Psychometric development of the Problematic Pornography Use Scale

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HIGHLIGHTS

• We report the development of the Problematic Pornography Use Scale.
• Scale showed high internal consistency, convergent validity, and construct validity.
• High scores were positively correlated with measures of psychopathology.
• Future research should explore problematic pornography use as a behavioral addiction.

ARTICLE INFO

ABSTRACT

Despite the increased social acceptance and widespread use of pornography over the past few decades, reliable and valid instruments assessing problematic use of pornography are lacking. This paper reports the findings of three studies aimed at developing and validating a new scale measuring problematic pornography use. The Problematic Pornography Use Scale (PPUS) items showed high internal consistency, convergent validity, and construct validity. Exploratory and confirmatory factor analyses revealed four core factors relating to proposed domains of problematic pornography use. High PPUS scores were positively correlated with measures of psychopathology, low self-esteem and poor attachment. Although PPUS scores were related to other behavioral addictions, problematic pornography use as operationalized in the current paper appears to be uniquely distinguished from features of behavioral addictions relating to gambling and Internet use. Findings highlight the potential use of the PPUS for future research and possible clinical applications by defining problematic pornography use as a behavioral addiction.

1. Introduction

Increased Internet use over the past few decades has been accompanied by an increased consumption and societal acceptance of pornography. Both trends may contribute to an increase in self-reported problematic pornography use, including what some have labeled "pornography addiction" (D'Orlando, 2011). Various conceptualizations about problematic pornography use and related behaviors (e.g., cybersex) have been proposed, and their clinical implications have been documented (e.g., Bensimon, 2007; Bostwick & Bucci, 2008; Cooper, Delmonico, & Burg, 2000; Delmonico & Miller, 2003; Schneider, 2000; Tarver, 2010). While research on this topic has increased over the past few decades (Voros, 2009), operational definitions or validated

measures have not been developed to capture what some have labeled pornography addiction (D'Orlando, 2011; Short, Black, Smith, Wetterneck, & Wells, 2012).

In the current article, we propose an operational definition of problematic use of pornography within an addiction framework. We identified specific features that may reflect addictive pornography use and then constructed a self-report instrument aimed at assessing these features. Based on four common characteristics of substance and non-substance addictions, a Problematic Pornography Use Scale (PPUS) was developed, tested and examined in relation to measures of mental health, attachment and excessive/addictive engagement in sex, Internet use, and gambling.

1.1. Defining pornography

Understanding patterns of excessive pornography use requires a definition of pornography; however, efforts to classify material as

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pornographic have been challenging, as others have noted (e.g., Ayres & Haddock, 2009; Daneback, Træen, & Sven-Axel, 2009; Ford, Durtschi, & Franklin, 2012; Haavio-Mannila & Kontula, 2003; Kingston, Malamuth, Fedoroff, & Marshall, 2009). Despite differences among evolving conceptualizations of pornography including those influenced by societal perspectives and the growth of the pornography industry (D'Orlando, 2011), most agree that it contains sexually explicit material depicting naked or semi-naked bodies engaged in genital stimulation or sexual acts (Davis & McCormick, 1997; Traeen, Sørheim-Nilsen, & Stigum, 2006). Moreover, pornography can be conveyed through a vast array of mediums including magazines, books, Internet sites, phone services and videos designed to sexually stimulate the consumer (e.g., Davis & McCormick, 1997; Flood, 2007; Ford et al., 2012). For the purposes of this study, material is considered pornographic if it: (1) creates or elicits sexual thoughts, feelings, or behaviors; and, (2) contains explicit images or descriptions of sexual acts involving the genitals (e.g., vaginal or anal intercourse, oral sex, or masturbation). This definition has been used among other sex researchers in operationalizing a working definition of pornography (Hald & Malamuth, 2008; Reid, Li, Gilliland, Stein, & Fong, 2011).

1.2. Internet pornography

The Internet has contributed significantly to increased consumption of pornography. Internet pornography differs from other forms of pornography in that it is easily accessible, anonymous, and often free. Cooper (1998) reported that the combined effect of these characteristics may drive the popularity of Internet pornography, and referred to them as the "Triple-A engine:" access, affordability, and anonymity.

The revolution in information and communication technology has not only made pornography more accessible, but also may have increased societal acceptance of pornography use (D'Orlando, 2011). Cooper et al. (2000) reported that up to 17% of individuals may experience moderate or greater levels of sexual compulsivity. In 2008, Carroll et al. (2008) reported that two thirds of young men and one half of young women claimed that viewing pornography is acceptable. However, the current prevalence of problematic pornography use is presently unknown.

Ropelato (2006) reported that approximately 40 million Americans visit pornography websites regularly. The Internet pornography industry revenues are larger than those of the top technology companies (e.g., Microsoft, Google, Amazon). They are also larger than the combined revenues of all professional football, baseball, and basketball franchises in the United States (Ropelato, 2006). Excessive pornography use was reported as the most prominent problem among 81% of patients assessed for the proposed DSM-5 criteria for hypersexual disorder in a field trial (Reid, Carpenter, et al., 2012; Reid, Garos and Fong, 2012). Furthermore, many clinicians report that pornography use is a frequent concern among people they see in treatment (e.g., Ayres & Haddock, 2009; Goldberg, Peterson, Rosen, & Sara, 2008; Wood, 2011), making the extent to which individuals engage in pornography viewing a potentially important health consideration.

The privacy of cyberspace also allows individuals to indulge in fantasies that may be socially unacceptable to varying degrees, such as fetish, bondage, bestiality, and incest fantasies (e.g., Cooper, 1998; Young, 2008). While this might allow people to explore their sexuality in positive and unprecedented ways, the Triple-A engine effect may also create a diathesis leading some individuals to develop excessive patterns of problematic pornography use.

1.3. Clinical characteristics of pornography users

Hald, Smolenski, and Rosser (2013) discuss pornography use as possibly being a positive source of information and helping individuals confirm and understand their sexual orientation. However, significant psychological problems have also been associated with frequent use of pornography. Individuals who report highly frequent use of pornography may be at increased risk for many negative health consequences, including engaging in risky sexual behavior such as unprotected sex with multiple partners, extramarital sex, and use of commercial sex workers (Reid, Carpenter, et al., 2012; Reid, Garos and Fong, 2012). As a result, they may also be at an increased risk of contracting sexually transmitted infections (e.g., Levert, 2007; Stack, Wasserman, & Kern, 2004; Wright & Randall, 2012). Individuals using pornography with violent or aggressive themes may increase their risk of engaging in sexual violence (e.g., Dines, Jensen, & Russo, 1998; Fisher, Belfry, & Lashambe, 1999; McKee, 2005; Russell, 1997) and develop negative perceptions about women (e.g., Fisher et al., 1999). People who report highly frequent use of pornography (versus non-users) are more likely to consume alcohol during sexual encounters (e.g., Braun-Courville & Rojas, 2009), to exhibit more delinquent behavior and substance use (e.g., Ybarra & Mitchell, 2005), and to report more dissatisfaction with life (e.g., Peter & Valkenburg, 2006), loneliness (e.g., Yoder, Virden, & Amin, 2005) and job-related problems (e.g., Hertlein & Piercy, 2008; Kafka, 2000; Wright & Randall, 2012). Excessive pornography use may also contribute to marriage distress, conflict, and attachment ruptures among couples in monogamous committed relationships (Bergner & Bridges, 2002; Bridges, Bergner, & Hesson-McInnis, 2003; Manning & Watson, 2007; Reid, Carpenter, & Draper, 2011; Reid, Carpenter, Draper, & Manning, 2010). Individuals who report highly frequent use of Internet pornography also tend to report a history of traumatic experiences, such as sexual, physical or emotional abuse (e.g., Levert, 2007). They also tend to report coming from rigidly disengaged families and to experience relatively low levels of emotional bonding with their caregivers (e.g., Levert, 2007; Wood, 2011; Ybarra & Mitchell, 2005). These individuals also tend to report lower self-esteem (e.g., Levert, 2007) and greater depressive symptoms than do non-users (Weaver et al., 2011), and some studies have suggested that individuals suffering from depression or anxiety disorders tend to use pornography to regulate sleep and pain and to cope with family and other interpersonal problems (e.g., Black, Kehrberg, Flumerfelt, & Schlosser, 1997; Carnes, 1991; Kafka, 2000; Kafka & Prentky, 1994, 1998). Individuals with excessive use of pornography may also suffer from Internet addiction or exhibit hypersexual behavior, both of which may be severely debilitating (Carli et al., 2013; Kor, Fogel, Reid, & Potenza, 2013; Reid, Carpenter, et al., 2012; Reid, Garos, & Fong, 2012).

Surprisingly, despite accumulated evidence on the problematic nature of excessive pornography use, there is no agreed-upon way to measure excessive pornography use. As a result, operational definitions of pornography use are varied and inconsistent (e.g., Fisher & Barak, 2001; Maddox, Rhoads, & Markman, 2011; Short et al., 2012). For example, a review of 42 quantitative studies on pornography use published during the past decade revealed 95% of studies used researcher-generated questions and only two of the studies used validated measures (Short et al., 2012). Moreover, pornography use was measured through several distinct indicators: some studies measured the frequency of use, others the duration of use, and others either the absence or presence of pornography use. Additionally, several studies were limited to young adults or high-school students (e.g., Braun-Courville & Rojas, 2009; Haggstrom-Nordin, Hanson, & Tyde'n, 2005; Wingood et al., 2001), raising questions about the generalizability of findings across age groups.

Insofar as a large percentage of individuals classified as having "hypersexual disorder" based on the DSM-5 proposed criteria reported problems with dysregulated pornography use, Reid, Carpenter, and Draper (2011) and Reid, Li, Gilliland, Stein, and Fong (2011) developed the *Pornography Consumption Inventory* (PCI) to assess the motivations for using pornography among this population (Reid, Li, Gilliland, Stein, & Fong, 2011). A four-factor solution for the PCI suggested that hypersexual individuals use pornography to avoid unpleasant affective states, for sexual curiosity, in response to a perception that pornography is exciting, and to facilitate sexual arousal. However, while high scores on the

PCI were linked to higher levels of loneliness, perceived stress, emotional dysregulation, impulsivity, and a lack of self-discipline, the items themselves were not intended to assess addiction to pornography per se, but instead the PCI attempts to assess the reasons why individuals exhibiting hypersexual behavior may be motivated to use pornography (Reid, Li, Gilliland, Stein, & Fong, 2011).

Although frequent use of pornography can be viewed as a necessary component of problematic pornography use, it cannot be considered as a sufficient definitional aspect of this phenomenon. For example, a person can frequently visit pornographic Internet sites but discontinue this behavior when necessary or view large amounts of pornography to satiate a high libido rather than an attempt to escape or avoid unpleasant affective states. Therefore, existing scales assessing frequency or duration of pornography are limited in scope given they do not capture the broader range of hypothesized characteristics of problematic pornography use. In order to measure this phenomenon, we begin by defining several hypothesized components purported to characterize frequent pornography and then develop scale items to capture these elements. Theories of substance and non-substance ("behavioral") addictions that have identified common features associated with addictive disorders were used as a foundation in developing item content for the PPUS.

1.4. From pornography use to problematic pornography use

Debate exists regarding how best to classify excessive engagement in sexual behaviors, and similar considerations could extend to pornography use. Sexual behaviors characterized by poor impulse control have been at times termed impulsive, compulsive, or addictive (Kor et al., 2013). A model of addiction has been proposed for hypersexual disorder (Garcia & Thibaut, 2010), although this conceptualization has been debated and was ultimately not adopted by the DSM-5 (Kafka, 2010). Nevertheless, like substance addictions, the criteria for hypersexual disorder proposed for DSM-5 are characterized by excessive sexual behaviors, diminished self-control over sexual engagement, use of sex for escaping/avoiding negative emotions, and functional impairment and distress (Kor et al., 2013; Schreiber, Odlaug, & Grant, 2012; Winters, Christoff, & Gorzalka, 2010). However, criteria for the DSM-5 proposal did not require patterns of escalation or withdrawal that have often been associated with addictive disorders. Regardless, individuals with excessive pornography problems appear to share several features with other addictive behaviors, such as gambling and substance use (e.g., Brand et al., 2011; Carnes & Wilson, 2002; Goodman, 1993). Consequently, a valid measure of problematic pornography use might best assess proposed core features of addictions as they relate to pornography use. As described previously (Potenza, 2006; Shaffer, 1999), the core features considered included: (1) highly frequent, excessive or compulsive behavioral engagement; (2) an appetitive urge prior to engagement in the behavior, with an aim to reach/maintain a positive emotional state or to escape/avoid a negative emotional state; (3) diminished self-control over behavioral engagement; and (4) continued engagement despite adverse consequences, which, in turn, leads to significant personal distress and functional impairment.

1.5. Purpose of studies

The current paper describes three studies conducted to validate the self-report scale (PPUS) constructed to assess problematic pornography use based on our proposed operational definition. In Study 1, initial items were written assessing the four definitional features of problematic pornography use and subject to psychometric examination to generate a 21-item PPUS. In Study 2, the 21-item PPUS was revised into a shorter and more concise 12-item scale. The psychometric properties of the 12-item scale were also ascertained. In Study 3, associations between the 12-item PPUS and other theoretically relevant constructs were examined. By helping to operationally define and measure problematic pornography use, the current research may help guide future

efforts to identify and treat problematic pornography use and promote further research on problematic pornography use.

2. Studies

2.1. Method

2.1.1. Participants in Studies 1–3

A representative sample of the general population of Hebrew-speaking Israelis was recruited by a major Israeli website designed to collect panel data for surveys in social science. The samples for all three studies were independent. The Study 1 sample consisted of 333 participants (137 women, 166 men), ranging from 18 to 70 years of age ($M = 39.5$, $SD = 14.5$). Fifty-three percent of participants were college graduates. The Study 2 sample consisted of 300 participants (120 women, 180 men), ranging from 18 to 69 years of age ($M = 43.85$, $SD = 14.34$). Forty-six percent of participants were college graduates. The Study 3 sample consisted of 1720 participants (834 men, 886 women) ranging in age from 18 to 70 years ($M = 39.52$, $SD = 14.18$). Forty-seven percent of participants were college graduates. In each study, participants were compensated for their participation in the study via the online panel provider, each receiving $3.5 (in local currency) in purchase coupons. Participants consented prior to participation and the study was reviewed and approved by the Interdisciplinary Center's Institutional Review Board.

2.2. Study 1

2.2.1. Procedure

In Study 1, the initial item pool for the PPUS was derived from multiple sources including existing measures related to hypersexuality, online pornography use, Internet addiction, and theoretical literature related to the concept of addiction as reflected in our four a priori hypotheses: (1) excessive use, (2) use in order to escape or avoid negative emotions, (3) self-control difficulties, and (4) personal distress and adverse consequences in important areas of functioning due to excessive use.

2.2.2. Initial item pool of the PPUS

First, items for the PPUS were adapted from a self-report scale assessing Internet addiction (The Internet Addiction Test, Young, 1998). Items were chosen that could be altered to assess PA (e.g., "How often do you find that you stay on-line longer than you intended?"), replacing references to Internet with references to pornography (e.g., "How often do you find that you watch pornography longer than you intended?"). Second, items were adapted from the Hypersexual Disorder Questionnaire (HDQ) used in the DSM-5 field trial for hypersexual disorder (Reid, Carpenter, et al., 2012; Reid, Garos and Fong, 2012). References to sexuality were replaced with references to pornography (e.g., "I spend too much time planning for, and engaging in sexual behavior" was replaced with "I spend too much time planning for, and engaging in viewing of pornography"). Third, items were adapted from a self-report scale assessing cyber-pornography use (The Cyber-Pornography Use Inventory, Grubbs, Sessoms, Wheeler, & Volk, 2010). Specific references to cyber-pornography were replaced with references to pornography use (e.g., "I feel unable to stop my use of online pornography" was replaced with "I feel unable to stop my use of pornography").

Initially, 43 items were generated and structured in a 6-point response format (0 = "Never True", 1 = "Rarely True", 2 = "Sometimes True", 3 = "Often True", 4 = "Very Often True", 5 = "Almost Always True") with all items fully labeled with the Likert response categories in an effort to increase the interpretability of responses and reduce ambiguity associated with item endorsement (Weijters, Cabooter, & Schillewaert, 2010). Instructions for the PPUS were adapted from the HDQ and asked participants to report on their behaviors over the past

six months. To establish face validity, 16 Israeli participants who were not part of the Study 1 sample were asked to rate the relevance of each item to pornography use. Minor changes in the wording of the items were made based on their ratings and comments.

Participants in Study 1 responded to a call on the panel website for participation in a short study (up to 30 min) of attitudes and behaviors concerning pornography use. Then they were asked to read the 43 PPUS items and rate the extent to which the items described their feelings and behaviors over the past six months.

2.2.3. Results and discussion

Data were examined for extreme scores, heterogeneity of variance, sphericity, and tolerance. Data met the requirements of test assumptions of normality, linearity, homoscedasticity, homogeneity, and multicollinearity. Subsequently no transformations were conducted. A series of exploratory principal component analyses were conducted to identify items that served as the best indicators of the four major features of pornography use noted above. We chose 21 items based on factor loadings and eliminated items that complexly loaded across more than one scale. We then subjected them to a second factor analysis using Varimax rotation. This analysis yielded four factors with Eigenvalues greater than 1.0. These four factors accounted for 70% of the item variance and corresponded to the four theoretical factors of behavioral addictions. The first factor (21.9% of explained variance) included 6 items relating to personal distress and functional disability due to excessive pornography use, the second factor (21.3%) included 6 items relating to highly frequent use of pornography, the third factor (13.5%) included 5 items relating to control difficulties, and the fourth factor (12.6%) included 4 items relating to the use of pornography as a means for escaping/avoiding negative emotions. Items showed satisfactory internal consistency for all four factors (Cronbach α from .70 to .90) with the total 21 items yielding high internal consistency (Cronbach α = .95).

Overall, the PPUS showed adequate face validity and satisfactory internal consistency across the four-factor structure which corresponds to the four model components of addictive disorders as discussed previously.

2.3. Study 2

2.3.1. Method

2.3.1.1. Procedure. In Study 2, we sought: 1) to determine if the PPUS items could be further reduced; 2) to examine the socio-demographic correlates (e.g., gender, age, education level, marital status, income level) of the PPUS; 3) to examine the association between the PPUS and the frequency of pornography use; and, 4) to assess the readability level of the PPUS items.

2.3.1.2. Materials and procedure. The procedures, instructions, and scale administration were similar to those described in Study 1. Participants completed the 21-item with a brief demographic questionnaire. In addition, they completed seven items querying frequency of engagement in seven specific behaviors (e.g., viewing pornographic videos online, looking at pornographic magazines). These items were adapted from the Problematic Sexual Behaviors Interview used in the DSM-5 field trial for hypersexual disorder (Reid, Carpenter, et al., 2012; Reid, Garos, & Fong, 2012). Participants were asked to read the items and rate how frequently they engaged in a specific behavior over the past six months. Ratings were made on a 7-point scale, ranging from 1 ('not at all') to 7 ('nine times a week'). Cronbach α for the 7 items was .73. Therefore, a total score was computed for each participant.

2.3.1.3. Results and discussion

2.3.1.3.1. PPUS item reduction. With the aim of reducing the number of PPUS items, a principal component analysis was performed on the 21 items. For each of the four PPUS factors, three items were chosen that had the highest loading on the factor and lowest loading on the other three factors. Then, these 12 items were submitted to a new factor analysis, which yielded the four factors each containing three items capturing 82.4% of the total item variance and corresponded to our four-factor model. Table 1 presents item loading in the relevant factor, percent of variance explained by each factor, and Cronbach's alphas. As the 12-item scale had a high degree of internal consistency (α = .92), total scores were subsequently calculated for each participant and the analyses below. On the Flesch Reading Ease Test, the items yielded a score of 31.7, suggesting that individuals with a twelfth-grade level of education or higher can read and understand the test items.

2.3.1.3.2. Socio-demographic correlates. No significant associations were found between the PPUS total score and years of education and income level. However, higher scores on the PPUS significantly correlated with younger age, $r(298) = -.15$, $p < .01$, and being male, $t(298) = 7.05$, $p < .001$. Men scored higher on the PPUS ($M = 8.65$, $SD = 10.01$) than did women ($M = 2.16$, $SD = 4.84$). Significant differences were also found with regard to family status, $F(3, 291) = 3.34$, $p < 0.05$. Scheffé's post-hoc analyses revealed that single participants scored higher on the PPUS ($M = 8.03$, $SD = 9.39$) than those who were divorced ($M = 2.46$, $SD = 3.51$). Married individuals were in-between these two groups ($M = 5.13$, $SD = 8.39$). While somewhat speculative, this latter finding might suggest that single individuals turn to pornography to satiate their sexual needs more than married individuals who presumably have a regular sexual partner. Alternatively, if single individuals experience great relationship loneliness, they may

Table 1
PPUS item loadings in the relevant factors after rotation, and percent of explained variance, and Cronbach alphas for each factor.

Item	Loading
Factor 1 — Distress and functional problems (22.3%, Cronbach alpha = .91)	
Using pornography has created significant problems in my personal relationships with other people, in social situations, at work or in other important aspects of my life	.79
I risked or put in jeopardy a significant relationship, place of employment, educational or career opportunity because of the use of pornographic materials	.87
I continued using pornography despite the danger of harming myself physically (for example: difficulty getting an erection due to extensive use, difficulty reaching an orgasm in ways that do not include pornography)	.84
Factor 2 — Excessive use (21.8%, Cronbach alpha = .86)	
I often think about pornography	.87
I spend too much time being involved in thoughts about pornography	.79
I spend too much time planning to and using pornography	.53
Factor 3 — Control difficulties (21.4%, Cronbach alpha = .75)	
I feel I cannot stop watching pornography	.85
I have been unsuccessful in my efforts to reduce or control the frequency I use pornography in my life	.45
I keep on watching pornographic materials even though I intend to stop	.47
Factor 4 — Use for escape/avoid negative emotions (13.7%, Cronbach alpha = .93)	
I use pornographic materials to escape my grief or to free myself from negative feelings	.79
I watch pornographic materials when am feeling despondent	.82
I have used pornography while experiencing unpleasant or difficult feelings (for example: depression, sorrow, anxiety, boredom, restlessness, shame or nervousness)	.84

consume more pornography in problematic ways because they feel lonely, as noted by others (Yoder et al., 2005). Future studies should examine whether problematic pornography use interferes with the development of monogamous relationships such as those found in the context of marriage.

2.3.1.3.3. PPUS and frequency of pornographic behavior. A significant association was found between the PPUS total score and frequency of engagement in pornographic behavior, $r(298) = .61$, $p < .01$. This mild-to-strong correlation indicates that, although the PPUS is associated with the frequency of pornographic behavior, it captures other nonoverlapping aspects of problematic pornography use that are not assessed by simply querying frequencies of behavioral engagement.

2.4. Study 3

Study 3 sought to examine the convergent and construct validity of the 12-item PPUS through correlational analyses with measures of interest in pornography consumption and Internet pornography use. In examining the construct validity of the PPUS, associations between PPUS scores and measures previously found to be linked to pornography use, such as mental health and functioning problems, diminished self-esteem, insecure close relationships, a tendency for behavioral addictions, and a history of traumatic experiences (see the Introduction for a review), were examined. It was hypothesized that if the PPUS assesses the theoretical construct of problematic pornography use, higher PPUS scores would be associated with (1) poorer mental health and lower self-esteem, (2) greater prevalence/frequencies of negative consequences of sexual behavior (e.g., impairment in social, occupational, or other important areas of functioning); (3) less secure interpersonal relationships; (4) other behavioral addictions (hypersexuality, pathological gambling, and Internet addiction); and (5) a history of traumatic experiences.

2.4.1. Method

2.4.1.1. Materials and procedure. The procedure and instructions were similar to those described in Study 1. Participants completed the 12-item PPUS described in Study 2 together with a battery of other self-report scales. The order of the scales was randomized across participants.

Convergent validity of the PPUS was assessed with two scales. First, participants completed the compulsive use subscale (11 items) of the Cyber-Pornography Use Inventory (CPUI; Grubbs et al., 2010). Like the PPUS, the CPUI also focuses on pornography use. However, whereas the PPUS assesses general pornography use and four core components of addictive disorders, the CPUI only assesses Internet pornography and aspects relating to consumption of Internet pornography (e.g., social aspects, hiding attempts, guilt feelings). In the current study, participants only completed the 11-item subscale assessing compulsive consumption of Internet pornography. Participants rated the extent to which they agreed with each item on a 7-point scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). In the current sample, the Cronbach α for the 40 items was .57. We computed a total score for each participant. Higher scores reflect higher levels of Internet pornographic behavior and feelings.

Second, participants completed the 15-item Pornography Consumption Inventory (PCI; Reid, Carpenter, & Draper, 2011; Reid, Li, Gilliland, Stein, & Fong, 2011). This scale was designed to assess four motivations for pornography use: emotional avoidance, sexual curiosity, excitement seeking, and sexual pleasure. Participants rated each item on a 5-point scale, ranging from 1 (*never like me*) to 5 (*very often like me*). In the current sample, Cronbach αs for items in each motivation category were good to excellent, ranging from .83 to .92. Four total scores for each participant were computed based on items belonging to each motivation category. Higher scores reflect more interest in pornography use due to emotional avoidance, sexual curiosity, excitement seeking, or sexual pleasure.

In order to examine the construct validity of the PPUS, participants completed measures assessing mental health, self-esteem, distress and functional problems related to sexual behavior, insecurities in close relationships, comorbidity with other behavioral addictions, and history of traumatic events. Mental health was assessed with the 53-item Brief Symptom Inventory (BSI; Derogatis & Melisaratos, 1983). This measure covers nine symptom categories: somatization, obsession–compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism. Participants rated to extent to which they experienced each symptom over the past month on a 5-point scale, ranging from 0 (*not at all*) to 4 (*extremely*). In the current sample, Cronbach αs for each of the nine symptoms were good to excellent, ranging from .81 to .90. Nine total scores were computed for each participant, with higher scores reflecting greater levels of psychiatric symptomatology.

Self-esteem was assessed with the 10-item Rosenberg Self-Esteem scale (RSE; Rosenberg, 1965). Participants rated the extent to which each item is descriptive of themselves on a 4-point scale, ranging from 1 (*strongly disagree*) to 4 (*strongly agree*). In the current sample, Cronbach α for the 10 items was .87. A total score was computed for each participant with higher scores reflecting poorer self-esteem.

Distress and functional problems related to sexual behavior were assessed with the 22-item Hypersexual Behavior Consequences Scale (HBCS; Reid, Garos, & Fong, 2012). Questions on the HBCS probe into job, financial, or partner loss; sexual disease; lowered self-esteem; and hurting a loved one. Participants rated the extent to which the problems described in each item are likely to happen to them on a 5-point scale, ranging from 1 (*unlikely to happen*) to 5 (*has happened several times*). Only participants who replied affirmatively to the question: "Did your sexual behavior cause problems in your life?" completed the 22-item HBCS (N = 118). In the current sample, Cronbach α for the 22 items was .92. Therefore, a total score was computed for each participant. Higher scores reflect more distress and functional problems related to sexual behavior.

Emotional insecurities in close relationships were assessed with the 36-item Experiences in Close Relationships scale (ECR; Brennan, Clark, & Shaver, 1998). This scale was designed to assess two attachment insecurities: attachment anxiety (i.e., worries that a partner will not be available in times of need and energetic, insistent attempts to obtain care, support, and love from relationship partners) and attachment avoidance (i.e., distrust of relationship partners' goodwill, striving to maintain behavioral independence and emotional distance from partners, and suppression of intimacy-related thoughts and emotions). Participants rated the extent to which each item was descriptive of their feelings and behavior in close relationships on a 7-point scale ranging from 1 (*not at all*) to 7 (*very much*). Eighteen items measured attachment anxiety (e.g. "I worry about being abandoned") and 18 items measured avoidance (e.g., "I prefer not to show a partner how I feel deep down"). In the current sample, Cronbach αs were good for both the anxiety items (.84) and the avoidance items (.83), and two total scores for attachment anxiety and attachment avoidance were computed. Scale scores were computed. Higher scores indicate greater attachment anxiety and avoidance.

Relationships with behavioral addictions were assessed with three scales assessing hypersexuality, Internet addiction, and problematic gambling. Hypersexuality was assessed with the 10-item Hypersexual Disorders Questionnaire (HDQ; Reid, Carpenter, et al., 2012, Reid, Garos and Fong, 2012). Internet addiction was assessed with the 20-item Internet Addiction Test (IAT; Young, 1998). In these two scales, participants rated how frequently they experienced thoughts, feelings, and behaviors described in a specific item over the past six months on

a 5-point scale, ranging from 1 (never) to 5 (almost always). Gambling addiction was assessed with the 12-item South Oaks Gambling Screen-RA (SOGS-RA; Winters, Stinchfield, & Fulkerson, 1993). Participants read each item and answered whether or not the item is self-descriptive (yes/no response). In the current sample, Cronbach αs for these three scales were good to excellent, ranging from .85 to .92. Therefore, three total scores were computed for each participant. Higher scores reflect more sexual, Internet, and gambling addiction, respectively.

History of traumatic experiences was assessed with the 25-item Traumatic Experiences Questionnaire (TEQ; Nijenhuis, der HartO, & Vanderlinden, 1999). This questionnaire asks participants to indicate whether or not (yes/no responses) they have experienced any of 25 types of traumas, including emotional neglect, physical abuse, sexual abuse (by family members and others), death or loss of a family member, bodily harm, and war experiences. A total score was then computed for each participant by counting the number of traumatic events endorsed by him or her.

2.4.1.2. Results and discussion. The 12-item PPUS yields a minimum score of 0, indicating no evidence for self-reported problematic pornography use, and the maximum score is 60, indicating the highest score on each item. For Study 2, the mean for the PPUS was 5.54, the standard deviation was 8.58 and the range was 0–59. For Study 3, the mean for the PPUS was 5.73, the standard deviation was 8.71 and the range was 0–58.

2.4.1.2.1. Confirmatory factor analysis of the PPUS. We submitted the 12-item PPUS to a confirmatory factor analysis based on single items, using the PROC CALIS procedure in SAS version 9.2. The hypothesized four-factor model fit the data well: CFI = 0.95, NNFI = 0.93, RMSEA = 0.09 with a significant chi-square goodness-of-fit test ($p < .001$), which is reasonable to expect due to the large sample size. The four factors accounted for 79.5% of the item variance and corresponded to the four theoretical factors of behavioral addictions.

2.4.1.2.2. Reliability. An examination of the correlation matrix revealed that all the PPUS items were positively and significantly correlated (ranging from .33 to .81). The four factors yielded good to excellent Cronbach αs, ranging from .79 to .92. In addition, the scale had a high degree of overall internal consistency ($\alpha = .93$).

2.4.1.2.3. Convergent validity. The convergent validity of the PPUS was high. As shown in Table 2, we found significant positive correlations between the PPUS total score and Internet pornography use (CPUI total score) as well as the four motivations for pornography consumption as measured by the PCI (emotional avoidance, sexual curiosity, excitement seeking, sexual pleasure). However, since correlations ranged from .49 to .69, it is evident that there was only a partial overlap between the PPUS and the other measures; thus, with respect to these other measures, the PPUS appears to assess both common and unique features.

2.4.1.2.4. Construct validity. The observed correlations support the validity of the total PPUS score as relating to the hypothesized domains (Table 2). Specifically, the total PPUS score was significantly associated with (a) more psychiatric symptomatology across the nine assessed symptom dimensions, (b) poorer self-esteem, and (c) higher levels of emotional insecurities, either attachment anxiety or avoidance, within close relationships.

Almost a third of the participants in the high PPUS median split (30.1%) reported that their sexual behavior caused problems in their life, compared to only 4.9% in the low PPUS median split. The former group completed the HBCS (n = 118), and the total PPUS score was significantly associated with more personal distress and functional problems as a result of sexual behavior (see Table 2).

As hypothesized, the total PPUS score was also significantly associated with a history of more traumatic events (Table 2). Although statistically significant, the relationship appeared more modest than those with the psychopathological domains and particularly less robust than relationships with hypersexual and Internet-related addictive behaviors.

The findings supported the hypothesis about comorbidity between problematic pornography use and other behavioral addictions. Specifically, the total PPUS score was significantly associated with higher levels of hypersexuality, Internet addiction, and gambling addiction (see Table 2). As might be anticipated, relationships between PPUS scores and hypersexuality and Internet-addiction scores appeared stronger than those between PPUS scores and gambling-addiction scores. Additionally, since correlations ranged from .28 to .68, it is evident that there was only a partial overlap between the PPUS and other measures of behavioral addictions. Therefore, it seems that, although problematic pornography use, as measured by the PPUS, shares commonalities, particularly with hypersexuality and Internet addiction, it has unique features that distinguish it from other behavioral addictions.

3. General discussion

In this paper, we propose that pornography use has the potential to become addictive and might be conceptualized as a behavioral addiction. In an effort to fill the gaps in the literature with regard to defining, identifying, and measuring problematic pornography use, we conducted three studies that aimed to establish a valid operational definition and measure of this phenomenon. Specifically, we devised a short self-report scale (PPUS) in order to assess problematic pornography use in the general population, consistent with recommendations by Short et al. (2012).

The PPUS items were found to be reliable, and our studies provided some support for the validity of a four-factor PPUS structure. Individuals who scored higher on the PPUS reported poorer mental health and self-esteem, and more insecure close relationships than those who scored lower, illustrating the negative emotional correlates of problematic pornography use. The correlations between the PPUS and negative consequences of hypersexuality, Internet addiction, and gambling addictions provide some support for our conceptualization of problematic pornography use.

3.1. Clinical implications

The PPUS appears to be a valid instrument for assessing problematic pornography use and may be useful in assessing treatment outcomes. Future work should examine the psychometric properties of the PPUS

Table 2
Pearson correlations between the PPUS and other assessed variables (Study 3).

Variables		Total PPUS score
Internet pornography use		.56***
Motivation for pornography use	Sexual curiosity	.49***
	Emotional avoidance	.69***
	Sensation seeking	.59***
	Sexual pleasure	.50***
Psychopathological symptoms	Somatization	.18***
	OCD	.21***
	Interpersonal sensitivity	.23***
	Depression	.24***
	Anxiety	.20***
	Hostility	.20***
	Phobic anxiety	.25***
	Paranoid ideation	.21***
	Psychoticism	.27***
Self-esteem		.23***
Sexual behavior consequences		.38***
Attachment insecurities	Avoidance	.23***
	Anxiety	.26***
Hypersexuality disorder		.68***
Internet addiction		.40***
Gambling addiction		.28***
Traumatic events		.14***

Notes: OCD = obsessive–compulsive disorder.
*** $p < .001$.

in clinical treatment-seeking populations. Our findings indicate that individuals who score high on the PPUS also report significant distress across many domains. Thus, it appears important for clinicians to be aware of problematic pornography use and its related negative health associations. The criteria we propose for evaluating problematic pornography use (the four components of addictions) and the scale we propose (the PPUS) appear valuable in accurately assessing this phenomenon, and the identified factors may represent important targets for treating problematic pornography use. By identifying specific symptomatology domains, treatments may be designed to target specific aspects of problematic pornography use.

3.2. Strengths and limitations

The survey sample in the current study was derived from the general population and is the largest sample used to date for validating a scale assessing problematic pornography use. Nonetheless, generalizing from this study may pose certain problems. First, the Israeli society is largely Jewish, and this religious affiliation may be associated with negative attitudes towards pornography. Replicating this study's findings in other cultures and with other religious denominations would strengthen their validity and generalizability. Moreover, exploring the psychometric properties of the PPUS in non-religious groups is also warranted.

Another limitation of this study is that the PPUS items were adapted from items in existing scales for evaluating Internet addiction, hypersexuality disorder, and pornography use and their limitations would apply. For example, we adapted items from the Cyber-Pornography Use Inventory to generate initial PPUS items. The CPUI was developed and validated using a religious sample. Furthermore, because we used an online self-report questionnaire, this study is affected by the limitations of online self-reported data. Future studies should examine cultural and ethnic differences in self-reports of sexual behavior and its consequences. Studies on assessing problematic pornography use in clinical populations would further enhance our understanding of its impact and help determine the need for clinical interventions. The PPUS should prove valuable in efforts to evaluate efficacy of treatments for problematic pornography use.

It should be noted that factor analysis, while helpful in some facets of theory construction, is insufficient to substantiate a phenomenon as a disorder (Block, 1995). Additionally, the designation of sexual symptom clusters characterized as "addictive" might be understood as non-pathological variations of high sexual desire (Steele, Staley, Fong, & Prause, 2013), and this possibility should be examined in future studies of problematic pornography use.

3.3. Conclusion

In this study, a 12-item self-report scale, the PPUS, was developed for assessing problematic pornography use. After devising this scale, the PPUS questionnaire was administered to a large and representative sample of the general Israeli population. Findings suggest that although hypersexuality and Internet addiction may somewhat overlap with problematic pornography use, this phenomenon warrants its own consideration from conceptual and treatment perspectives. The data suggest that problematic pornography use may represent a unique behavioral addiction with specific criteria, and further study is needed to verify the clinical utility of such an approach. The results of this study provide an instrument that should prove useful in determining the extent to which problematic pornography use might be conceptualized as an addiction. As the current studies did not assess the extent to which individuals may have had diagnoses of hypersexual disorder or may have been seeking help for problematic use of pornography or hypersexual disorder, future studies are needed to examine for these disorders and tendencies and to determine the extent to which specific thresholds on the PPUS might relate to pornography addiction or hypersexual disorder.

The problematic pornography use demonstrated high internal consistency and reliability. Future research should replicate the reliability and validity of the PPUS in other populations using different methodologies (e.g., face-to-face interviewing). If such studies also demonstrate reliability, there would be even greater support for the utility of the PPUS in assisting researchers and clinicians in evaluating the prevalence and severity of problematic pornography use, as well as its potential for assessing treatment efficacy.

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