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Pornography Use and Loneliness: Assessing Correlations
Using Three Associative Models

Samuel Alejandro Pereyra

A thesis submitted to the faculty of
Brigham Young University
in partial fulfillment to the requirements for the degree of

Master of Science

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ABSTRACT

Pornography Use and Loneliness: Assessing Correlations Using Three Associative Models

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Given the current debate on the discrepancies of pornography research and the inconclusiveness of addiction to pornography, this study examines the associative nature between pornography use and loneliness using a measurement model and two structural equation models where pornography use and loneliness are regressed on each other, respectively. Survey data was collected from a sample of 1,247 participants, who completed an online questionnaire containing questions on pornography use, the University of Los Angeles Loneliness Scale (UCLALS), and other demographic variables. Results from our analyses revealed significant and positive associations between pornography use and loneliness for all three models. Findings provide grounds for future possible models of bidirectionality suggesting a possible addictive cycle between pornography use and loneliness.

Keywords: pornography use, loneliness, addiction

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Pornography Use and Loneliness: Assessing Correlations Using Three Associative Models

Internet use has been accompanied by a dramatic increase in pornography consumption (Gutiérrez, Vega, & Rendón, 2013; Saavedra, 2011; see Cooper, Putnam, Planchon, & Boies, 1999). Individuals are increasingly self-identifying compulsive pornography use as a problem—often self-characterizing it as an addiction—and presenting it in therapy as their primary presenting problem (Woods, 2013). These issues combined with the ubiquitous availability of pornographic depictions calls into question continuing reluctance to consider the applicability of an addiction template to pornography use (Grubbs, Volk, Exline, & Pargament, 2015).

Some researchers provide various refutations against addiction claims (Ley, Prause, & Finn, 2014; Steele, Staley, Fong, & Prause, 2013). Yet, researchers have theoretically modeled and found evidence for behavioral addictions in gambling (Reuter et al., 2005), eating (Lenoir, Serre, Cantin, & Ahmed, 2007), sex (Phillips, Hajela, & Hilton, 2015), and pornography (Griffiths, 2012; Young, 2008). Research has also suggested neurochemical processes of dependency for behavioral addictions to pornography (Hilton, 2013; Love, Laier, Brand, Hatch, & Hajela, 2015). Notwithstanding these research claims supporting pornography addiction, it has not been included in the DSM-V (Hilton, 2013).

Despite a general increase in acceptance of pornography (Braun-Courville & Rojas, 2009; Carroll et al., 2008), there is growing evidence linking pornography use to various mental health issues (Bernardon, 2012; Carroll et al., 2008; Cook, 2006; Nelson, Padilla-Walker, & Carroll, 2010; Wright & Randall, 2012;) and negative relationships outcomes (Poulsen, Busby, & Galovan, 2013; Willoughby, Carroll, Busby, & Brown, 2015; Zitzman, & Butler, 2009).

In the context of these negative individual and relationship outcomes, pornography users' experience of loneliness is important to consider as one potential correlate. Only two studies that we are aware of have examined pornography use and loneliness (Marshall, O'Brien, Marshall, Booth, & Davis, 2012; Yoder, Virden, & Amin, 2005). However, they come short of proposing a possible association between both variables where either could theoretically predict the other. Examining three different statistically associative models where either variable is regressed on the other provides a supposition which potentially strengthens the addiction argument. Knowing that individuals keep returning to pornography because of a possible cyclical relationship involving loneliness would support the validity of a pornography addiction. The purpose of this study is to further examine how loneliness and pornography use might manifest an association between each other in additional ways that possibly support an addictive cycle model.

Literature Review

Prevalence of Pornography

Increased pornography consumption has expanded the adult entertainment industry. The \$13 billion pornography market (Richtel, 2007) has been estimated to exceed the revenues of ABC, NBC, and CBS combined (Ropleto, 2007). Prior to this, the adult entertainment industry profited primarily from magazine distributions, movie theater releases, and videocassette recordings (Hawkins & Zimring, 1988; Williams, 1989). Internet technology—and with it, the triple-A engine of accessibility, affordability, and anonymity—has led to more pornography being accessed through the Internet than through those sources during the previous decades (Döring, 2009). The Internet has surpassed older mediums of pornographic entertainment in sophistication and accessibility, such that users no longer have to go through elaborate rituals to

avoid detection for what might be viewed as undesirable or embarrassing behavior (Buzzell, 2005).

Outcomes of Pornography Use

Pornography use is associated with various negative individual, couple, and family outcomes. Some of those who view pornography experience poorer mental health including shame (Gilliland, South, Carpenter, & Hardy, 2011), anxiety (Cook, 2006), and depression (Nelson et al., 2010). A formative research study on long-term exposure to pornography revealed negative effects on family values and sexual satisfaction (Zillmann & Bryant, 1988a; Zillman & Bryant, 1988b). Specifically, exposure to pornography decreased individual's sense of value towards marriage as an institution and reduced the desire to have children (Zillman & Bryant, 1988a). Exposure also led to lower satisfaction with intimate partner's affection, physical appearance, and sexuality (Zillman & Bryant, 1988b). Studies today continue to reflect those research findings (Steffens & Rennie, 2006; Weaver, 2004), linking pornography to aggression, sexual deviancy, objectification of women, marital distress, and negative outcomes in their children (Manning, 2006).

Conversely, other scholars note potentially positive correlates of pornography use such as increased sexual knowledge, openness (Weinberg, Williams, Kleiner, & Irizarry, 2010), and more positive communication about sexual relationships (Daneback, Træen, & Månsson, 2009). This was particularly true for couples who use pornography as a means of enhancing their sexual relationship (Daneback et al., 2009). Furthermore, couples with lower discrepancies of pornography use and higher acceptability showed greater relationship satisfaction than couples with high discrepancies (Willoughby et al., 2015).

Others explain this and other discrepancies in pornography use findings not as a distinction of short- versus long-term outcomes, but as an artifact of differing and evolving social constructions couples make concerning pornography use. The idea that negative outcomes are socially constructed (Hald & Malamuth, 2008; Patterson & Price, 2012) has been used to explain contrasting findings of negative and positive outcomes. If the relational meaning of pornography is socially constructed, and if some men and women are beginning to accept and even endorse pornography use in society (Olmstead, Negash, Pasley, & Fincham, 2013), then the idea is that negative effects may not manifest themselves as expected or (theoretically) could altogether disappear (Bridges et al., 2003). In addition to interpreting meaning of pornography use differently, some couples may even have different views on what is considered pornographic or not (Willoughby & Busby, 2015). A social constructionist view holds forth that changing social perceptions of pornography use may ultimately challenge traditional research findings.

Despite notions that some create their own meaning around pornography, the evidence that pornography negatively impacts individuals, relationships, and family life remains. Research continues to link pornography use to negative outcomes such as substance use (Carroll et al., 2008) and risky sexual behavior (Wright & Randall, 2012). Negative couple outcomes further include feelings of betrayal (Bridges, Bergner, & Hesson-McInnis, 2003; Zitzman & Butler, 2009), decreased relationship quality (Szymanski, & Stewart-Richardson, 2014), lower sexual satisfaction (Yucel & Gassanov, 2010), and feelings of emotional infidelity (Whitty, 2003; Zitzman & Butler, 2009).

Loneliness as a mental health issue is another correlate of pornography use (Yoder et al., 2005). Yet even with so many negative individual and relationship outcomes, some individuals have a hard time avoiding pornography use despite how problematic it is to them (Twohig,

Crosby, & Cox, 2009). One anonymous participant from a study examining pornography use on mobile phones reported that he would look at pornography on his phone even if his wife was by his side (Saavedra, 2011). Continuing to use pornography even at the risk of being discovered and resulting in negative personal and relationship consequences points to an element of powerlessness characteristic of addiction (Butler, Meloy, & Call, 2015).

The pathway from pornography to loneliness can be conceptualized using script theory (Gagnon & Simon, 1973). Gagnon and Simon (1973) claimed that the sexual template is scripted by personal experiences, values, and the mass media (Masters, Casey, Wells, & Morrison, 2013). Wright and Randall (2014) posited that mass media impacts socialization and influences sexual-relational expectations and patterns. Content analysis of sexual media, in particular pornographic depictions, documents a sexual depiction and script antagonistic to attachment exigencies such as availability, responsiveness, and engagement. The dissemination of pornography on various media platforms promulgates a sexual script to be created that heightens eroticism—obsessing on physical pleasure (Miller-Young, 2010)—creates a culture of objectifying women (Manning, 2006), normalizes detached promiscuity (Briken, Habermann, Berner, & Hill, 2007), and altogether trends toward misogyny. Pornography's sexual script threatens secure attachment (Zitzman & Butler, 2009) and jeopardizes relationship functioning (Dellner, 2009). By these dynamics we conceptually link pornography to loneliness.

Pornography as an Addiction

Addiction related to mental health has been described as a process perpetuated by maladaptive coping strategies (Loton, Borkoles, Lubman, & Polman, 2015; Tonioni et al., 2014). Coping strategies can be defined as cognitive and behavioral efforts to manage stressful demands (Folkman & Lazarus 1986). The manner in which they are carried out have been categorized

broadly in different ways—approach or avoidant, problem focused or emotion focused, as well as adaptive or maladaptive (Choi et al., 2015; Dempsey, Overstreet, & Moely, 2000; Endler & Parker, 1994). Maladaptive coping strategies are efforts intended to manage distress, but they leave the stressor unresolved. As a result, it creates a repetitive cycle, arguably an addictive cycle.

In the context of cyber addiction, Suissa (2015) adapts a psychosocial framework to describe the cycle of addiction related to maladaptive coping strategies. Suissa (2015) posits that the cycle of addiction is created when destructive behaviors are used to the detriment of other sources of interest or help. The cycle of addiction contains five phases which individuals move through recursively. First come feelings of loneliness or distress. In an attempt to manage these negative emotions, the individual decides to engage in the addictive behavior in phase two. Phase three is exemplified by the artificial feeling of well-being that follows, which temporarily fills the emptiness from phase one, but which also fails to address root causes. This leads to further guilt and shame when reality settles in during phase four, which feelings are fundamentally similar to those of phase one. The final phase includes the opportunity to either break or continue the cycle. Using Suissa's cyber addiction model, pornography may play a similar role in addiction as a maladaptive coping strategy to address feelings of loneliness.

Describing the pornography-loneliness cycle with the element of a maladaptive coping strategy can begin when an individual succumbs to viewing it. First, viewing pornography disturbs the psychology of the individual skewing perceptions on sexuality and relationship functioning (Manning, 2006), affecting emotional well-being (Tylka, 2015) and overall relationship satisfaction (Szymanski & Stewart-Richardson, 2014). As a result of their behavior, they are then left feeling lonely (Yoder et al., 2011), embarrassed, or possibly even ashamed of

themselves (Gilliland et al., 2011). In their attempt to manage their loneliness, they have the option to turn to meaningful relationships for healing (Butler & Seedall, 2006) or they turn to pornography which provides an immediate distraction or diversion from the negative experience, immediate “relief,” and temporary escape (Griffiths, 2000) from those feelings of loneliness. To the degree that viewing pornography as a response to loneliness leaves the triggering affect unresolved, or worsens one’s situation, it would be classified as a maladaptive coping strategy, and one which has the potential to initiate a perpetuating, closed-loop cycle of pornography use and loneliness—each recursively triggering and strengthening the other.

Loneliness Related to Pornography and Addiction

Research on loneliness is growing but is focused primarily in relation to the experience of aging (Boehlen, 2015; Peerenboom, Collard, Naarding, & Comijs, 2015), physical health (Barlow, Liu, & Wrosch, 2015), and medical care (Karhe, & Kaunonen, 2015; Kömürçü, Beydag, & Merih, 2015). Under the scope of these findings, loneliness is defined as perceived deficiencies in one’s ongoing relationships in both quantity and quality (Peplau & Perlman, 1979). Such deficiencies occur when a “person’s network of relationships is either smaller or less satisfying than the person desires” (Peplau & Perlman, 1979, p. 101). This is different than solitude, which some may prefer in their working environment to improve work efficacy or stimulate creativity (Stone, 2013). Loneliness on the other hand, is a negative attribute of social functioning that impairs an individual’s ability to communicate effectively with others. As a way to ease their feelings of distress and anxiety, those experiencing loneliness may turn to Internet use attempting to compensate for their lack of social connection (Leung & Liang, 2015), though this certainly does not describe all Internet use.

Some researchers have found links between loneliness and certain addictions, including Internet use (Usta, Korkmaz, & Kurt, 2014), video gaming (Zhou & Leung, 2012), and mobile phone usage (Bian & Leung, 2015). One study found that emerging adults who reported spending more time on social networks also reported higher levels of loneliness, whereas the opposite was true for those who reported being involved in various social groups (Bernardon, 2012). Addictive behaviors resulting in increased perception or experience of social isolation, such as pornography use, can be hypothesized to produce increased loneliness.

Loneliness related to Internet addiction (Usta et al., 2014) may be especially prevalent where there is pornography use. As described previously, seeking to alleviate the experience of loneliness by turning to pornography may propel the individual deeper into loneliness and the indulgent behavior. Therefore, an addiction cycle between pornography use and loneliness could ensue and prove difficult to break (Twohig, Crosby, & Cox, 2009). While one study found significant reports of loneliness among Internet child pornography offenders (Marshall et al., 2012), more generalizable is the finding of Yoder and colleagues (2005) of a significant association between pornography use and loneliness among a nonclinical sample.

Data analysis from a sample size of 400 self-volunteered participants revealed that there was a significant positive association between pornography use and loneliness (Yoder et al., 2005). The researchers advertised the questionnaire in eight different pre-existing Internet pornography websites. The response rate consisted of 114 females and 286 males with 53% of the total sample ranging from 21-30 years of age. The highest reports for loneliness fell within that age category and within the income bracket of less than \$10,000. In addition, Yoder et al. (2005) employed multiple regression analyses to examine their data to see if pornography use predicted loneliness. No study that we are aware of has attempted to see if loneliness also

predicts pornography use or sought to assess that relationship utilizing structural equation modeling. This is significant because items in a scale would be given the proper weight indicated in a factor analysis as opposed to averaging them together in a regression analysis, thus yielding less biased findings (Kline, 2010). In other words, to more accurately determine an association between loneliness and pornography use with greater precision, utilizing structural equation modeling is needed.

Although Yoder and colleagues provided good preliminary insight to the relationship between pornography use and loneliness, research may benefit from analyzing further associations between pornography use and loneliness that lead to future grounding on the idea of an addiction cycle. Examining these associations will add to extant research on pornography addiction and will provide a more comprehensive view of the relationship between pornography use and loneliness.

Current Study

In light of the ongoing research debate of pornography being addictive (Griffiths, 2012; Hilton, 2013) or merely having socially constructed ramifications (Grubbs, Volk, Exline, & Pargament, 2015), addiction to pornography may further be explained using models of loneliness and pornography that relate to each other. Documentation of these associations would confirm earlier research findings (Yoder et al., 2005) and highlight different perspectives of analyzing those associations. The purpose of this study is to further delineate the relationship between pornography use and loneliness and their respective association towards each other. This study will also control for demographic factors including age, gender, education, religious attendance, relationship length, and marital status in the analysis between pornography use and loneliness (for a description on the research design, see Appendix).

We hypothesize that 1) pornography use will significantly positively correlate with loneliness, that 2) higher scores on pornography will be positively related to more loneliness, controlling for all demographic variables in this study, and that, based on the research outlined in the literature review, 3) higher scores on loneliness will be positively related to more pornography use, holding all other control variables constant. Finding results that support these hypotheses would further highlight the associative nature between pornography use and loneliness (Figure 1).

Method

Participants

Respondents in this study participated in an online survey developed by Growth Climate. Originally created in 1981, Growth Climate is a clinical organization that offers resources for individuals, couples, and parents seeking relationship help and recovery from pornography use. It is assumed that participants may be in some stage of recovery from behavioral addiction or compulsion. Participants self-reported their pornography involvement. The online services and the survey were intended to reach individuals from different English speaking countries throughout the world. Respondents were not asked to state where they lived. However, based on purchases of Growth Climate books where the survey is referenced, it seems likely that participants may represent various parts of the United States, Canada, and Australia. This study included a sample of 1,247 participants (ages ranging from 18-70 years old, modal age group 25-29; 90% male; 77% White; 6% Hispanic; 6% Black; 6% Asian; 5% other). The majority of participants (68%) were married. Religious affiliation of participants stood at 64% and included Buddhism/Hinduism, Catholicism, Christian Science, Islam, Judaism, Mormonism, Methodist, Protestant, and Other. Protestants represented the largest percentage (21%) of respondents.

Respondents' education included not having completed high school (3%), high school diploma (19%), associate's degree (8%), currently enrolled or attending college (10%), bachelor's degree (33%), and graduate degree (26%).

Procedure

Participants were recruited through the Growth Climate website and through their self-help books, presentations, other online resources, and professional referrals. Individuals who have questions about their pornography use are invited to login to the Growth Climate website and take the survey. This method of recruitment allows the participants to respond to sensitive questions about pornography use in privacy, at their own pace, and without interviewers present, thus potentially yielding more authentic responses. The purposive nature of the sampling allows the researchers to target what is more likely to be a clinical sample. Interested participants could only begin the questionnaire after consent was obtained and after they created a login username and password. This was the only identifying information required to allow the participant to return in the future to access results. Participants were asked to respond to a 125-item survey that addressed pornography use, depression, loneliness, life satisfaction, and background information. Participants who omitted multiple sections of the survey or who otherwise responded systematically were excluded from the final data set.

IRB approval for the study was received. The principle investigators received the data in de-identified form from Growth Climate under a data transfer agreement compliant with Institutional Review Board (IRB) protocol, and the principal investigators conducted all analyses independent of the soliciting agency (Growth Climate). The soliciting agency (Growth Climate) conducted data collection, surrendered the de-identified data to the principal investigators, and had no further involvement in the study.

Measures

The current study assessed pornography use and loneliness while controlling for age, gender, education, religious attendance, relationship length, and marital status.

Pornography use. Pornography use was assessed using 5 items from the history of involvement subscale of the revised Assessing Pornography Addiction scale (Skinner, 2011). The Assessing Pornography Addiction scale was developed as a 63-item assessment used to determine history of pornography use, beliefs, desensitization, impact on sexual intimacy (for men in a committed relationship), relationships (for men self-identified as single), work ethic, and emotions. This history of involvement subscale consists of 12 items related to how much money was spent on pornography, mediums of viewing pornography, questions about first exposure to viewing pornography, and how often they currently view pornography. Participants responded to these items based on six to eight response choices with higher scores indicating more pornography use. Factor analysis of the history of involvement subscale indicated four possible constructs. The five items selected for the pornography use scale in this study were derived from one of those factors, which clustered around the latent construct of the respondent's reported magnitude of pornography use. Questions included, "In the last year, what is the frequency with which you have viewed pornography?" (ranging from 1 = 1-2 times, to 7 = almost every day, if not daily) "Once you start looking at pornography do you:" (ranging from 1 = view it briefly, but don't look again for months, to 6 = view it as often as I can, every day all day if I could), "How often do you think about or fantasize about viewing pornography?" (ranging from 1 = very rarely to never, to 8 = multiple times a day) "How often do you act upon your fantasies and view pornography or act out?" (ranging from 1 = very rarely to never, to 8 =

multiple times a day), and “What is the longest period of time that you have gone without pornography in the last year?” (ranging from 1 = 8 months to year, to 8 = one or two days).

When modeled as a latent variable with the current data, factor loadings were statistically significant and all above .57. Reliability analysis with the current data indicated that the alpha coefficient was .84.

Loneliness. The University of California Los Angeles Loneliness Scale (UCLALS), Version #3 (Russell, 1996), was used to assess feelings of loneliness. This scale contains 20 items comprised of 10 items worded to indicate presence of or increasing loneliness and 10 items worded to indicate absence of or decreased levels of loneliness direction. Participants responded using a 4-point Likert scale ranging from 1 to 4 (*strongly disagree, disagree, agree, strongly agree, respectively*). Factor analysis of the loneliness scale indicated three possible constructs. The nine items selected for the loneliness scale in this study were derived from one of those factors, which clustered around the latent construct of the respondent’s experience of loneliness representing lack of connection or companionship. Example questions include, “How often do you feel that you lack companionship?” “How often do you feel alone?” and “How often do you feel that people are around you but not with you?” When these 9 items were modeled as a latent variable with the current data, factor loadings were statistically significant and all above .40. A reliability analysis for these items indicated an appropriate alpha level at .93. Higher scores on the UCLALS indicated greater perceived loneliness in a person’s life. The factor loadings for all items corresponding to the loneliness and pornography use scales in this study are summarized in Table 1.

Control variables. As mentioned previously, several control variables are needed to assess the relationship between pornography use and loneliness. Participants reported their age

by selecting an age bracket (under 18, 18-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, over 70). This assessment was used as a continuous variable with higher scores representing older age. In this study, gender was a categorical variable that was dummy coded with male being 1 and females being 2. Education level was assessed using one item with response choices ranging from 1 (*I have not completed high school*) to 6 (*I have a graduate degree*). Higher scores indicate higher levels of education ($M = 4.28$, $SD = 1.56$). Religious attendance was also measured using one item asking the participants to report on the frequency with which they attend religious services. Response choices ranged from 1 (*Every week*) to 5 (*Never*) on a 5-point Likert scale. Items for this scale were reverse coded so that higher scores indicate higher religious attendance ($M = 3.33$, $SD = 1.71$). For those who were married, relationship length ranged from 0-43 years ($M = 12.54$ years, $SD = 11.04$). Since the researchers were interested in whether marital status has an effect on a relation between pornography use and loneliness, relationship status was recoded as married being 1 and all other statuses being 0. Descriptive statistics for all study variables are summarized in Table 2.

Data Analysis

Structural equation modeling in Amos (Version 23) was used to examine associations between pornography use and loneliness. Age, gender, education, religious attendance, relationship length, and marital status were included in the model as control variables. Pornography use and loneliness were modeled as latent variables and the control variables were modeled as observed variables. We first ran a measurement model to assess factor loadings, correlations, and model fit for the study variables. Analyzing the correlation between pornography use and loneliness at this point was used to test our first hypothesis. In order to test our second and third hypotheses, two separate structural equation models were analyzed. In one

model, pornography use predicted loneliness, controlling for all else in the model; in the second model, loneliness predicted pornography use, controlling for the same demographic variables.

Results

Results from the measurement model revealed good fit to the data ($\chi^2 = 273.10$, $df = 142$, $p < .001$; CFI = .99; RMSEA = 0.03). Bivariate correlations between all study variables from the measurement model are presented in Table 3. The measurement model along with the two structural equation models are represented in Figure 2. Correlational analyses of the data from the measurement model support our first hypothesis. Pornography use was significantly positively correlated with loneliness ($r = 0.19$, $p < .001$).

Furthermore, pornography use was negatively related to age ($r = -0.08$, $p < .01$), education ($r = -0.13$, $p < .001$), and religious attendance ($r = -0.36$, $p < .001$) for our sample. Being a male significantly correlated with more pornography use ($r = -0.17$, $p < .001$) and being married significantly correlated with less pornography use. ($r = -0.22$, $p < .001$). Loneliness was significantly negatively associated with education ($r = -0.11$, $p < .001$) and religious attendance ($r = -0.09$, $p < .01$).

Analyses of the data from the two structural equation models revealed that our second and third hypotheses were also supported. When loneliness was the endogenous variable, every one unit increase in pornography use was associated with a .20 increase in loneliness ($p < .001$), controlling for all other demographic factors. When pornography use was the endogenous variable, every one unit increase in loneliness was associated with a .16 increase in pornography use ($p < .01$), holding all other variables constant.

Similar to the bivariate correlation analyses, being male was related to higher pornography use ($\beta = -.21$, $p < .001$), while being married was related to lower pornography use

($\beta = -.11, p < .01$). It is interesting to note the moderate beta for religious attendance on pornography. Every one unit increase in religious attendance was associated with a .31 decrease in pornography use for the sample, $p < .001$. In the model predicting loneliness, higher education was associated with lower loneliness ($\beta = -.11, p < .001$).

Discussion

The purpose of this study was to examine the associative nature between pornography use and loneliness using three similar statistical approaches among a clinical sample of individuals. Results revealed that the association between loneliness and viewing pornography was positive and significant. The support for this claim found in our measurement model emerged from the two structural equation models as well. Those who viewed pornography were more likely to experience loneliness, and those who were experiencing loneliness were more likely to view pornography. These findings are consistent with research linking pornography use to negative affect (Tylka, 2015), especially loneliness (Yoder et al., 2005).

The association between pornography use and loneliness may be explained in a number of different ways. For example, those who watch pornography may experience more loneliness because of the relationship distress that it causes (Willoughby et al., 2015), creating distance between the married couple. As mentioned previously, pornography provides a sexual script that creates a culture of objectifying women (Wright, & Randall, 2014), threatening secure attachment (Zitzman & Butler, 2009), and hindering relationship functioning (Dellner, 2009). Individuals who view pornography regularly may adopt the sexual script that pornography creates and eventually strain any romantic relationships they are in, thus heightening their experience of loneliness.

The pathway from loneliness to pornography use in the second structural equation model indicates a significant association that might be explained through the addiction model also outlined in our earlier conceptualization. Modeling pornography use as an addiction characterizes pornography viewing as a maladaptive coping strategy. If an individual is experiencing loneliness, he or she may turn to pornography for relief, which provides immediate distraction and temporary escape from those feelings of loneliness (Griffiths, 2000). The sexual response cycle that pornography abuses includes two features. First is the preoccupying physical pleasure during the arousal phase, followed second by a comforting, soothing experience during the resolution phase (mediated in the brain's dopaminergic reward structure in part by oxytocin, Fonagy, Gergely, & Target, 2008, p. 794). Along with pornography, both of these aspects of the sexual response cycle allows for the possibility of a combined drug-like experience providing both euphoria and narcosis brain effects, permitting temporary escape into "fantasy" and/or "obliviousness." Fonagy et al. (2008) note that oxytocin—released during the sexual response cycle—can "inhibit the neural systems that underpin the generation of negative affect" (p. 794). This linkage between the brain reward system stimulated by the sexual response cycle and the addiction reward circuit suggests the possibility of becoming addicted to the sexual response cycle, including pornography which is used as the stimulus.

Yet long-term effects of pornography use include loneliness and relational isolation and deterioration. Altogether, these combined dynamics fit the pattern and template of substance use disorders or, in lay terms, "addiction." Pornography use that is only temporarily palliative while failing to address the root causes of loneliness qualifies it as a maladaptive coping strategy (Suisa, 2015), and creates the possibility of a destructive entrapment in a recursive cycle of pornography use and loneliness. Entrapment fits the profile of addictive experience.

Analysis from the control variables related to pornography use and loneliness such as gender, age, education, religious attendance, relationship length, and marital status revealed both confirming and disconfirming results. First, the association in our measurement and second structural equation model that males were more likely to use pornography was significant and confirms existing research (Nelson et al., 2010). It should be noted that 90% of the sample were males. Despite suspect findings on the relationship between gender and pornography use in this study, research still supports this relationship (e.g. that males are more likely to use pornography use).

Another possible reason that male gender was associated with more pornography use may be because of general reporting trends by men and women when discussing personal issues. Wherein males more commonly report externalizing behavior and women disclose more internalizing emotional experiences (Albert, 2015), it seems likely that males' significant reporting of pornography use could have occurred because it is considered more of an externalizing behavior. Additionally, women might self-assess having a problem with pornography use at a much lower level given the perpetuating notion that women do not have issues with pornography (Emmers-Sommer, Hertlein, & Kennedy, 2013). For instance, women who report sexual openness and activity are socially frowned upon more frequently than men are (Emmers-Sommer, 2002). The women in this study could have underreported the extent of their pornography use contributing to the significant connection between males and pornography use.

Next, higher religious attendance and being married were each related to lower pornography use. This was true for our correlational analyses and our structural model. Religion often teaches against using pornography because of perceived negative relationship and spiritual outcomes associated with it (Sumerau & Cragun, 2015). Those who attend church more

frequently may be reminded of those teachings more often and might do their best to adhere to those teachings. Although this usually does not mean that there is complete abstinence from pornography viewing, this finding corroborates with other research suggesting lower pornography use among those reporting higher religious attendance (Rote et al., 2013). As regards the marriage effect on pornography use, multiple dynamics could account for diminished use.

In relation to our variable of interest here, an attachment relationship producing both diminished loneliness and a healthy coping strategy of having a partner to turn to in times of distress could both contribute to reduced resort to or reliance upon pornography use. When a married person is feeling lonely, he or she may seek support from his or her spouse (Rokach, 2012), instead of turning to pornography as a maladaptive coping strategy. It would be interesting to compare various relationship statuses—as possible markers of attachment security—to determine if pornography use co-varies systematically across varying levels of attachment security and relationship stability. Since the relationship between marriage and pornography use in this study was associative, lower pornography use may also be explained by a selection effect during marriage (i.e. those who use pornography less may be more likely to marry). Pornography use as a manifestation of sexual permissiveness has been found to be associated with lower marriage readiness attribution for emerging adult women (Carroll, et al., 2009). In other words, women who are considering marriage may choose a partner who has overcome personal challenges rather than someone who engages in risky sexual behavior like pornography use.

In addition to correlations between demographic variables and pornography use, there were also significant correlations involving loneliness. Although significant demographic

correlations with pornography use were found for education and religious attendance, in the subsequent structural model predicting loneliness, education was the only control variable that yielded a significant finding. Those reported achieving more education were less likely to experience loneliness. This may be explained by the kinds of social resources more education affords. For example, those with higher education have access to greater social support (Documet, 2015), and therefore, may be less likely to experience loneliness (Shankar et al., 2013). While education negatively correlated with pornography use in our bivariate correlational analyses, it was not supported in the structural model. Even though the hypothesized relationship was not supported, other research reveals similar nonsignificant associations between education level and pornography use (Wright, & Randall, 2014). The inconsistency of significant findings with the control variables across pornography use and loneliness may represent true relationships or may reflect limitations with the study.

Limitations and Future Directions

There exist a number of limitations to this study. First, the cross-sectional nature of our data set prevents us from determining the directionality of the relationships in our findings, especially between pornography use and loneliness in our structural models. If we had a longitudinal data set, a non-recursive structural equation model of pornography use and loneliness predicting each other would have been preferred for our statistical analysis. Aside from not having longitudinal data, we did not have a suitable instrumental variable in the data set we could theoretically identify that truly has a direct effect on a given predicting variable and no direct effect on the respective outcome variable (see Kline, 2010, p. 156). Where available, such a variable would permit researchers to statistically discriminate whether pornography use and loneliness predict each other. Utilizing longitudinal data to analyze a non-recursive structural

equation model where pornography and loneliness predict each other across time, will add to research on the addictive nature of pornography and the cyclical relationship it has with loneliness.

Second, self-report surveys do not always yield accurate results. Contrary to the belief that the stigma of pornography use is decreasing (Lofgren-Mårtenson, & Månsson, 2010), it is nevertheless often viewed as a deviance, which may perpetuate the issue of underreporting in this case, even though the questionnaire was conducted online. Nonsignificant findings involving some of our demographic variables may be due to the lack of statistical power coming from this issue, resulting in possible type II errors.

Another limitation that possibly influences self-report accuracy exists in the way some of our measures were created. Many of the items in the Assessing Pornography Addiction scale were worded negatively and included the word “pornography” in some way in items assessing work ethic or effects on spirituality or emotional functioning. Though such wording was not found in the loneliness scale or demographic questions, participants may have been primed throughout the course of the survey to answer more negatively, possibly creating type I errors in our results. This is especially true for one of the items of the pornography use measure where “acting out” was not clearly defined. Future research should focus on using improved survey development aimed for the most accurate and unbiased self-reporting.

Another bias possibility contributing to type I errors limiting generalizability comes from our clinical sample who most likely consider pornography to be a problem in the first place. This process of self-nominating to participate in the study also prevents broader application of our research claims because they come from a sample of participants who may have been seeking relief from loneliness. This study is not able to account for varying thresholds of loneliness

pathology (those who experience loneliness, but who may not consider it a problem) or distress from pornography use because of the self-nominating clinical sample. However, the intentions of this research paper was to address pornography use and loneliness for a clinical population and our findings do provide insights for them.

Important considerations for future research include religious or educational processes as mediators for the relationship between pornography use and loneliness. The idea that religious conviction could minimize the cycle between pornography use and loneliness could add to the clinical research on addiction recovery. Examining education as a similar means to abate pornography addiction through social mechanisms of support could aid in creating programs for awareness and education about the empirically evident risk of pornography use.

Conclusion

The current study provided initial ground highlighting the need to move forward with refined methods, measures, and approaches to modeling the relationship between pornography use and loneliness in a way that more effectively supports bidirectionality. Though the associative nature of pornography use and loneliness was the extent of our research findings, the various statistical models supporting those findings suggest that pornography use and loneliness may be modeled in ways that emphasize the bidirectional role between them in the future. Furthermore, the use of measurement and structural equation modeling in this study builds on other statistical approaches and confirms prior research on pornography use and loneliness (Yoder et al., 2005). Additional research utilizing longitudinal data with a more nonclinical sample can help extend the knowledge base on pornography further supporting its addictive nature.

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Appendix

We employed a nonexperimental research design to test our hypotheses. The data used came from a third-party source where participants responded to items in a survey. No randomization occurred in the sampling process and no variables were manipulated to be controls, both of which are necessary for an experimental design. Use of control variables in our statistical model stem from existing research. For example, age is a known correlate to loneliness (Djukanović, Sorjonen, & Peterson, 2015) and pornography use (Carroll et al., 2008). Gender is also correlated with pornography use (Nelson et al., 2010) and loneliness (Ang, 2015). For education, higher levels have been associated with lower loneliness (Shankar, Hamer, McMunn, & Steptoe, 2013) and lower pornography use (Yoder et al., 2005). Similar trends have been found for religious attendance (Nelson et al., 2010; Rote, Hill, & Ellison, 2013), relationship length (Knoke, Burau, & Roehrl, 2010; Poulsen et al., 2013) and marital status (Ben-Zur, 2012; Doran, & Price, 2014). Further description of our independent and dependent variables are found in the Method section and the way in which we modeled them statistically are outlined specifically under the Data Analysis subsection.

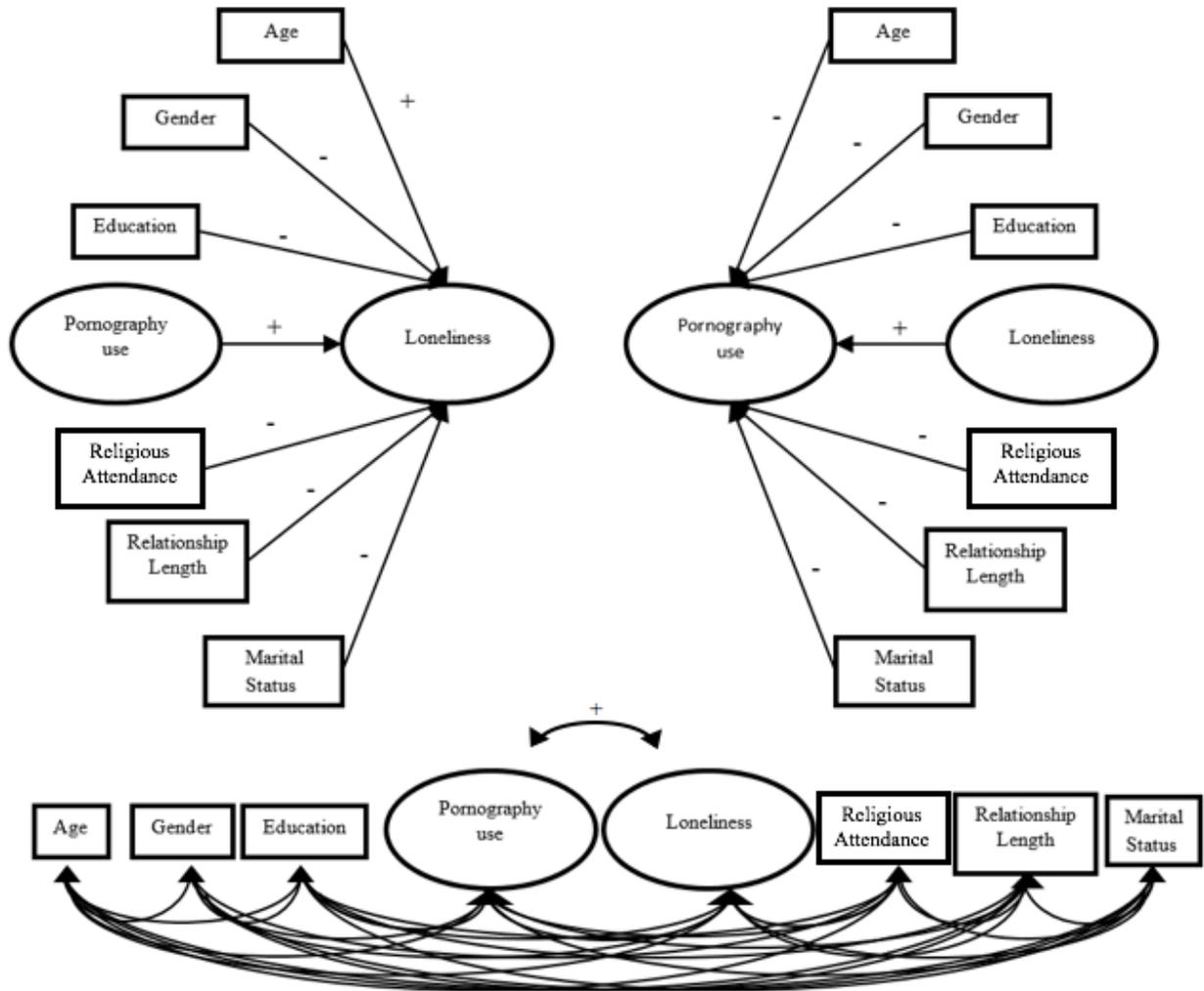


Figure 1. Hypothesized measurement and structural equation models of the relationship between pornography use (assessed by the revised Assessing Pornography Addiction scale) and loneliness (assessed by the UCLALS) controlling for age, gender, education, religious attendance, relationship length, and marital status. These hypothesized models provide different statistical approaches in assessing the associative nature between pornography use and loneliness.

Table 1
Factor Loadings, Means, and Standard Deviations for the Pornography Use and Loneliness Scales

Scale	<i>N</i>	Loadings	<i>M</i>	<i>SD</i>
Pornography Use				
1. In the last year, what is the frequency with which you have viewed pornography?	1238	.85	5.16	1.70
2. Once you start looking at pornography do you:	1236	.74	3.23	1.43
3. How often do you think about or fantasize about viewing pornography?	1242	.72	5.57	1.43
4. How often do you act upon your fantasies and view pornography or act out?	1242	.80	4.65	2.28
5. What is the longest period of time that you have gone without pornography in the last year?	1245	.76	5.16	1.73
Loneliness Items				
1. How often do you feel that you lack companionship?	1246	.71	2.58	0.92
2. How often do you feel alone?	1242	.80	2.60	0.86
3. How often do you feel that you are no longer close to anyone?	1244	.74	2.38	1.00
4. How often do you feel that your interests and ideas are not shared by those around you?	1242	.69	2.55	0.87
5. How often do you feel left out?	1244	.77	2.58	0.85
6. How often do you feel that your relationship with others are not meaningful?	1246	.75	2.46	0.89
7. How often do you feel that no one really knows you well?	1246	.74	2.77	0.95
8. How often do you feel isolated from others?	1240	.81	2.57	0.93
9. How often do you feel that people are around you but not with you?	1241	.75	2.60	0.83

Table 2
Descriptive Statistics for All Study Variables

	<i>N</i>	<i>M</i>	<i>SD</i>	Range
Porn use	1247	4.81	1.12	
Loneliness	1247	2.40	.62	
Age	1247	4.52	2.26	18 - 70 (Mode = Age 25-29)
Gender				
Male	1131			
Female	59			
Education	1247	4.28	1.56	1-6
Did not complete high school	41			
High school diploma	242			
Associate's degree	103			
Currently attending college	127			
Bachelor's degree	411			
Graduate degree	323			
Religious Attendance	1228	3.33	1.72	1-5
Relationship Length	948	12.8	11.04	1-43
Marital Status				
Married	852			
Single	395			

Table 3
Correlations Between All Study Variables

	1	2	3	4	5	6	7	8
1. Porn Use	1.00							
2. Loneliness	0.19***	1.00						
3. Age	-0.08**	0.02	1.00					
4. Gender	-0.17***	0.02	-0.13***	1.00				
5. Education	-0.13***	-0.11***	0.15***	-0.04	1.00			
6. Religious Attendance	-0.36***	-0.09**	0.06.	-0.06*	0.17***	1.00		
7. Relationship Length	0.06.	0.01	0.34***	0.02.	-0.03.	-0.06.	1.00	
8. Marital Status	-0.22***	-0.01	0.34***	-0.12***	0.16***	0.30***	-0.32***	1.00

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

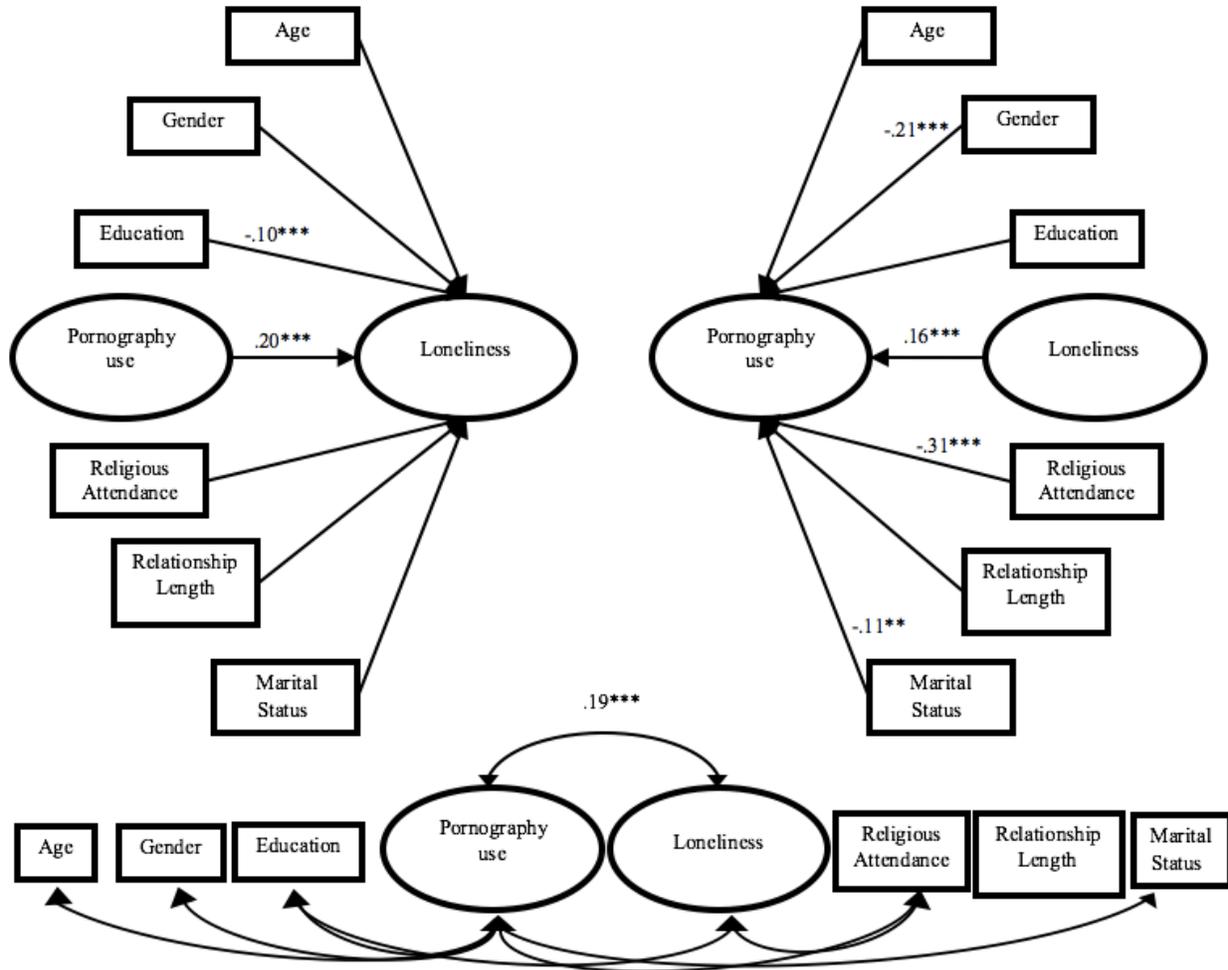


Figure 2. Three statistical models depicting the association between pornography use and loneliness. The measurement model shows significant correlational paths related to pornography use and loneliness with only one r coefficient for the two main variables. All other significant correlations are omitted in the diagram. Standardized coefficients from the two structural equation models of pornography and loneliness predicting each other, respectively, are also depicted ($N = 1247$). Correlations between control variables in the structural equation models are not shown in the diagram; Model fit (for each model): $\chi^2(142) = 273.10, p < .001$; root-mean-square error approximation = .03, confidence interval [.02, .03]; comparative fit index = .99. Beta coefficients for non-significant pathways are omitted. * $p < .05$. ** $p < .01$. *** $p < .001$.