of problem gambling (Currie, Hodgins, & Casey, 2013).

Game Addiction Inventory for Adults. Included with the addiction measures was the Game Addiction Inventory for Adults (GAIA), a scale developed to assess addictive propensities to video games (Wong & Hodgins, 2013). The overall addiction score of the GAIA has excellent internal reliability ($\alpha = .94$). Scores of 30+ are considered mild-moderate and scores of 40+ are significant level of problem. Both problematic IP use and problematic video game use are disorders that involve the use of computers and the Internet. We predict a moderate correlation between these two disorders, and inclusion of this measure allows for additional exploration of the association of computer- and Internet-based disorders.

Frequency/volume of Internet pornography questionnaire. Participants answered an 11-item researcher compiled questionnaire that assessed IP use. Questions included the participant's frequency of IP use (number of sessions per month), the time spent per IP session (in minutes), and the number of pictures/videos/files/documents used within each session. Participants were also asked to indicate the age of their first exposure to IP and to briefly describe the nature of that experience in words. Finally, participants were asked whether their frequency of IP use, the time spent per IP session, and/or the amount of IP per session had increased or decreased within the previous year. Total IP exposure was calculated by subtracting the first age of exposure from the participant's current age. Participants who did not use IP were omitted from this measure.

Internet pornography addiction criterion questions. The *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM-5; American Psychiatric Association, 2013) includes a preliminary set of criteria for diagnosing Internet Gaming Disorder. An international group has proposed a set of corresponding assessment questions (Petry et al., 2014), which have been adapted by the researchers to assess for IP addiction criteria (see Appendix). Adapting these items required minimal rephrasing. Some items were expanded into more distinct questions to assess each of their parts separately. Three additional questions were added to assess issues of sexual dysfunction with arousal, orgasm, and pain. A likert scale (Not at all [0], Rarely [1], Sometimes [2], Often [3]) was adopted to allow for a richer dataset. As with the Internet Gaming Disorder criterion questions, each question was in reference to the last 12 months. A high internal consistency was found among items within the sample of the present study ($\alpha = .90$). Corrected total item correlations ranged from .55 to .76.

Cyber-pornography use inventory – compulsion measure. Finally, the CPUI (Grubbs et al., 2010) was included to assess convergent validity with an inventory that has demonstrated acceptable reliability ($\alpha > .80$) and some

evidence of construct validity. The compulsive subscale is 11-item scale meant to assess an individual's lack of self-regulatory behaviors, despite the desire to quit using IP.

Data analysis

Relationships between IP use (frequency, time, and amount) and psychosocial functioning, addiction measures, and IP addiction were assessed using bivariate Pearson correlations and independent sample *t*-tests. Sequential polynomial regression analysis (Wuenssch, 2014) was used to assess whether relationships between IP use and psychosocial functioning are linear, quadratic, or cubic. The shape of this relationship was examined to identify a potential threshold of harmful IP use. Descriptive thematic analysis (Braun & Clarke, 2006) was used to analyze participant responses to experiences of first exposure to IP. Finally, multiple regression analysis was computed to assess at-risk factors that predict problematic and addictive IP use. Statistical outliers were adjusted in the IP frequency, time, and amount measures. For frequency, the outlier responses of 60, 50, and 40 times per month were adjusted to 34, 33, and 32 times per month. For time spent per IP session, the outlier responses of 120, 100, and 95 minutes were adjusted to 63, 62, and 61 min. For amount of IP/session, the outlier response of use of 100 pornographic items/session was adjusted to 61 items.

Ethics

Ethical review was provided by the University's Conjoint Faculties Research Ethics Board. All subjects were informed about the study and all provided informed consent. Upon completion of the questionnaires, participants were debriefed and given information on where to seek counseling if any part of the study had caused them distress.

RESULTS

Description of the sample

The responses of 191 undergraduate students, 86 male and 105 female, were analyzed. Mean age was 21.05 years ($SD = 2.96$, range = 17 to 38) and ethnicity was mostly Caucasian ($n = 97$), followed by Chinese ($n = 23$), South Asian ($n = 20$), Latin American ($n = 12$), Southeast Asian ($n = 8$), Black ($n = 6$), Arab ($n = 5$), Other ($n = 5$), Filipino ($n = 4$), West Asian ($n = 4$), Korean ($n = 4$), Aboriginal ($n = 2$), and French Canadian ($n = 1$). Total annual household income was bimodally distributed, with 27% of students reporting \$100,000 and over ($n = 52$), and 21% reporting under \$10,000 ($n = 40$). Current relationship status was 50% single ($n = 96$), 17% dating ($n = 32$), and 33% in a serious relationship ($n = 63$). Participants were predominantly heterosexual ($n = 162$), with 6% of participants identifying as homosexual ($n = 12$), 6% as bisexual ($n = 11$), and 3% identifying as asexual ($n = 6$). Participants were predominantly atheist/agnostic ($n = 85$), followed by Catholic ($n = 31$), Christian ($n = 22$), Muslim ($n = 15$), Protestant ($n = 12$), Other ($n = 10$), Buddhist ($n = 6$), Sikh

($n = 6$), Hindu ($n = 2$), and Jewish ($n = 2$). Participant religiosity and spirituality was recorded, with a rating of 1 being of no importance and 4 being of high importance. Mean ratings for importance of religion in one's life was low ($M = 1.15$, $SD = 1.12$) with the majority of participants stating that they did not find religion important at all ($n = 74$). Spirituality was rated slightly higher in importance ($M = 1.49$, $SD = 1.04$) with the majority of participants rating spirituality as somewhat important ($n = 65$).

Table 1 provides the means, standard deviations, and ranges for measures of psychosocial functioning, addiction measures, and measures of addictive and IP use. Participant mean score on the BSI-18 was 12.45 ($SD = 9.00$). Mean score on the BSI-18 for student populations has been previously recorded at 8.41 ($SD = 7.83$, $n = 266$) (Meijer, de Vries, & van Bruggen, 2011), which is significantly lower than the present study, $t(455) = 5.11$, $p < 0.001$. Participant mean scores on the SWLS ($M = 24.17$, $SD = 4.52$) were in the average range of 20 to 24, typical of individuals, who live in economically developed regions (Diener et al., 1985). Percentage of participants who scored below this range was 22%. Mean participant scores for the RAS ($M = 29.91$, $SD = 4.52$) are indicative of above average range scores ($M = 28.00$), the highest being a score of 35 (Hendrick et al., 1998). Only 6% of participants scored in the range of greater relationship distress and dissatisfaction.

Table 1 provides means and standard deviations for scores on addiction measures. Mean participant scores for the AUDIT was $M = 4.90$ ($SD = 4.78$) and the percentage of participants in the problematic range was 25%. For the CUDIT-R ($M = 2.13$, $SD = 3.76$), only 2% of participants met criteria for problematic cannabis use. Scores on the PGSI ($M = 0.34$, $SD = 0.89$) were particularly low, as very few participants indicated they gambled at all (9%). No

participants met criteria for problematic gambling, and only 3% of participants met criteria for moderate gambling severity. GAIA mean score was 14.14 ($SD = 17.39$), with 13% falling in the mild-moderate range and 20% in the significant range of problems.

Pornography use

Mean age of first exposure to IP was 12.78 years for males ($SD = 1.92$), and 15.10 years ($SD = 3.42$) for females. In terms of frequency of IP use, males and females differed significantly, $\chi^2(6) = 8.87$, $p < 0.001$. For females, 46% ($n = 48$) did not use IP for masturbation whatsoever, 23% ($n = 24$) used it less than monthly, 11% ($n = 12$) once a month, 11% ($n = 11$) more than once a week, and 10% ($n = 10$) once a week. For males, 5% ($n = 4$) indicated that they did not use IP for masturbation at all, 6% ($n = 5$) of males used IP less than monthly, 8% ($n = 7$) used IP once a month, 12% ($n = 11$) used IP once a week, 36% ($n = 31$) used IP for masturbation more than once a week, 27% ($n = 24$) used IP daily, and 5% ($n = 4$) indicated that they were using IP for masturbation twice a day or more.

Qualitative analysis of first exposure to Internet pornography

Descriptive thematic analysis was used to analyze the written descriptions of first exposure to IP of 84 male and 86 female participants. The majority of responses (57%) described having been first exposed to IP by intentionally searching for IP on a personal computer while in private. The five most common themes found in participant descriptions of their first exposure were feelings of curiosity (34%), followed by feelings of awkwardness/confusion (24%),

Table 1. Means and standard deviation for scores on psychosocial functioning, addiction inventories, IP addiction measures, and exposure to IP. Gender differences shown in t values

	Total ($N = 191$)	Males ($n = 86$)	Females ($n = 105$)	$t(189)$	Min	Max
BSI-18	12.45 (9.00)	11.66 (10.70)	13.09 (11.70)	0.869	0.00	46.00
SWLS	24.17 (4.52)	23.07 (6.76)	25.08 (5.56)	0.225	8.00	35.00
RAS ¹	29.92 (4.52)	30.05 ^a (6.00)	29.83 ^b (3.34)	0.199	13.00	35.00
AUDIT	4.90 (4.78)	5.45 (5.54)	4.44 (4.02)	1.465	0.00	27.00
CUDIT-R	2.13 (3.76)	3.02 (4.65)	1.39 (2.64)	2.798*	0.00	23.00
PGSI	0.34 (0.89)	0.53 (1.10)	0.18 (0.62)	3.050*	0.00	5.00
GAIA	14.14 (17.39)	23.95 (19.05)	6.10 (10.53)	8.200**	0.00	82.00
IP-CRIT	7.41 (8.04)	11.60 (8.76)	3.98 (5.39)	7.376**	0.00	32.00
CPUI-COMP	11.28 (8.64)	16.35 (9.28)	7.12 (5.21)	8.658**	0.00	39.00
Age of first exposure	13.95 (3.00)	12.78 (1.92)	15.10 (3.42)	5.457**	7.00	32.00
Total years of exposure	7.24 (3.67)	8.60 (3.42)	5.90 (3.42)	5.144**	0.00	19.00
Frequency of IP use (times/month)	7.68 (9.82)	14.73 (10.66)	1.90 (2.92)	11.819**	0.00	34.00
Time spent per IP session (in min)	14.97 (15.87)	17.31 (13.05)	13.05 (16.19)	1.856	0.00	63.00
Amount of IP (files per session)	4.72 (8.72)	6.78 (9.43)	3.03 (7.73)	3.016*	0.00	61.00

Note. BSI-18 = Brief Symptom Inventory; SWLS = Satisfaction With Life Scale; RAS = Relationship Assessment Scale; AUDIT = Alcohol Use Disorders Identification Test; CUDIT-R = Cannabis Use Disorders Identification Test – Revised; PGSI = Problematic Gambling Severity Index; GAIA = Game Addiction Inventory for Adults; IP-CRIT = adapted DSM-5 Internet pornography addiction criteria; CPUI-COMP = Cyber-Pornography Use Inventory – Compulsion Measure.

¹ $n = 67$. ^a $n = 26$. ^b $n = 41$.

* $p < .01$. ** $p < .001$.

excitement (15%), guilt/immorality (14%), and finally arousal (11%).

Coding for quality of experience was based on language of positive or negative connotation. Language such as “enjoyed” or “pleasure” was coded as positive, and language such as “uncomfortable” or “gross” was coded as negative. Responses were coded as mixed if equal amounts of positive and negative language were used or if no clear connotation to the language used could be identified. Males predominantly rated their first exposure to IP as being a positive experience (35% of male responses) with 11% of male responses describing a negative experience, and 24% describing a mixed experience. Females had more negative experiences than males (34% of responses), with 20% of female responses describing a positive experience, and 26% of responses describing a mixed experience. The differences between positive and negative experiences for males and females were significant, $\chi^2(2) = 13.04$, $p < 0.005$, with males being more likely than females to rate their first exposure as being a positive experience. Six female participants described having first been exposed to IP via a significant other, the majority of which were negative experiences. Many females who had positive experiences did not find the experience sexually arousing and described the experience as one of amusement or humor (41% of female’s positive experiences). Finally, most males intentionally sought out IP for their first exposure (73%), as opposed to accidentally viewing it (19%). Many female participants described having stumbled upon IP unintentionally or being introduced to it without their discretion (37% of responses). Quality of experience of first exposure was neither found to be associated with later IP frequency and volume of use nor was quality of first exposure associated with higher scores on IP addiction measures.

Demographics and Internet pornography exposure

The t tests for participant demographics and IP use found that the frequency of IP use per month for single participants ($M = 9.07$, $SD = 10.50$) was significantly higher than the frequency of IP use for participants in relationships ($M = 6.27$, $SD = 8.92$), $t(189) = 1.99$, $p = 0.05$. The t tests also confirmed the likelihood of higher scores on addictive IP

criteria for participants, who were single ($M = 9.16$, $SD = 8.50$) than for participants in relationships ($M = 5.65$, $SD = 7.18$), $t(189) = 3.08$, $p = 0.002$.

Age of first exposure to IP ($M = 13.95$, $SD = 3.00$) was found to be significantly correlated with frequent and addictive IP use (see Table 2). Participants who were exposed to IP at an earlier age were more likely to use IP more frequently ($r = -.27$, $p < 0.001$), have longer IP sessions ($r = -.16$, $p = 0.033$), and more likely to score higher on Adapted DSM-5 Internet Pornography Addiction Criteria (IP-CRIT; $r = -.28$, $p < 0.001$) and CPUI-COMP measures ($r = -.29$, $p < 0.001$). Finally, total IP exposure was found to be significantly correlated with higher frequency of IP use. Participants who had longer total exposure to IP were also more likely to have more IP sessions per month ($r = .25$, $p = 0.003$).

Internet pornography use and psychosocial functioning

Table 2 provides Pearson correlations between BSI-18, SWLS, and RAS scores and IP use. Overall, there was minimal to no association found between IP use and reports of poor psychosocial functioning. There was a small but significant negative correlation found between life satisfaction and amount of IP use ($r = -.15$, $p = 0.04$). Participants who used higher volume of IP/session were more likely to rate their life satisfaction lower than others.

Reports on psychosocial functioning were also compared to IP addictive criteria (see Table 2). Significant correlations were found between IP-CRIT and BSI-18 scores ($r = .26$, $p < 0.001$) and LSS scores ($r = -.32$, $p < 0.001$). Participants were more likely to have higher general anxiety and distress, as well as lower life satisfaction, if they reported symptoms of addictive IP use. Addictive IP use also had a small but significant negative correlation with RAS ($r = -.26$, $p = 0.03$). CPUI measure of compulsive use of IP was also significantly correlated with higher scores on the BSI-18 ($r = .25$, $p < 0.001$), a lower score on the SWLS ($r = -.36$, $p < 0.001$) and slightly more likely to have lower RAS scores ($r = -.32$, $p = 0.009$). Participants who identified as having addictive propensities to IP showed higher general levels of distress and lower levels of life satisfaction and relationship satisfaction.

Table 2. Measures of psychosocial functioning, addiction, and exposure to IP correlated with IP use and measures of IP addiction

	Frequency of IP use	Time spent per session	Amount per session	IP-CRIT	CPUI-COMP
BSI-18	0.060	0.086	0.112	0.255***	0.250***
SWLS	-0.137	-0.063	-0.155*	-0.318***	-0.362***
RAS ($n = 67$)	0.038	-0.153	-0.179	-0.263*	-0.316**
AUDIT	0.190**	0.150*	-0.026	0.049	0.033
CUDIT-R	0.203**	0.089	0.019	0.125	0.060
PGSI	0.180*	0.030	0.071	0.217**	0.242**
GAIA	0.459***	0.189**	0.281***	0.403***	0.435***
Age of first IP exposure	-0.267***	-0.163*	-0.033	-0.282***	-0.292***
Total exposure to IP	0.281***	0.161*	0.143	0.168*	0.204**

Note. BSI-18 = Brief Symptom Inventory; SWLS = satisfaction with life scale; RAS = relationship assessment scale; AUDIT = alcohol use disorders identification test; CUDIT-R = cannabis use disorders identification test – revised; PGSI = problematic gambling severity index; GAIA = Game Addiction Inventory for Adults; IP-CRIT = adapted DSM-5 Internet pornography addiction criteria; CPUI-COMP = cyber-pornography use inventory – compulsion measure.

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

Table 3. Sequential polynomial regression analysis of IP use, psychosocial functioning, and measures of addictive IP use

Pearson correlations		BSI-18	SWLS	RAS ^a	IP-CRIT	CPUI-COMP
Frequency of IP use	Linear	0.060	−0.137	−0.038	0.536***	0.528***
	Quadratic	0.057	−0.089	0.138	0.445***	0.455***
	Cubic	0.053	−0.060	0.185	0.385***	0.401***
Time spent per IP session	Linear	0.086	−0.063	−0.153	0.389***	0.302***
	Quadratic	0.075	−0.025	−0.128	0.262***	0.188**
	Cubic	0.063	−0.003	−0.104	0.203**	0.133
Amount of IP per session	Linear	0.112	−0.155*	−0.179	0.333***	0.325***
	Quadratic	0.115	−0.119	−0.138	0.166*	0.176*
	Cubic	0.112	−0.105	−0.120	0.115	0.124

Note. IP = Internet pornography; SWLS = satisfaction with life scale; RAS = relationship assessment scale; IP-CRIT = adapted DSM-5 Internet pornography addiction criteria; CPUI-COMP = cyber-pornography use inventory – compulsion measure.

^a $n = 67$.

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

Internet pornography use and addictive propensities

Pearson correlations were computed to compare IP use and IP addiction with other measures of addiction: alcohol (AUDIT), cannabis (CUDIT-R), problematic gambling (PGSI), and video games (GAIA). Significant correlations were found between frequency of IP use and all four addiction measures (see Table 2).

Threshold of harmful Internet pornography use

To assess whether a threshold of harmful IP use exists, sequential polynomial regression analysis was used to investigate the nature of the relationship between IP use and psychosocial functioning, and to identify a curvilinear relationship, as per Wuensch (2014). As shown in Table 3,

no significant relationships were found with the BSI-18, the SWLS, or the RAS. The relationship between IP use and psychosocial functioning does not appear to be curvilinear, and therefore, no threshold of harmful IP use could be identified. However, there were significant curvilinear relationships found with IP-CRIT ($r = .39$, $p < 0.001$) and CPUI-COMP ($r = .40$, $p < 0.001$) IP use (see Figures 1 and 2). Initially, scores on both IP measures rise from zero, but then plateau. Addictive IP use criteria scores appear to plateau at 15 IP sessions/month, and at a score of ~ 14.00 . Scores on the CPUI-compulsion (COMP) scale plateau at 13 IP sessions/month and at a score of ~ 18.00 . However, these scores sharply rise again in a positively accelerating curve when sessions occur more than once a day. At daily or greater use of IP, there is a noticeable increase in the scores of IP addiction measures.

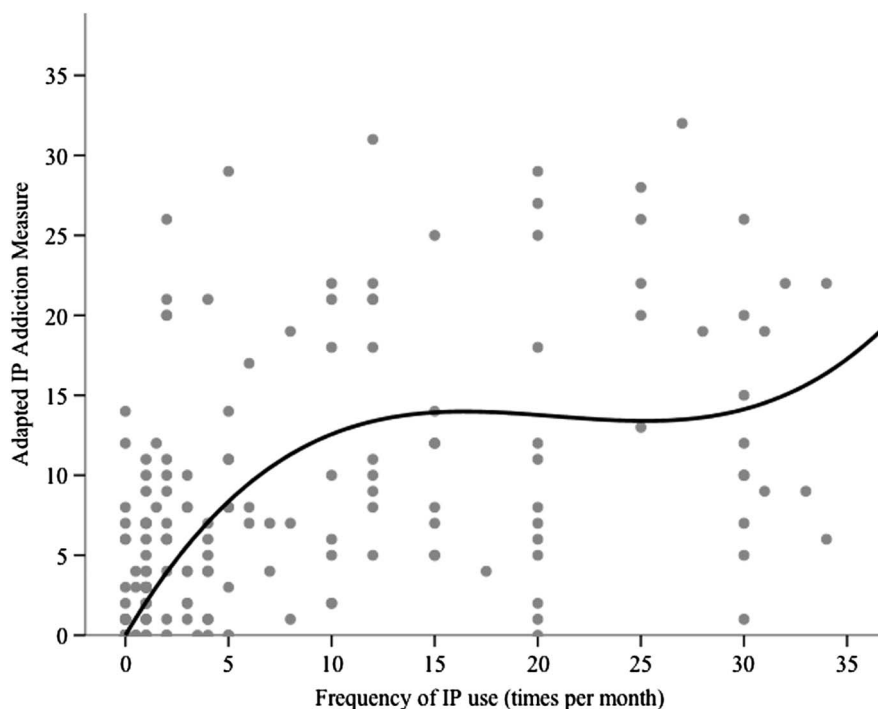


Figure 1. Curvilinear relationship between frequency of IP use and addictive IP criteria adapted from DSM-5. Line of best fit suggests that addictive use of IP plateaus at a use of 15 sessions/month but increases once participants begin using IP once a day

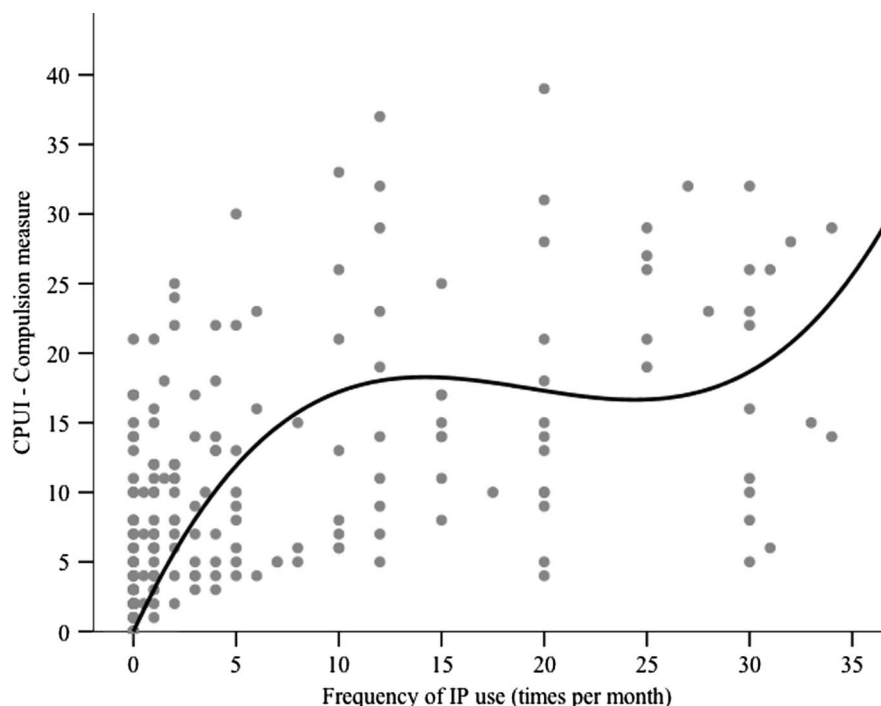


Figure 2. Curvilinear relationship between frequency of IP use and the CPUI measure of compulsive IP use. Note the similarity with the line of best fit in Figure 1. CPUI-COMP plateaus at 13 sessions/month but then increases when participants use IP once or more a day

DISCUSSION

Higher scores on addictive measures of IP use were correlated with daily or more frequent use of IP. However, the results indicate that there was no direct link between the amount and frequency of an individual's pornography use and struggles with anxiety, depression, and life and relationship satisfaction. Significant correlations to high IP addiction scores included an early first exposure to IP, addiction to video games, and being male. While some positive effects of IP use have been documented in previous literature (Broad, 2002; Correll, 1995; Hald & Malamuth, 2008; Kaufman et al., 2007; Kingston & Malamuth, 2010; Koch & Schockman, 1998; McLelland, 2002; Poulsen, Busby, & Galovan, 2013), our results do not indicate that psychosocial functioning improves with moderate or casual use of IP.

Threshold of harmful Internet pornography use

The failure to find a strong significant relationship between IP use and poor psychosocial functioning (general anxiety and distress, life satisfaction, relationship satisfaction) suggests that the overall effect of IP use is not necessarily harmful in and of itself. However, higher IP addiction scores were associated with poor psychosocial functioning. The scores on addictive IP measures increased once participants indicated IP use of at least once a year, but these scores eventually plateaued once participants were using it every second day. While this could be interpreted as evidence that IP is inherently addictive, what is more likely is that these scores of ~14.00 for IP-CRIT and ~18.00 for the CPUI-COMP measure are the scores of recreational IP users. Naturally, there would be some observable score on either

measure when a participant is using IP, even if this use does not qualify as addictive.

We did see a dramatic shift in addictive IP use when participants were using IP once a day or more. Above this frequency, there is an increase in scores of addiction. This pattern would suggest that addictive use of IP, which is associated with poorer psychosocial functioning, emerges only when people begin to use IP daily. However, as the data from the addictive measures of IP use were based on self-report, this also suggests that poor psychosocial functioning may coincide with frequent IP use only when the individual feels that their use is problematic or addictive. Whether the individuals' distress is caused by daily use of IP or is reflective of the individuals' reaction to their suspicion of being addicted is unclear.

A similar distinction between level of use and addiction has been reported in the video gambling addiction literature (Charlton & Danforth, 2007, 2010; Wong & Hodgins, 2013). Although strong engagement is a necessary condition for addiction or problematic play, strong engagement is not synonymous with addiction.

At-risk populations

The results of the present study suggest that populations that are the most at-risk for problematic IP use are single males who were exposed to IP at an early age. Early first exposure to IP is frequently cited in research as being related to poorer psychosocial functioning. These problems may include increased delinquent behavior and substance use in later years (Ybarra & Mitchell, 2005), risky sexual behaviors in adolescence (Sinković, Štulhofer, & Božić, 2013), and increased propensity for sexual aggression (Flood, 2009). Using IP as an addendum, or perhaps even a substitute, for

sexual education creates the potential for youths to develop misconceptions about sex and sexuality. Further study of this early onset age group would provide more information on this idea.

Gender

Males were the predominant IP users in this study and the most likely to identify as having addictive IP use. The finding is consistent with the existing literature. This is not to say that women are not at risk for developing addictive use of IP, but males appear to be a much more prone population. As to why males find pornography so enticing, some have pointed to evolution for an explanation (Vasey & Abild 2013; Wilson, 1997, 2014). The prevalent (often intuited) opinion is that males evolved to be “hard-wired” to prefer large numbers of novel sexual partners, as this is apparently the most efficient way to pass on their genetics. While this explanation has its merits, it makes the assumption that males are preordained by their evolutionary past to exhibit this preference. This and many other assumptions housed in evolutionary psychology have their limitations and can create misunderstandings about human behavior (Confer et al., 2010). What is more likely is that modern public attitudes and accepted norms of male sexual behavior perpetuate this preference for IP, whereas the modern attitudes and norms of female sexual behavior do not (Malamuth, 1996). Research has shown that both sexes who use IP enjoy it equally, depending on the content (Ciclitira, 2004; Poulsen, Busby, & Galovan, 2013). Male use of IP may be simply more socially acceptable than it is for females in Western culture.

IP and video games

Addictive use of IP appears to be moderately correlated with video game addiction. This should not be necessarily surprising, as there are strong similarities between these two addictions. Both utilize computers and the Internet, and the way that either medium is accessed and interacted with is virtually the same. Moreover, many adult and erotic video games have been created in recent years (e.g., BoneCraft, Leisure Suit Larry) and their popularity is steadily increasing. Even commercial video games are beginning to show increasing levels of sexual content (e.g., God of War, The Witcher, Grand Theft Auto).

Given the similarities of these two mediums, it is possible that addiction to video games and IP could reinforce each other. Problematic IP use and problematic video game use are both moderately correlated with reports of isolation and loneliness, as both mediums are often used as substitutions for social contact (Ng & Wiemer-Hastings, 2005; Yoder, Virden, & Amin, 2005). This may create a harmful cycle in which the individual does not receive regular social contact, and then substitutes the lack of social contact with video games and IP. Adolescent males would be particularly prone to this cycle (Jansz, 2005; Sabina et al., 2008), and further research into the connection between these two addictions may elucidate causes and at-risk factors during adolescent development.

Limitations

All participant responses were based on self-report. It is possible that some participants may have lied due to the sensitive nature of the questions. It is also possible that some participants exaggerated when responding (e.g., reporting their IP use was greater than it was), or incorrectly estimated their behavior. Social desirability may also have played a large role in how participants answered the questionnaire. Although participants were provided with private computers when completing the measures, some may have been too embarrassed to give accurate responses. Others may have had prior knowledge of the theory of IP addiction and wanted to prove or disprove this theory. Additionally, recruitment of students taking psychology courses may have affected responses. Some participants may have had prior exposure to or knowledge of the scales included. Recruitment of other student populations, or certainly populations outside of academia, could be more representative of the general population.

The scales used to assess IP addiction in this study, the CPUI-COMP measure, the GAIA, and the additive IP criteria, which were adapted from the DSM-5, lack validated cutpoints to indicate clinically relevant elevations. Therefore, it is not clear what constitutes as average use versus harmful use of IP or video games based on these measures.

Finally, as this study utilizes a correlation design, no definitive claims can be made about a threshold of harmful IP use or at-risk factors. However, the results generated by this study do stand in opposition to many popular claims and conceptions about IP use.

Future directions

Revisions of this study should include recruitment of a larger number of male participants, and perhaps even a version of the study entirely composed of male participants. A caveat to this, however, will be the difficulty in finding a control group, as it is very uncommon for males to have never used IP.

There should be further examination into the combined effect of problematic video games and IP use. The present study collected the responses of a large number of adult gamers, but it would be beneficial to also look at younger ages closer to the mean age of first exposure. The effect of video games and IP on the minds of adolescents is a very sensitive topic, and obtaining ethics would present an issue. However, designing a study for an adolescent age range could vastly increase our understanding of how problematic IP and video game use develop and potentially reinforce one another.

SUMMARY

Our results show that daily IP use has no direct correlation with poor psychosocial functioning. Poor psychosocial functioning emerged only when an individual identified as having addictive IP use. This suggests that identifying oneself as an IP addict may be what causes distress and poor psychosocial functioning, not the IP itself. However, there is potential for daily IP use to lead to addictive behavior. There may also be a relationship with addictive

use of IP and video game addiction, as these two mediums are sometimes used as a substitute for healthy social contact. This substitution may cause a compounding effect of poorer psychosocial functioning over time. Additionally, earlier exposure to IP may lead to higher risk of problematic IP use. Adolescent males are likely to be an at-risk group, and future study with this population could confirm this and elucidate more detailed at-risk factors.

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APPENDIX: INTERNET PORNOGRAPHY ADDICTION CRITERIA

The following are questions about your use of Internet pornography. Please answer honestly and to the best of your knowledge. Your answers are entirely anonymous and cannot be traced to any identifying information. All answers should be in reference to the last 12 months.

1. Do you spend a lot of time thinking about Internet pornography even when you are not using it or planning when you can use it next? (Not at all/Rarely/Sometimes/Often)
2. Do you feel restless, irritable, moody, angry, anxious, or sad when attempting to cut down or stop your use of Internet pornography, or when you are unable to use Internet pornography? (Not at all/Rarely/Sometimes/Often)
3. Do you feel the need to use Internet pornography for increasing amounts of time? (Not at all/Rarely/Sometimes/Often)
4. Do you feel the need to use more intense or immersive forms of Internet pornography to receive the same amount of excitement or arousal that you used to? (Not at all/Rarely/Sometimes/Often)
5. Do you feel that you should use less Internet pornography but are unable to cut back on the amount of time you spend using it? (Not at all/Rarely/Sometimes/Often)
6. Do you lose interest in or reduce participation in other recreational activities (hobbies, meetings with friends) due to Internet pornography? (Not at all/Rarely/Sometimes/Often)
7. Do you continue to use Internet pornography even though you are aware of negative consequences, such as not getting enough sleep, being late to school/work, spending too much money, having arguments with others, or neglecting important duties? (Not at all/Rarely/Sometimes/Often)
8. Do you continue to use Internet pornography for masturbation even though you are experiencing an inability or difficulty in achieving sexual arousal? (Not at all/Rarely/Sometimes/Often)
9. Do you continue to use Internet pornography for masturbation even though you are experiencing an inability or difficulty in achieving orgasm? (Not at all/Rarely/Sometimes/Often)
10. Do you continue to use Internet pornography for masturbation even though you are experiencing bodily pain? (Not at all/Rarely/Sometimes/Often)
11. Do you try to keep your family or friends from knowing how much you use Internet pornography? (Not at all/Rarely/Sometimes/Often)
12. Do you use Internet pornography to escape from or forget about personal problems? (Not at all/Rarely/Sometimes/Often)
13. Do you use Internet pornography to relieve uncomfortable feelings such as guilt, anxiety, helplessness, or depression? (Not at all/Rarely/Sometimes/Often)
14. Does your use of Internet pornography add risk for potentially losing significant relationships, jobs, educational or career opportunities? (Not at all/Rarely/Sometimes/Often)