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Pornography, Preference for Porn-Like Sex, Masturbation, and Men's Sexual and

Relationship Satisfaction

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Abstract

Pornography use, preference for "porn-like" sex, masturbation, and sexual and relationship satisfaction were assessed among two samples of men ($N_{\text{study 1}} = 326$, $N_{\text{study 2}} = 335$). Frequent pornography use was associated with sexual dissatisfaction, greater preference for porn-like sex, and more frequent masturbation in both studies. Pornography use was associated with relationship dissatisfaction in Study 2 only. The data did not support the notion that pornography negatively impacts sexual or relationship satisfaction via preference for porn-like sex. In fact, it may bolster sexual satisfaction by promoting sexual variety. The data were consistent with a model in which pornography negatively indirectly affects sexual and relationship satisfaction via masturbation frequency. Pornography use may have multiple opposing influences on sexual satisfaction.

Introduction

Investigating pornography's impact on romantic relationships is a relatively recent development in the pornography research literature. One focus of this nascent line of enquiry has been to determine the nature of the association between pornography use and sexual and relationship satisfaction. While numerous studies (reviewed below) have indicated that frequent pornography use is associated with sexual and relationship dissatisfaction, relatively few studies have investigated possible drivers of these associations. Some authors (e.g., Wright, Tokunaga, Kraus, & Klann, 2017) have suggested that pornography use negatively impacts sexual and relationship satisfaction by distorting consumers' conceptions of what sexual practices are normative and satisfying. It is argued that exposure to the messages contained within pornography creates a preference for the kinds of sexual practices commonly depicted in pornography (i.e., a preference for "porn-like" sex), which leads porn users to feel sexually dissatisfied when their preferences are not met by their sexual partners. Another possibility is that it is not exposure to the messages contained within pornography, but frequent masturbation (which results from frequent pornography use) which undermines consumers' feelings of sexual satisfaction, by negatively impacting sexual performance, arousability, or feelings of sexual interest toward one's partner. This paper has two goals. First, it aims to replicate and extend existing research by assessing the degree of association between pornography use, sexual satisfaction, relationship satisfaction, and preferences for porn-like sex among men (who, as a group, are the more frequent consumers of pornography; Hald, 2006; Petersen & Hyde, 2010). Second, it seeks to investigate two possible drivers of the associations between pornography use and sexual and relationship dissatisfaction: preference for porn-like sex and masturbation frequency.

Numerous correlation studies have been conducted examining the associations between pornography use and relationship and sexual satisfaction. In one such study,

pornography use was predictive of sexual dissatisfaction but not relationship dissatisfaction, among both men and women (Poulsen, Busby, & Galovan, 2013). Daspe, Vaillancourt-Morel, Lussier, Sabourin, and Ferron (2018) similarly found pornography use to correlate with sexual satisfaction but not relationship satisfaction. These authors also found sexual and relationship satisfaction to moderate the relationship between frequency of pornography use and feeling that one's pornography use is out of control, such that this association was stronger among those low in sexual and relationship satisfaction. Another two studies have detected negative relationships between pornography use and relationship and sexual satisfaction among men but not women (Bridges & Morokoff, 2011; Morgan, 2011). Szymanski and Stewart-Richardson (2014) similarly found pornography use to be predictive of poorer relationship quality and sexual dissatisfaction among their sample of young men. In contrast, some authors have found pornography use to have no direct effect on relationship intimacy (Štulhofer, Buško, & Schmidt, 2012), to be predictive of relationship dissatisfaction among men low in emotional intimacy only (Veit, Štulhofer, & Hald, 2017), or to have an indirect effect on sexual dissatisfaction through suppression of intimacy, but only among male consumers of paraphilic pornography (Štulhofer, Buško, & Landripet, 2010).

As can be seen, there are some inconsistencies in the literature in terms of the significance of the associations between pornography use and sexual and relationship satisfaction. Even among the significant results, estimates of the magnitude of these effects tend to vary. Fortunately, Wright, Tokunaga, et al. (2017) recently conducted a meta-analysis of studies assessing pornography's impact on intrapersonal (body image and sexual self-esteem) and interpersonal satisfaction (relationship and sexual satisfaction). This meta-analysis found an average correlation between pornography use and interpersonal satisfaction of –.10. However, this relationship was moderated by gender (–.13 for men and –.01 for women). Among men, the average correlation between pornography use and relationship

satisfaction was –.12 and the average correlation between pornography use and sexual satisfaction was –.14 (among women these figures were –.03 and .00 respectively). While correlations in the range of –.12 to –.14 would be considered "small" in relation to Cohen's (1992) effect size guidelines, other factors (e.g., the commonality of predictors and severity of outcomes) should also be considered when determining the importance of an effect of any particular magnitude (Rosenthal, 1986; Rosnow & Rosenthal, 2003). Indeed, Hald (2015) posits that the small (in magnitude) effect sizes commonly observed across the pornography research literature warrant consideration, as these effects may still have large social and practical repercussions if outcomes are sufficiently adverse. This is especially relevant given the high prevalence of pornography use among men (Hald, 2006).

While Wright, Tokunaga, et al.'s (2017) meta-analysis suggests that pornography use is associated with sexual and relationship satisfaction (at least among men), it tells us little about the causal direction of these associations. Some authors (e.g., Campbell & Kohut, 2017; Kohut, Fisher, & Campbell, 2017) are critical of assuming that pornography use causes sexual or relationship dissatisfaction, arguing that it is equally plausible that relationship or sexual dissatisfaction could cause someone to seek out pornography. Fortunately, some longitudinal studies are available to draw on. A three-wave study of Dutch adolescents, uncovered a reciprocal directional relationship between pornography use and sexual satisfaction (Peter & Valkenburg, 2009). Later, Doornwaard et al. (2014), who also sampled Dutch adolescents, found earlier pornography use to be predictive of later sexual dissatisfaction. Muusses, Kerkhof, and Finkenauer (2015) found that among newlywed couples, husbands' pornography use was bi-directionally related to their relationship satisfaction. However, this study did not detect a relationship between husbands' pornography use and sexual satisfaction in either direction. More recently, a large, nationally-representative sample of married US adults found that men's pornography use was predictive

of self-reported marriage quality at a six-year follow-up (Perry, 2016, 2018). Additionally, there is some experimental evidence to indicate that pornography exposure negatively impacts satisfaction with one's sexual partner's physical appearance, sexual curiosity, and sexual performance (Zillmann & Bryant, 1988). Taken together, these studies provide preliminary evidence of pornography use causing relationship and sexual dissatisfaction.

Wright, Tokunaga, et al.'s (2017) review highlights some assertions common to many of the theoretical explanations for how pornography may negatively impact relationships: 1) pornography creates certain expectations of sexual relationships, shaping what is considered normative and desirable, 2) these expectations are not met by "real-world" sexual partners, 3) this incongruence between what is expected and what actually occurs within sexual relationships leads to sexual dissatisfaction, and 4) this sexual dissatisfaction then negatively impacts relationship satisfaction. This kind of argument is consistent with many of the theoretical frameworks employed within the pornography effects literature (e.g., sexual script theory, gender role conflict theory, social comparison theory, cultivation theory; Wright, Tokunaga et al., 2017).

There is some evidence for the first of these assertions. Certainly, it seems that pornography can shape sexual scripts. For example, pornography use is associated with greater sexual permissiveness (Braithwaite, Coulson, Keddington, & Fincham, 2015; Wright, 2013; Zillmann & Bryant, 1988), a greater incidence of behaviours such as "hooking up" (Braithwaite et al., 2015), and believing women to be more likely to engage in porn-like sex in particular social situations (Miller, McBain, & Raggatt, 2018). Perhaps more directly in support of assertion one, Morgan (2011) found that men's pornography use was positively associated with a preference for the types of sexual practices frequently depicted in pornography, across all three of the domains she measured: hot sex (e.g., trying multiple positions), kinky sex (e.g., the use of sex toys), and sexual appearance (e.g., partner dressing

in lingerie). Furthermore, college men's pornography use has been found to be predictive of requesting pornographic sex acts from sexual partners and conjuring pornographic images during sex to maintain arousal (Sun, Bridges, Johnson, & Ezzell, 2016). Similarly, frequency of pornography use was directly predictive of preferring pornographic, to partnered, sexual excitement among a convenience sample of German men and women (Wright, Sun, Steffen, & Tokunga, 2017).

A large qualitative study of partnered men and women's responses to open-ended questions regarding the impact pornography has on romantic relationships (Kohut, Fisher, & Campbell, 2017), also supports the notion that pornography influences consumers' sexual norms and preferences. While participants in the study most commonly reported that pornography use had had no negative impact on their relationship, a relatively common theme to emerge among respondents (indeed, the most frequently reported negative effect) was that pornography creates unrealistic expectations in the sexual domain, particularly around sexual appearance, performance, likes and dislikes, and the willingness of partners to engage in various sexual behaviors. Furthermore, a number of participants in the study made explicit links between their unrealistic expectations and a decreased interest in sex with their partner.

The fourth assertion (that feelings of sexual dissatisfaction undermine relationship satisfaction) is supported by the large positive correlation between sexual and relationship satisfaction observed across multiple studies (Bridges & Morokoff, 2011; Muusses, Kerkhof, & Finkenauer, 2015; Poulsen, Busby, & Galovan, 2013; Szymanski & Stewart-Richardson, 2014). However, some authors (e.g., Lambert, Negash, Stillman, Olmstead, & Fincham, 2012; Muusses et al., 2015; Perry, 2016; Wright, Tokunaga, et al., 2017) posit that pornography use has a direct effect on relationship satisfaction, irrespective of its influence on sexual satisfaction. Furthermore, one longitudinal study (Byers, 2005) found sexual and

relationship satisfaction to change concurrently, rather than sexual dissatisfaction causing relationship dissatisfaction. Accordingly, pornography's association with both sexual and relationship satisfaction are assessed in the current paper.

To the current authors' best knowledge, no study has formally assessed whether the relationship between pornography use and sexual or relationship satisfaction is mediated by preference for porn-like sex. This being said, Wright, Sun, et al.'s (2017) aforementioned path analysis did assess whether the relationship between pornography use and sexual satisfaction is mediated by preference for pornographic, over partnered, sexual excitement. However, we contend that preference for pornographic, over partnered, sexual excitement is distinct from (albeit related to) preference for porn-like sex. The former refers to preferring to be aroused by pornographic stimuli, as opposed to real-world stimuli (e.g., imaging pornographic images while having sex with one's partner), while the latter relates to interest in engaging in the kinds of sexual practices depicted in pornography with a sexual partner. Wright, Sun, et al.'s (2017) study found support for a model in which pornography use results in perceiving pornography to be a good source of sexual information, which in turn is associated with 1) a greater preference for pornographic, over partnered, sexual excitement, and 2) the devaluation of sexual communication; both of which were related to sexual dissatisfaction in the path model.

While the notion that pornography undermines sexual and relationship satisfaction by altering sexual preferences has received much theoretical consideration, less attention has been paid to the role of masturbation. This is despite the fact that men typically masturbate when consuming pornography (Böhm, Franz, Dekker, & Matthiesen, 2014; Carvalheira, Træen, & Štulhofer, 2015). It is the current authors' contention that pornography consumption may result in male porn users masturbating more frequently than they otherwise would. We believe this frequent masturbation may negatively impact male porn users' sexual

and relationship satisfaction by undermining their sexual performance, arousability, or sexual interest in their romantic partners. Our argument is based on a consideration of the male sexual response cycle, particularly the post-ejaculatory refractory time (PERT) phenomenon.

PERT is the period following ejaculation during which erections and further ejaculation are inhibited (Levin, 2009). Animal research suggests the existence of *absolute PERT*, during which erections and ejaculation are entirely inhibited, and *relative PERT*, during which arousal is suppressed but still possible, especially in response to novel stimuli (e.g., a new partner, or a new virtual partner in the form of pornography). The exact cause of PERT among men is unknown. However, ejaculation has been shown to increase prolactin (Brody & Krüger, 2006), a hormone which reduces sex drive (Krüger, Haake, Hartmann, Schedlowski, & Exton, 2002; Krüger et al., 2003). Post-ejaculatory increases in oxytocin (Levin, 2003, 2009) and serotonin (Levin, 2009; Turley & Rowland, 2013) have also been speculated to play a role in PERT. Frequent masturbation (due to frequent pornography use) could undermine male porn users' sexual performance, arousability, or partnered sexual interest by keeping these porn users in a near-continual state of relative PERT, in which their arousal is suppressed. This process would likely reinforce itself if the porn user is only able to become fully sexually aroused by novel sexual stimuli (such as pornography) due to already being in a state of relative PERT.

There is some extant research to support the idea that frequent masturbation may undermine men's arousal or partnered sexual interest. Daneback, Træen, and Månsson (2009) found solitary pornography use to be predictive of arousal problems in partnered men and Træen and Daneback (2013) found that among their sample of Norwegian men, pornography use for the purposes of solo masturbation was associated with relationship dissatisfaction. In another study, a strong positive relationship was observed between frequency of viewing pornography and frequency of masturbation in a sample of men with decreased sexual desire

(Carvalheira et al., 2015). The same study found masturbation frequency to be associated with greater sexual boredom and less relationship intimacy. A number of themes consistent with this line of thinking also emerged from Kohut et al.'s (2017) qualitative study, including pornography use resulting in decreased arousal response and decreased interest in sex with one's partner (but not decreased interest in pornography). Some participants in the study also connected the use of pornography as an alternative outlet to sex to decreased interest in sex with one's partner. For example, being uninterested (or unable) to have sex with one's partner due to having used pornography to masturbate earlier in the day.

There is also some evidence linking pornography use to sexual functioning issues such as erectile dysfunction (Landripet & Štulhofer, 2015). On the other hand, Prause and Pfaus (2015) found hours per week spent watching pornography to be unrelated to erectile problems in men, and actually predictive of increased desire for sex with one's partner. Furthermore, Internet pornography use was directly associated with less sexual dysfunction in an online sample of men and women (Blais-Lecours, Vaillancourt-Morel, Sabourin, & Godbout, 2016). It is difficult to put these findings into context given the paucity of research in this area—although some authors argue there is enough preliminary evidence for frequent pornography use to be considered a cause of erectile problems among young men (e.g., Park et al., 2016).

The current paper assessed the following hypotheses and research question across two samples of heterosexual[1] men:

- Hypothesis 1: Consistent with past research, pornography use will be positively associated with a preference for porn-like sex.

- Hypothesis 2: Consistent with past research, pornography use will be negatively associated with sexual and relationship satisfaction.

- Research Question 1: Can preference for porn-like sex or masturbation frequency account for the associations between pornography use and sexual and relationship satisfaction?

Study 1

Method

Participants and procedure. Data for this study were taken from a larger online survey into the effects of pornography use.[2] The survey was open to all adult males. Participants were recruited through websites which host psychological studies (e.g., callforparticipants.com, lehmiller.com,[3] facebook.com/psychologyparticipantsresearchers, and socialpsychology.org) and from the student participant pool at the authors' host institution. Student participants (45.7% of final sample) received course credit in exchange for their participation and non-student participants went into a prize draw for a $50 gift voucher.

A total of 470 completed responses were obtained. Eleven cases were deleted due to duplicate data. Nine cases were deleted due to missing data on key variables (e.g., frequency of pornography use). A further three cases were deleted due to outlying data (see Data Screening below), leaving 447 participants. Of these participants, 326 self-identified as heterosexual. The demographic characteristics of the sample are reported on in Table 1.

Measures. *Demographics and background variables*. Several demographic and background variables were assessed, including sexual orientation (heterosexual; gay; bisexual; other), age, highest level of formal education (no university study; some undergraduate study; undergraduate degree; some postgraduate study or postgraduate degree), and relationship status (in a relationship, cohabiting; in a relationship, not cohabiting; not in a relationship). Length of relationship, if applicable, was measured in years

and months. To assess religiosity, participants were asked to respond to the statement "I am religious" on a 9-point scale, where 1 = *extremely inaccurate* and 9 = *extremely accurate*.

Sexual preferences. Participants' sexual preferences were measured using an instrument designed by Morgan (2011). The instrument consists of 15 Likert-type items with response options ranging from 1 = *strongly disagree* to 5 = *strongly agree*. All items refer to the prompt "My ideal partner would…" The instrument breaks into three subscales: hot sex (six items, e.g., "try different positions during sex"), kinky sex (five items, e.g., "enjoy using sex toys or props"), and sexual appearance (four items, e.g., "dress in sexy lingerie/underwear"). Scale items were chosen to reflect acts commonly depicted in pornography, based on the instrument author's review of content analyses of pornography. Thus, higher scores on the subscales represent a greater preference for the kinds of sexual acts commonly depicted in pornography. In the current study, Cronbach's alphas for the hot sex, kinky sex, and sexual appearance subscales were .82, .74, and .68 respectively. The latter alpha falls slightly below the generally accepted cut-off value of .70. This subscale was the shortest of the three (four items), and alphas are generally lower for shorter scales (Widaman, Little, Preacher, & Sawalani, 2011).

Sexual and relationship satisfaction. Sexual satisfaction and relationship satisfaction were measured using the Global Measure of Sexual Satisfaction and the Global Measure of Relationship Satisfaction (Lawrance & Byer, 1998). Participants were asked to rate their sexual relationship and overall relationship across three 7-point bipolar scales: good-bad, satisfying-unsatisfying, and valuable-worthless. Items were summed to give an overall sexual satisfaction score (α = .94) and an overall relationship satisfaction score (α = .92), with higher scores indicating greater satisfaction. Relationship satisfaction items were only presented to those who indicated they were either in a relationship and cohabiting with their partner, or in

a relationship, but not cohabiting ($n = 175$). Sexual satisfaction items were only presented to partnered men who indicated that they were in a sexual relationship ($n = 156$).

Pornography use. In the study pornography was defined for participants as "Any kind of material that aims to create or enhance sexual feelings or thoughts in the audience and, at the same time contains: 1) explicit depictions of genitals, and/or 2) clear and explicit depictions of sexual acts such as vaginal intercourse, anal intercourse, oral sex, masturbation etc." Participants were asked to indicate if they had viewed pornography ever and in the past six months. Participants who had, were then asked about the frequency of their pornography use over the last six months. This was assessed using an 8-point scale (where 1 = *less than monthly*, 2 = *monthly*, 3 = *fortnightly*, 4 = *1–2 times per week*, 5 = *3–4 times per week*, 6 = *5–6 times per week*, 7 = *daily*, and 8 = *more than once a day*). The same response format was used to assess frequency of masturbation using pornography and frequency of masturbation without the use of pornography over the past six months. Participants who indicated that they had not viewed pornography in the previous six months were assigned a value of zero for frequency of pornography use and frequency of masturbation using pornography. Frequency of masturbation using pornography and frequency of masturbation without pornography were summed to produce an overall frequency of masturbation score.

To explore the context of participants' pornography use, participants were also asked whether they view pornography more or less often when in a relationship compared to when single (ranging from 1 = *much less often* to 5 = *much more often*) and whether, and how commonly, they view pornography with a sexual partner (response options ranged from *never* to *91–100 percent of the time I view pornography*).

Data Screening and Analysis

Missing data analysis was performed on pertinent scale items. All scale items (e.g., items on the Global Measure of Sexual Satisfaction) were missing fewer than 2% of

responses. This degree of "missingness" is unlikely to bias data (Graham, 2009). Expectation maximisation was used to obtain estimates for missing scale item values. Some missing responses (7.7%) were observed for frequency of masturbation without the use of pornography. Pairwise deletion was utilised for analyses involving masturbation frequency scores. Mahalanobis distances were generated to screen for multivariate outliers. Three multivariate outliers were identified and deleted (using an α of .001; Tabachnick & Fiddel, 2013).

Results

Pornography use. Over 90% of the total sample reported having seen pornography at some point (96.9%) and in the past six months (90.8%). Among those who had seen pornography in the past six months, median frequency of pornography use over the past six months was 3–4 times per week. Median frequency of masturbation using pornography was also 3–4 times per week. Median frequency of masturbation without pornography was fortnightly.

Almost half (51.9%) of participants reported that when in a relationship they view pornography less often, or much less often, compared to when they are single, 33.7% indicated that their pornography viewing frequency does not change when in a relationship, and 14.4% reported viewing pornography more often, or much more often, when in a relationship. Relationship status groups (in a relationship, cohabiting; in a relationship, not cohabiting; not in a relationship) were also compared on pornography use frequency and masturbation frequency using ANOVA. These groups were not found to significantly differ in terms of frequency of pornography use, $F(2, 323) = 1.55$, $p = .214$, $\eta^2 = .01$. Similarly, relationship status groups did not differ in terms of frequency of masturbation, $F(2, 291) = 0.87$ $p = .419$, $\eta^2 = .01$.

Partnered pornography use was rare. Over half (54.0%) of participants indicated that they had never viewed pornography with a sexual partner. A further 34.0% reported viewing pornography with a sexual partner very rarely (1-10% of the occasions they view pornography). Only 1.3% of participants reported exclusive, or almost exclusive (> 90% of the occasions they view pornography), partnered pornography use.

Hypotheses 1 and 2. Table 2 presents Pearson correlation coefficients between study variables among the heterosexual men sampled (all tests were one-tailed). Consistent with H1, pornography use was significantly positively associated with all three sexual preferences subscales: hot sex, kinky sex, and sexual appearance. The test of H2 was mixed. Pornography use frequency was significantly negatively associated with sexual satisfaction. However, pornography use frequency was orthogonal to relationship satisfaction.

Research Question 1. The zero-order correlations reported in Table 2 were used to probe RQ1. If the previously observed negative associations between pornography use and sexual and relationship satisfaction are the result of an increased preference for porn-like sex, we would expect to observe a negative correlation between sexual preference scores and sexual and relationship satisfaction. However, none of the sexual preferences subscales (hot sex, kinky sex, and sexual appearance) showed a significant negative correlation with sexual or relationship satisfaction.

Similarly, if the negative associations between pornography use and sexual and relationship satisfaction are driven primarily by frequent masturbation, we would expect masturbation frequency to be negatively associated with sexual and relationship satisfaction. We would also expect any significant relationship between pornography use frequency and sexual or relationship satisfaction to diminish once masturbation frequency is controlled for. Masturbation frequency did in fact show a significant negative correlation with sexual satisfaction. Furthermore, the partial correlation between pornography use frequency and

sexual satisfaction, controlling for masturbation frequency, was non-significant, $r(141) = -.10$, $p = .124$, in contrast to the significant zero-order correlation between pornography use frequency and sexual satisfaction, $r(152) = -.18$, $p = .012$. However, masturbation frequency was orthogonal to relationship satisfaction.

Summary

Consistent with past research, a significant negative association was observed between frequency of pornography use and sexual satisfaction. However, contrary to expectations, pornography use was unrelated to relationship satisfaction among the sample.

A major goal of this study was to determine if preference for porn-like sex or masturbation frequency can account for the association between pornography use and sexual and relationship satisfaction. While pornography use frequency was associated with a greater preference for the kinds of sexual practices commonly depicted in pornography, this was unrelated to sexual or relationship satisfaction among the sample. Conversely, masturbation frequency was significantly negatively associated with sexual satisfaction (but orthogonal to relationship satisfaction). Additionally, the relationship between pornography use frequency and sexual satisfaction appeared to diminish once masturbation frequency was controlled for.

One limitation of this study is its use of a convenience sample. Self-selection may have biased the sample to be unrepresentatively sexually liberal. Furthermore, the average age of the sample was relatively young. Both of these factors may impact the effect of pornography on sexual and relationship satisfaction. For example, younger, sexually-liberal men would be more likely to have younger, sexually-liberal partners and younger sexually-liberal partners may be more likely to meet porn-driven sexual preferences (hence the lack of a negative association between pornographic sexual preferences and sexual satisfaction). Another possible limitation of the study is the use of Morgan's (2011) sexual preference scale. Although scale items were selected to reflect sexual practices commonly depicted in

pornography, it could be argued that the instrument taps desire for sexual variety more generally, as opposed to desire for pornographic sex specifically. To account for these limitations, the hypotheses and research question were assessed in a second more representative sample of partnered men, while utilizing a more direct measure of preference for pornographic sex in addition to Morgan's (2011) sexual preferences scale.

Study 2

Measures

Participants and procedure. A commercial survey panel (SurveyGizmo) was utilized to collect a sample of Australian men currently in romantic relationships. Participants received cash incentives for their participation. Time spent on the survey was recorded. Participants who completed the survey too quickly were iteratively disqualified, as were duplicate responses (as indicated by IP address), until 400 responses were obtained. Twenty-two participants were deleted for data quality reasons (see Data Screening and Analysis below). Of the remaining 378 participants, 88.6% self-identified as heterosexual, leaving a final N of 335. The demographic characteristics of the final sample are reported in Table 1.

Measures. *Demographics and background variables*. The same demographic and background variables were measured as in Study 1.

Sexual preferences. As in Study 1, Morgan's (2011) instrument was used to measure participants' preferences for the sexual acts commonly depicted in pornography. Scores on the three subscales—hot sex, kinky sex, and sexual appearance—were all found to have acceptable internal reliability (Cronbach's α = .83, .80, and .72 respectively). Correlations between subscales were positive and large (correlations ranged from .54 to .66, see Table 3). Accordingly, in the analysis of RQ1 subscale scores were summed to produce an overall preference for porn-like sex score, with higher values indicating a greater preference for the sexual practices depicted in pornography (Cronbach's α = .90 for this composite scale). In

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addition, participants' preference for porn-like sex was assessed more directly with the following original item: "I would like the sex I have in real-life to be like the sex in pornography." Response options ranged from 1 = *strongly disagree* to 7 = *strongly agree*.

Sexual and relationship satisfaction. Once again, the Global Measure of Sexual Satisfaction and the Global Measure of Relationship Satisfaction (Lawrance & Byer, 1998) were utilised. Scores on these scales showed good internal reliability (Cronbach's α = .94 and .88 respectively).

Pornography use. The same approach as in Study 1 was taken to assessing frequency of pornography use and masturbation frequency over the past six months.[4]

Data Screening and Analysis

Mahalanobis distance figures were generated to screen for multivariate outliers. Eleven multivariate outliers were detected and deleted (using an α of .001; Tabachnick & Fiddel, 2013). A further 11 participants were deleted for impossible or inconsistent responses (e.g., if reported frequency of masturbation using pornography exceeded reported frequency of pornography use). Missing data was minimal in the second sample (< 1% for all variables). Expectation maximisation was used to obtain estimates for missing sexual preference scale items.

Mediation analysis was used to assess RQ1. This was done via the PROCESS (version 3.0) macro for SPSS (Hayes, 2018). PROCESS estimates indirect effects and then bootstraps confidence intervals around these point estimates. The indirect effect is significant if this confidence interval band does not contain zero. Models with multiple mediators were specified (see below). Severe collinearity between predictors in multiple mediator models can affect sampling variance and impact the width of confidence intervals (Hayes, 2018). Accordingly, VIF values were generated (entering all predictors and control variables) to assess for collinearity. VIF values were small (< 2.5 for all predictors), falling well below the

commonly recommended value of 10, and also the more conservative cut-off value of 5 (Montgomery, Peck, Vining, & Vining, 2012).

Results

Pornography Use. Just over two-thirds (70.7%) of the sample reported having viewed pornography in the last six months. Among those who had viewed pornography in the previous six months, median frequency of pornography use was 1–2 times per week. Around two-thirds (63.0%) of the sample reported having masturbated using pornography in the previous six months. Among those who had, median frequency of masturbation using pornography was 1–2 times per week. Sixty-six percent of participants reported having masturbated without pornography in the previous six months. Among this group, median frequency of masturbation without pornography was monthly.

Hypotheses 1 and 2. Table 3 presents correlations between continuous study variables. As pornography use frequency was severely positively skewed (due to the large number of participants who indicated that they had not accessed pornography in the previous six months) Spearman correlation coefficients are reported in place of Pearson correlation coefficients. All tests were one-tailed.

As can be seen, consistent with H1, frequency of pornography use was significantly positively associated with all three sexual preferences subscales: hot sex, kinky sex, and sexual appearance. Frequency of pornography use also showed a significant positive association with the single item measure of preference for porn-like sex.

In line with H2, the associations between frequency of pornography use and sexual satisfaction and frequency of pornography use and relationship satisfaction were negative and significant.

Research Question 1. RQ1 asks whether preference for porn-like sex or masturbation frequency can account for pornography's association with sexual and relation dissatisfaction.

To assess this, two parallel multiple mediator models were run: the first assessing the relationship between pornography use frequency and sexual satisfaction, and the second assessing the relationship between pornography use frequency and relationship satisfaction. In both models three mediators were specified: masturbation frequency, responses on the single-item pornographic sexual preference index, and responses on the multi-item pornographic sexual preference index (which, as discussed above, was calculated by summing hot sex, kinky sex, and sexual appearance scores). Multiple mediator models are most useful when mediators are correlated, as multiple mediator models quantify the effect of each mediator holding constant the effect of the other mediators (Hayes, 2018).

Past research suggests several possible confounds of the relationships being tested. Relationship length has been found to negatively correlate with sexual satisfaction (Schmiedeberg & Schröder, 2016), and research suggests that religiosity may impact the nature of the association between pornography use and relational outcomes (Perry & Whitehead, 2018). Additionally, age was found to correlate with a number of the model predictors in the preliminary analysis (see Table 3). Accordingly, relationship length, religiosity, and age were entered into the models as control variables.

Due to the severe skew in frequency of pornography use, this variable was trichotomized into three roughly equal groups: a *no consumption* group ($n = 98$) consisting of those who had not viewed pornography in the past six months; a *low consumption* group ($n = 108$) consisting of those who had consumed pornography in the past six months, but did so less than weekly; and a *high consumption* group ($n = 129$) composed of those who consumed pornography at least weekly over the past six months. This trichotomized consumption variable was treated as categorical in PROCESS. Given the ordinal nature of the variable, sequential group coding was utilized (Hayes & Preacher, 2014; Hayes & Montoya, 2017). Under this coding system "relative direct and indirect effects can be interpreted as the effects

of membership in one group relative to the group one step sequentially lower in the ordered system" (Hayes & Preacher, 2014, p. S9). That is, the indirect effect of low pornography use on sexual or relationship satisfaction would be the indirect effect of low pornography use relative to no pornography use. Similarly, the indirect effect of high pornography use on satisfaction would be the indirect effect relative to low pornography use (rather than no pornography use, as would be the case if using indicator group coding). Trichotomizing pornography use frequency and then utilizing sequential coding in this way is compatible with Wright, Bridges, Sun, Ezzell, and Johnson's (2018) argument that the association between pornography use and sexual satisfaction is a curvilinear relationship in which pornography use has little, to no, negative impact on sexual satisfaction until a viewing threshold is reached (around monthly in the study), with additional increases in viewing frequency beyond this threshold resulting in disproportionally larger negative effects. A conceptual diagram of the models tested is presented in Figure 1.

Relative direct and indirect effects for each model are reported in Table 4. In terms of the model predicting sexual satisfaction, the relative indirect effects of pornography use on sexual satisfaction through masturbation frequency were both negative and significant, meaning that, among the sample, greater pornography use was associated with greater masturbation frequency (a_{11}= .95, $p < .001$; a_{21}= 1.84, $p < .001$), which in turn was associated with lower sexual satisfaction ($b_1 = -.49$, $p = .023$). The relative indirect effects of pornography use on sexual satisfaction through the multi-item sexual preferences scale were both significant. However, the direction of these effects was positive. Pornography use was associated with a more pronounced preference for the kinds of sexual acts depicted in pornography (a_{13}= 3.85, $p = .006$; a_{23}= 5.28, $p < .001$), which in turn was associated with *greater* sexual satisfaction ($b_3 = .08$, $p = .003$). The single-item sexual preference measure was not found to mediate the relationship between pornography use and sexual satisfaction.

The omnibus direct effect of pornography use on sexual satisfaction was non-significant, ΔR^2 = .02, $F(2, 311)$ = 2.64, p = .073, whereas the omnibus total effect was significant, ΔR^2 = .04, $F(2, 314)$ = 5.95, p = .003. The model accounted for 9.67% of the variance in sexual satisfaction.

Neither of the sexual preference scales were found to mediate the relationship between pornography use and relationship satisfaction. As in the first model, the relative indirect effects of pornography use on relationship satisfaction through masturbation frequency were both negative and significant. Again, greater pornography use was associated with more frequent masturbation (a_{11}= 1.00, p < .001; a_{12}= 1.82, p < .001), which in turn was predictive of lower relationship satisfaction (b_1 = −.39, p = .005). Both the omnibus direct effect, ΔR^2 = .02, $F(2, 326)$ = 4.17, p = .016, and total effect, ΔR^2 = .05, $F(2, 329)$ = 8.42, p < .001, were significant. The model accounted for 8.98% of the variance in relationship satisfaction.

It is possible that the single-item sexual preference measure was not found to mediate the relationships between pornography use and sexual or relationship satisfaction due to the simultaneous inclusion of the multi-item sexual preference scale in the models. Accordingly, the models were rerun excluding the multi-item sexual preferences measure. However, the single-item sexual preference measure was still not found to be a significant mediator in either model.

Summary

Pornography use was positively correlated with preference for the kinds of sexual practices commonly depicted in pornography (as measured by the three sexual preference subscales) among the sample of heterosexual, Australian men in romantic relationships. Furthermore, pornography use was positively associated with the single-item sexual preference measure ("I would like the sex I have in real-life to be like the sex in

pornography"). As expected, a significant negative correlation was observed between pornography use and sexual satisfaction. Unlike in Study 1, pornography use was also negatively predictive of relationship satisfaction.

The data were not consistent with the idea that pornography use has a negative indirect effect on sexual or relationship satisfaction through its influence on sexual preferences, when controlling for the other model variables. Interestingly, the indirect effect of pornography use on sexual satisfaction through the multi-item sexual preference measure was found to be positive. Conversely, pornography use was found to have a significant indirect effect on both sexual and relationship satisfaction through masturbation frequency, when controlling for the other model variables.

Discussion

This research utilized two samples of heterosexual men to explore the nature of the associations between pornography use, preference for porn-like sex, masturbation, and sexual and relationship satisfaction. Consistent with a recent meta-analysis (Wright, Tokunaga, et al., 2017), pornography use showed a modest negative association with sexual satisfaction in both studies. The findings around relationship satisfaction were mixed. Pornography use was negatively associated with relationship satisfaction in Study 2, but unrelated to relationship satisfaction in Study 1. The reason for this discrepancy is unclear. However, the first sample tended to skew younger, thus an age effect may be at play. This may also explain discrepancies in the frequency of pornography use among the two samples. Indeed, an analysis utilizing nationally-representative survey data from the US suggests that pornography use does diminish with age (Price, Patterson, Regnerus, & Walley, 2016).

Consistent with Morgan's (2011) findings, frequency of pornography use was moderately to highly positively correlated with a preference for the sexual acts commonly depicted in pornography in both studies. Furthermore, greater frequency of pornography use

was predictive of greater agreement with the statement "I would like the sex I have in real-life to be like the sex in pornography." Adopting a sexual script perspective (Wright & Bae, 2016), it could be argued that these findings indicate that pornography influences men's perceptions of what is normal and desirable within a sexual relationship. However, due to the correlational study design, it is not possible to rule out other explanations (e.g., preference for porn-like sex causing pornography use, or this relationship being the result of an unmeasured third variable such as sexual liberalism).

As outlined in the Introduction, it has been argued that pornography use negatively impacts sexual satisfaction by creating unrealistic expectations of sexual relationships (expectations which then go unmet). Both sets of data were inconsistent with the idea that pornography use reduces sexual satisfaction in this way. In Study 1, scores on the three pornographic sexual preference subscales (hot sex, kinky sex, and sexual appearance) were unrelated to sexual and relationship satisfaction. In Study 2, neither measure of preference for porn-like sex were found to negatively mediate the relationships between pornography use frequency and sexual or relationship satisfaction. In fact, pornography use was found to have a significant positive indirect effect on sexual satisfaction through the multi-item sexual preference measure. This unexpected finding raises an important question: Why did the indirect effect of pornography use on sexual satisfaction differ when mediated via the multi-item and single-item measure of preference for porn-like sex when, ostensibly, these instruments both measure desire for pornographic sex? One possible explanation is that the single-item sexual preferences scale ("I would like the sex I have in real-life to be like the sex in pornography") more closely assesses preference for porn-like sex over real-world sex, while high scores on Morgan's (2011) scale do not necessarily indicate a disinterest in real-world sex. Morgan's (2011) scale assesses interest in various sexual activities frequently depicted in pornography. In this way it may tap preference for sexual variety generally, in

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addition to measuring interest in porn-like sex. It is worth noting that while sexual preference subscales scores were all positively correlated with the single-item sexual preference measure, these correlations were not exceeding large, suggesting that the measures may be assessing related, but distinct, constructs. With this distinction between measures in mind, the finding that pornography use had a positive indirect effect on sexual satisfaction through the multi-item sexual preferences scale is more readily understandable. It seems plausible that pornography use could bolster interest in a greater variety of sexual behaviors, and that this may, in turn, increase sexual satisfaction (e.g., if new sexual practices are incorporated into one's sexual relationship in a way that is enjoyable for both partners). In support of this, qualitative research indicates that many porn users believe that pornography has been a valuable source of sexual ideas and has contributed positively to sexual experimentation within their relationships (Kohut et al., 2017).

These issues aside, neither study found evidence for the notion that pornography use undermines sexual satisfaction by promoting a preference for porn-like sex. There are several possible explanations for this. Porn users may desire their real-world sex to be more like the sex depicted in pornography, but not feel any less sexually satisfied if their porn-induced sexual preferences are not met by their partners (perhaps because they recognize that pornography is a fantasy). Alternatively, it may be the case that most porn users' romantic partners are accommodating of porn-induced sexual preferences. As partner acceptance of one's sexual preferences was not measured, this cannot be assessed.

Perhaps unsurprisingly, pornography use frequency was highly positively correlated with masturbation frequency in both samples, suggesting that pornography is commonly used for masturbation—a finding consistent with existing research (Böhm et al., 2014; Carvalheira et al., 2015). A major goal of this research was to understand the degree to which

masturbation may drive the negative associations between pornography use and sexual and relationship satisfaction.

In the Introduction we suggested that access to pornography allows men to masturbate more frequently than they otherwise would, that frequent masturbation may partially suppress arousal toward one's partner (due to post-ejaculatory refractory effects), and that this suppression of arousal may result in sexual or relationship dissatisfaction. This argument would be undermined if it was found that the average porn user consumes pornography primarily when partnered sex is unavailable. However, in Study 1, relationship status groups were not found to differ in terms of pornography use frequency or masturbation frequency. Furthermore, roughly half of participants indicated that when in a relationship they sustain the same level of pornography use or increase their usage of pornography. The results of Study 1 are inconsistent with the idea that men only use pornography when partnered sex is unavailable. Rather, it appears that many men use pornography (and by extension, masturbate) *in addition to* having sex with their partners.

Consistent with the notion that frequent masturbation undermines sexual satisfactions, masturbation frequency was significantly negatively associated with sexual satisfaction in Study 1. Furthermore, the relationship between pornography use frequency and sexual satisfaction diminished once masturbation frequency was controlled for. Study 2 data lend more credence to the notion that masturbation plays an integral role in the relationships between pornography use and sexual and relationship satisfaction. The data were consistent with a model in which pornography use undermines sexual and relationship satisfaction through increased masturbation frequency. However, it should be acknowledged that, due to the cross-sectional study design, direction of causation cannot be determined with certainty. It is also possible that sexual or relationship dissatisfaction causes an increase in solitary masturbation, which then causes men to seek out pornography to facilitate this masturbation.

Alternatively, more frequent masturbation may result in more frequent pornography use, while also independently negatively impacting sexual and relationship satisfaction. Nonetheless, we feel the findings of Studies 1 and 2, when considered alongside extant research connecting masturbation frequency to poorer sexual arousal (see Introduction), provide enough evidence to warrant exploring the relationship between pornography use, frequency of masturbation, and sexual and relationship satisfaction in a longitudinal context.

Four limitations should be considered when parsing the research findings. First, the use of a convenience sample for Study 1 may have introduced self-selection bias in a way that undermined the generalizability of results. A commercial panel service was utilized in the second study to avoid this self-selection problem as much as possible. It should be noted that findings were largely consistent between Studies 1 and 2.

Second, as mentioned above, the use of a cross-sectional research design undermined our ability to be definitive regarding direction of causation. This being said, the hypotheses tested were conceptualised based on a literature which does include longitudinal research designs.

Third, several newly identified moderators and mediators of the relationship between pornography use and relational outcomes were not controlled for in the present research. For example, Wright, Sun et al.'s (2017) recent path analysis underscores the role that perceiving pornography to be a valid source of sexual information plays in the relationship between pornography use and sexual dissatisfaction, and research conducted by Blais-Lecours et al.'s (2016) highlights the importance of pornography-use-related distress to sexual satisfaction. Work by Perry (2018) suggests that one's opinion on the morality of pornography may moderate the relationship between pornography use and relationship quality, and, as mentioned above, it is possible that the degree to which one's sexual partner is

accommodating of one's sexual preferences may act to moderate the indirect effect of pornography use on sexual satisfaction through preference for porn-like sex.

Forth, frequency of pornography use was assessed in a way that did not separate solitary pornography use from use with one's romantic partner. Campbell and Kohut (2017) have called for investigators to pay greater attention to the context of pornography use within relationships. This stems from a growing body of research suggesting that, unlike solitary pornography use, coupled pornography use may not be associated with poorer relational outcomes (Kohut, Balzarini, Fisher, & Campbell, 2018; Maddox, Rhoades, & Markman, 2011; Træen & Daneback, 2013; Willoughby, Carroll, Busby, & Brown, 2016; Yucel & Gassanov, 2010). However, the consistent findings around the sizeable gender gap in the use of pornography (see Hald, 2006; Petersen & Hyde, 2010) would suggest that partnered pornography use is relatively uncommon, at least when compared to men's solitary use. Furthermore, a recent survey of heterosexual couples (Carroll, Busby, Willoughby, & Brown, 2017) found that women commonly reported couple-based pornography use, whereas men were much more likely to report always viewing pornography alone. In line with these findings, in Study 1 partnered pornography use was found to be relatively rare (less than 2% of the sample indicated that they always, or almost always, view pornography with a sexual partner). Nonetheless, future studies may include more detailed measures of pornography use to enable researchers to separate the effects of partnered and solitary use. Furthermore, for the reasons discussed above, future studies may also seek to measure perceptions of pornography as a source of sexual information, pornography-use-related distress, perceptions of the morality of pornography, and partner acceptance of one's sexual preferences.

Despite these limitations, the studies provide researchers and clinicians some evidence as to the mechanisms underpinning pornography's impact on sexual and relationship dissatisfaction. While the data are entirely consistent with the idea that

pornography promotes a desire to engage in the kinds of sexual practices commonly depicted in pornography, this does not appear to result in feelings of sexual or relationship dissatisfaction. In fact, this may have a positive impact on sexual relationships by promoting an interest in a diversity of sexual activities. Conversely, the data suggests that frequent masturbation plays a key role in the associations between pornography use and sexual and relationship dissatisfaction.

References

Blais-Lecours, S., Vaillancourt-Morel, M. P., Sabourin, S., & Godbout, N. (2016).

Cyberpornography: Time use, perceived addiction, sexual functioning, and sexual

satisfaction. *Cyberpsychology, Behavior, and Social Networking, 19*, 649–655.

https://doi.org/10.1089/cyber.2016.0364

Böhm, M., Franz, P., Dekker, A., & Matthiesen, S. (2014). Desire and dilemma: Gender

differences in German students' consumption of pornography. *Porn Studies, 2*, 76-92.

http://dx.doi.org/10.1080/23268743.2014.984923

Braithwaite, S. R., Coulson, G., Keddington, K., & Fincham, F. D. (2015). The influence of

pornography on sexual scripts and hooking up among emerging adults in

college. *Archives of Sexual Behavior*, *44*, 111–123. http://dx.doi.org/10.1007/s10508-

014-0351-x

Bridges, A. J., & Morokoff, P. J. (2011). Sexual media use and relational satisfaction in

heterosexual couples. *Personal Relationships, 18*, 562–585.

http://dx.doi.org/10.1111/j.1475-6811.2010.01328.x

Brody, S., & Krüger, T. H. (2006). The post-orgasmic prolactin increase following

intercourse is greater than following masturbation and suggests greater

satiety. *Biological Psychology*, *71*, 312-315.

http://dx.doi.org/10.1016/j.biopsycho.2005.06.008

Byers, E. S. (2005). Relationship satisfaction and sexual satisfaction: A longitudinal study of

individuals in long-term relationships. *Journal of Sex Research, 42*, 113–118.

http://dx.doi.org/10.1080/00224490509552264

Campbell, L., & Kohut, T. (2017). The use and effects of pornography in romantic

relationships. *Current Opinion in Psychology*, *13*, 6–10.

http://dx.doi.org/10.1016/j.copsyc.2016.03.004

Carroll, J. S., Busby, D. M., Willoughby, B. J. & Brown, C. C. (2017) The porn gap:

Differences in men's and women's pornography patterns in couple relationships.

Journal of Couple & Relationship Therapy, 16, 146–163,

http://dx.doi.org/10.1080/15332691.2016.1238796

Carvalheira, A., Træen, B., & Štulhofer, A. (2015). Masturbation and pornography use

among coupled heterosexual men with decreased sexual desire: How many roles of

masturbation? *Journal of Sex & Marital Therapy, 41*, 626–635.

http://dx.doi.org/10.1080/0092623X.2014.958790

Cohen, J. (1992). A power primer. *Psychological Bulletin*, *112*, 155–159.

http://dx.doi.org/10.1037/0033-2909.112.1.155

Daneback, K., Træen, B., & Månsson, S. A. (2009). Use of pornography in a random sample

of Norwegian heterosexual couples. *Archives of Sexual Behavior, 38*, 746–753.

http://dx.doi.org/10.1007/s10508-008-9314-4

Daspe, M., Vaillancourt-Morel, M., Lussier, Y., Sabourin, S., & Ferron, A. (2018). When

pornography use feels out of control: The moderation effect of relationship and sexual

satisfaction. *Journal of Sex & Marital Therapy, 44*, 343–353.

http://dx.doi.org/10.1080/0092623X.2017.1405301

Doornwaard, S. M., Bickham, D. S., Rich, M., Vanwesenbeeck, I., van den Eijnden, R. J., &

Ter Bogt, T. F. (2014). Sex-related online behaviors and adolescents' body and sexual

self-perceptions. *Pediatrics, 134*, 1103–1110. http://dx.doi.org/10.1542/peds.2014-

0592

Graham, J. W. (2009). Missing data analysis: Making it work in the real world. *Annual

Review of Psychology, 60*, 549–576.

http://dx.doi.org/10.1146/annurev.psych.58.110405.085530

Hald, G. M. (2006). Gender differences in pornography consumption among young

heterosexual Danish adults. *Archives of Sexual Behavior, 35*, 577–585.

http://dx.doi.org/10.1007/s10508-006-9064-0

Hald, G. M. (2015). Comment on: Is pornography use associated with sexual difficulties and

dysfunctions among younger heterosexual men? *The Journal of Sexual Medicine, 12*,

1140–1141. https://doi.org/10.1111/jsm.12877

Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process

analysis: A regression-based approach* (2nd ed.). New York, NY: Guilford.

Hayes, A. F., & Montoya, A. K. (2017). A tutorial on testing, visualizing, and probing an

interaction involving a multicategorical variable in linear regression

analysis. *Communication Methods and Measures*, *11*, 1–30.

https://doi.org/10.1080/19312458.2016.1271116

Hayes, A. F., & Preacher, K. J. (2014). Statistical mediation analysis with a multicategorical

independent variable [Supplemental material]. *British Journal of Mathematical and

Statistical Psychology, 67*, 451–470. https://doi.org/10.1111/bmsp.12028

Kohut, T., Balzarini, R. N., Fisher, W. A., & Campbell, L. (2018). Pornography's

associations with open sexual communication and relationship closeness vary as a

function of dyadic patterns of pornography use within heterosexual relationships.

Journal of Social and Personal Relationships, 35, 655–676.

http://dx.doi.org/10.1177/0265407517743096

Kohut, T., Fisher, W. A., & Campbell, L. (2017). Perceived effects of pornography on the

couple relationship: Initial findings of open-ended, participant-informed, "bottom-up"

research. *Archives of Sexual Behavior*, 46, 585–602.

http://dx.doi.org/10.1007/s10508-016-0783-6

Krüger, T. H., Haake, P., Hartmann, U., Schedlowski, M., & Exton, M. S. (2002). Orgasm-
 induced prolactin secretion: feedback control of sexual drive? *Neuroscience and
 Biobehavioral Reviews*, *26*, 31–44. https://doi.org/10.1016/S0149-7634(01)00036-7

Krüger, T. H., Haake, P., Haverkamp, J., Kramer, M., Exton, M. S., Saller, B., ... &
 Schedlowski, M. (2003). Effects of acute prolactin manipulation on sexual drive and
 function in males. *Journal of Endocrinology, 179*, 357–365. https://doi.org/0022–
 0795/03/0179–357

Lambert, N. M., Negash, S., Stillman, T. F., Olmstead, S. B., & Fincham, F. D. (2012). A
 love that doesn't last: Pornography consumption and weakened commitment to one's
 romantic partner. *Journal of Social and Clinical Psychology*, 31, 410–438.
 http://dx.doi.org/10.1521/jscp.2012.31.4.410

Landripet, I., & Štulhofer, A. (2015). Is pornography use associated with sexual difficulties
 and dysfunctions among younger heterosexual men? *The Journal of Sexual
 Medicine*, *12*, 1136–1139. http://dx.doi.org/10.1111/jsm.12853

Lawrance, K., & Byers, E. S. (1998). Interpersonal Exchange Model of Sexual Satisfaction
 Questionnaire. In C. M. Davis, W. L. Yarber, R. Baureman, G. Schreer, & S. L. Davis
 (Eds.), *Sexuality related measures: A compendium* (2nd ed., pp. 514–519). Thousand
 Oaks, CA: Gage.

Levin, R. J. (2003). Is prolactin the biological 'off switch' for human sexual arousal? *Sexual
 and Relationship Therapy, 18*, 237–243.
 http://dx.doi.org/10.1080/1468199031000099488

Levin, R. J. (2009). Revisiting post-ejaculation refractory time: What we know and what we
 do not know in males and in females. *The Journal of Sexual Medicine,* 6, 2376-2389.
 http://dx.doi.org/10.1111/j.1743-6109.2009.01350.x

Maddox, A. M., Rhoades, G. K., & Markman, H. J. (2011). Viewing sexually-explicit materials alone or together: Associations with relationship quality. *Archives of Sexual Behavior*, 40, 441–448. http://dx.doi.org/10.1007/s10508-009-9585-4

Miller, D. J., Hald, G. M., & Kidd, G. (2018). Self-perceived effects of pornography consumption among heterosexual men. *Psychology of Men & Masculinity, 19,* 469–476. https://doi.org/10.1037/men00 00112

Miller, D. J., McBain, K. A., & Raggatt, P. T. F. (2018). An experimental investigation into pornography's effect on men's perceptions of the likelihood of women engaging in porn-like sex. *Psychology of Popular Media Culture.* Advance online publication. http://dx.doi.org/10.1037/ppm0000202

Montgomery, D. C., Peck, E. A., & Vining, G. G. (2012). *Introduction to linear regression analysis* (5th ed.). Hoboken, NJ: Wiley.

Morgan, E. M. (2011). Associations between young adults' use of sexually explicit materials and their sexual preferences, behaviors, and satisfaction. *Journal of Sex Research*, 48, 520–530. http://dx.doi.org/10.1080/00224499.2010.543960

Muusses, L. D., Kerkhof, P., & Finkenauer, C. (2015). Internet pornography and relationship quality: A longitudinal study of within and between partner effects of adjustment, sexual satisfaction and sexually explicit internet material among newly-weds. *Computers in Human Behavior*, *45*, 77–84. http://dx.doi.org/10.1016/j.chb.2014.11.077

Park, B. Y., Wilson, G., Berger, J., Christman, M., Reina, B., Bishop, F., ... & Doan, A. P. (2016). Is Internet pornography causing sexual dysfunctions? A review with clinical reports. *Behavioral Sciences*, *6*(3), 1–25. http://dx.doi.org/10.1016/10.3390/bs6030017

Perry, S. L. (2016). Does viewing pornography reduce marital quality over time? Evidence

    from longitudinal data. *Archives of Sexual Behavior*, 46, 549–559.

    http://dx.doi.org/10.1007/s10508-016-0770-y

Perry, S. L. (2018). Pornography use and marital quality: Testing the moral incongruence

    hypothesis. *Personal Relationships*, *25*, 233–248. https://doi.org/10.1111/pere.12234

Perry, S. L., & Whitehead, A. L. (2018). Only bad for believers? Religion, pornography use,

    and sexual satisfaction among American men. *The Journal of Sex Research*. Advance

    online publication. http://dx.doi.org/10.1080/00224499.2017.1423017

Peter, J., & Valkenburg, P. M. (2009). Adolescents' exposure to sexually explicit internet

    material and sexual satisfaction: A longitudinal study. *Human Communication*

    Research, 35, 171–194. http://dx.doi.org/10.1111/j.1468-2958.2009.01343.x

Petersen, J. L., & Hyde, J. S. (2010). A meta-analytic review of research on gender

    differences in sexuality, 1993–2007. *Psychological Bulletin, 136*, 21–38.

    http://dx.doi.org/10.1037/a0017504

Poulsen, F. O., Busby, D. M., & Galovan, A. M. (2013). Pornography use: Who uses it and

    how it is associated with couple outcomes. *Journal of Sex Research, 50*, 72–83.

    http://dx.doi.org/10.1080/00224499.2011.648027

Prause, N., & Pfaus, J. (2015). Viewing sexual stimuli associated with greater sexual

    responsiveness, not erectile dysfunction. *Sexual Medicine*, *3*, 90–98.

    http://dx.doi.org/10.1002/sm2.58

Price, J., Patterson, R., Regnerus, M., & Walley, J. (2016). How much more XXX is

    Generation X consuming? Evidence of changing attitudes and behaviors related to

    pornography since 1973. *The Journal of Sex Research, 53*, 12–20.

    https://doi.org/10.1080/00224499.2014.1003773

Rosenthal, R. (1986). Media violence, antisocial behavior, and the social consequences of

      small effects. *Journal of Social Issues*, *42*, 141–154. https://doi.org/10.1111/j.1540-

      4560.1986.tb00247.x

Rosnow, R. L., & Rosenthal, R. (2003). Effect sizes for experimenting psychologists.

      Canadian Journal of Experimental Psychology/Revue Canadienne de Psychologie

      Expérimentale, 57, 221–237. http://dx.doi.org/10.1037/h0087427

Schmiedeberg, C., & Schröder, J. (2016). Does sexual satisfaction change with relationship

      duration? *Archives of Sexual Behavior*, *45*, 99–107. http://dx.doi.org/10.1007/s10508-

      015-0587-0

Štulhofer, A., Buško, V., & Landripet, I. (2010). Pornography, sexual socialization, and

      satisfaction among young men. *Archives of Sexual Behavior*, *39*, 168–178.

      http://dx.doi.org/10.1007/s10508-008-9387-0

Štulhofer, A., Buško, V., & Schmidt, G. (2012). Adolescent exposure to pornography and

      relationship intimacy in young adulthood. *Psychology & Sexuality*, *3*, 95–107.

      http://dx.doi.org/10.1080/19419899.2010.537367

Sun, C., Bridges, A., Johnson, J. A., & Ezzell, M. B. (2016). Pornography and the male

      sexual script: An analysis of consumption and sexual relations. *Archives of Sexual*

      Behavior, *45*, 983–994. http://dx.doi.org/10.1007/s10508-014-0391-2

Sun, C., Miezan, E., Lee, N.-Y., & Shim, J. W. (2014). Korean men's pornography use, their

      interest in extreme pornography, and dyadic sexual relationships. *International*

      Journal of Sexual Health, 27, 16–35.

      http://dx.doi.org/10.1080/19317611.2014.927048

Szymanski, D. M., & Stewart-Richardson, D. N. (2014). Psychological, relational, and sexual

      correlates of pornography use on young adult heterosexual men in romantic

relationships. *The Journal of Men's Studies*, 22, 64–82.

http://dx.doi.org/10.3149/jms.2201.64

Tabachnick, B. G., & Fiddel, L. S. (2013). *Using multivariate statistics* (6th ed.). Boston,

MA: Pearson.

Træen, B., & Daneback, K. (2013). The use of pornography and sexual behaviour among

Norwegian men and women of differing sexual orientation. *Sexologies, 22*, e41–e48.

http://dx.doi.org/10.1016/j.sexol.2012.03.002

Turley, K. R., & Rowland, D. L. (2013). Evolving ideas about the male refractory period.

BJU International, 112, 442–452. https://doi.org/10.1111/bju.12011

Veit, M., Štulhofer, A., & Hald, G. M. (2017). Sexually explicit media use and relationship

satisfaction: A moderating role of emotional intimacy? *Sexual and Relationship*

Therapy, 32, 58–74. http://dx.doi.org/10.1080/14681994.2016.1193134

Widaman, K. F., Little, T. D., Preacher, K. J., & Sawalani, G. M. (2011). On creating and

using short form scales in secondary research. In K. H. Trzesniewski, M. Donnellan,

& R. E. Lucas, R. (Eds.), *Secondary data analysis: An introduction for psychologists*

(pp. 39–61). Washington, DC: American Psychological Association.

http://dx.doi.org/10.1037/12350-003

Willoughby, B. J., Carroll, J. S., Busby, D. M., & Brown, C. C. (2016). Differences in

pornography use among couples: Associations with satisfaction, stability, and

relationship processes. *Archives of Sexual Behavior*, *45*, 145–158.

http://dx.doi.org/10.1007/s10508-015-0562-9

Wright, P. J. (2013). A three-wave longitudinal analysis of preexisting beliefs, exposure to

pornography, and attitude change. *Communication Reports*, *26*, 13–25.

https://doi.org/10.1080/08934215.2013.773053

Wright, P. J., & Bae, S. (2016). Pornography and male socialization. In Y. J. Wong & S. R. Wester (Eds.), *APA handbook of men and masculinities* (pp. 551-568). Washington, DC: American Psychological Association. http://dx.doi.org/10.1037/14594-025

Wright, P. J., Bridges, A. J., Sun, C., Ezzell, M. B., & Johnson, J. A. (2018). Personal pornography viewing and sexual satisfaction: A quadratic analysis. *Journal of Sex & Marital Therapy, 44*, 308–315. https://doi.org/10.1080/0092623X.2017.1377131

Wright, P. J., Sun, C., Steffen, N. J., & Tokunaga, R. S. (2017). Associative pathways between pornography consumption and reduced sexual satisfaction. *Sexual and Relationship Therapy*. Advance online publication. http://dx.doi.org/10.1080/14681994.2017.1323076

Wright, P. J., Tokunaga, R. S., Kraus, A., & Klann, E. (2017). Pornography consumption and satisfaction: A meta-analysis. *Human Communication Research, 43*, 315–343. http://dx.doi.org/10.1111/hcre.12108

Yucel, D., & Gassanov, M. A. (2010). Exploring actor and partner correlates of sexual satisfaction among married couples. *Social Science Research*, *39*, 725–738. http://dx.doi.org/10.1016/j.ssresearch.2009.09.002

Zillmann, D., & Bryant, J. (1988). Pornography's impact on sexual satisfaction. *Journal of Applied Social Psychology*, *18*, 438–453. https://doi.org/10.1111/j.1559-1816.1988.tb00027.x

Footnotes

[1] The majority of previous studies in this area focus on heterosexual individuals or heterosexual relational dyads. It may be the case that pornography use differently impacts the romantic relationships of gay and lesbian people. As this paper wishes to investigate the nature of the previously observed associations between pornography use and sexual and relationship satisfaction, we have chosen to focus exclusively on self-identified heterosexual men. Readers who are interested in findings regarding the gay and bisexual men sampled are welcome to contact the first author.

[2] A discussion of the sample's self-perceptions around the effects of their pornography use can be found in Miller, Hald, and Kidd (2018).

[3] 45 participants indicated that they accessed the study via lehmiller.com, a blog dedicated to communicating sex research to the general public.

[4] In Study 1 participants were not given an option to indicate that they had not masturbated without pornography in the previous six months (the lowest response option was *less than monthly*). This was corrected in the second study. Accordingly, masturbation frequency scores cannot be directly compared across studies.

Table 1

Demographic Characteristics of Samples

Variable	Study 1 M (SD)	Study 2 M (SD)
Age	27.63 (11.16)	46.76 (14.48)
Religiosity	3.29 (2.46)	3.90 (2.62)
Relationship length (in years)[a]	6.88 (9.00)	17.08 (14.23)
	n (%)	n (%)
Highest level of formal education		
No university study	78 (23.9)	180 (53.7)
Some undergraduate study	102 (31.3)	19 (5.7)
Undergraduate degree	84 (25.8)	71 (21.2)
Some postgraduate study/degree	61 (18.7)	65 (19.4)
Missing	1 (0.3)	-
Country		
Australia/New Zealand	137 (42.0)	335 (100)
Asia	65 (19.9)	-
Europe	23 (7.1)	-
USA	86 (26.4)	-
North America, other	13 (4.00	-
Other	2 (0.6)	-
Relationship status		
In relationship, cohabiting	102 (31.3)	299 (89.3)
In relationship, not cohabiting	73 (22.4)	36 (10.7)
Not in relationship	151 (46.3)	-
Is this a sexual relationship?[a]		
Yes	156 (89.1)	320 (95.5)
No	19 (10.9)	15 (4.5)

Note. $N_{Study\ 1} = 326$, $N_{Study\ 2} = 335$
[a]Limited to partnered men

Table 2

Correlations, Means, and Standard Deviations for Study 1 Variables

Variable	1	2	3	4	5	6	7	M (SD)
1. Porn use frequency	–	.64***	.36***	.36***	.24**	−.18*	−.07	4.47 (2.25)
2. Masturbation frequency		–	.20***	.21***	.05	−.17*	−.05	7.64 (2.92)
3. Hot sex			–	.57***	.68***	−.04	.03	23.97 (3.74)
4. Kinky sex				–	.60***	−.03	.02	15.82 (3.96)
5. Sexual appearance					–	−.02	.01	14.37 (2.88)
6. Sexual satisfaction						–	.59***	17.84 (3.53)
7. Relationship satisfaction							–	18.27 (3.54)

Note. df = 142–324; all tests one-tailed

*p < .05; **p < .01; ***p < .001

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Table 3

Correlations, Means, and Standard Deviations for Study 2 Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	*M (SD)*
1. Porn use freq.	–	.81***	.35***	.51***	.45***	.42***	−.10*	−.19***	−.33***	.04	−.39***	2.52 (2.22)
2. Masturbation freq.		–	.36***	.51***	.45***	.34***	−.15**	−.22***	−.29***	−.05	−.39***	1.93 (1.71)
3. Hot sex			–	.54***	.66***	.37***	.19***	.05	−.24***	−.02	−.26***	21.98 (4.60)
4. Kinky sex				–	.66***	.49***	−.01	−.13**	−.26***	.01	−.30***	13.93 (4.52)
5. Sex appearance					–	.40***	.11*	−.08	−.33***	−.01	−.39***	13.56 (3.33)
6. Single-item, preference for porn-sex						–	.01	−.14**	−.14**	.14**	−.16**	3.85 (1.70)
7. Sex satisfaction							–	.61***	−.19***	.09	−.11*	16.17 (4.36)
8. Relationship satisfaction								–	.08	−.07	.09	18.36 (2.84)
9. Relationship length									–	−.09	.69***	17.08 (14.22)
10. Religiosity										–	−.06	3.90 (2.62)
11. Age											–	46.76 (14.48)

Note. df = 317–333; all tests one-tailed; Spearman correlations used in place of Pearson correlations due to non-normal distribution of pornography use frequency
*p < .05; **p < .01; ***p < .001

Table 4

Relative Total, Direct and Indirect Effects (and their 95% Confidence Intervals) for Multiple Mediator Models assessing the Effect of Pornography Use Frequency on Sexual Satisfaction (Model 1) and Relationship Satisfaction (Model 2), Controlling for Age, Relationship Length and Religiosity

Model	Total effect	Direct effect	Indirect effect: masturbation frequency	Indirect effect: single-item sexual preference	Indirect effect: multi-item sexual preference
Model 1: porn use → sexual satisfaction					
Low relative to no use	**−1.87 [−3.13, −0.61]**	**−1.55 [−2.89, −0.22]**	**−0.47 [−0.92, −0.07]**	−0.17 [−0.57, 0.17]	**0.32 [0.06, 0.72]**
High relative to low use	−0.15 [−1.28, 0.97]	0.40 [−0.95, 1.57]	**−0.91 [−1.72, −0.14]**	−0.09 [−0.34, 0.09]	**0.44 [0.11, 0.88]**
Model 2: porn use → relationship satisfaction					
Low relative to no use	**−1.51 [−2.31, −0.72]**	**−1.12 [−1.96, −0.27]**	**−0.39 [−0.74, −0.08]**	−0.17 [−0.41, 0.04]	0.16 [−0.01, 0.36]
High relative to low use	0.08 [−0.64, 0.80]	0.72 [−0.14, 1.68]	**−0.71 [−1.33, −0.15]**	−0.10 [−0.28, 0.02]	0.17 [−0.01, 0.41]

Note. $N_{\text{model 1}} = 320$, $N_{\text{model 2}} = 335$; 95% confidence intervals based on 5000 resamples; significant effects in bold
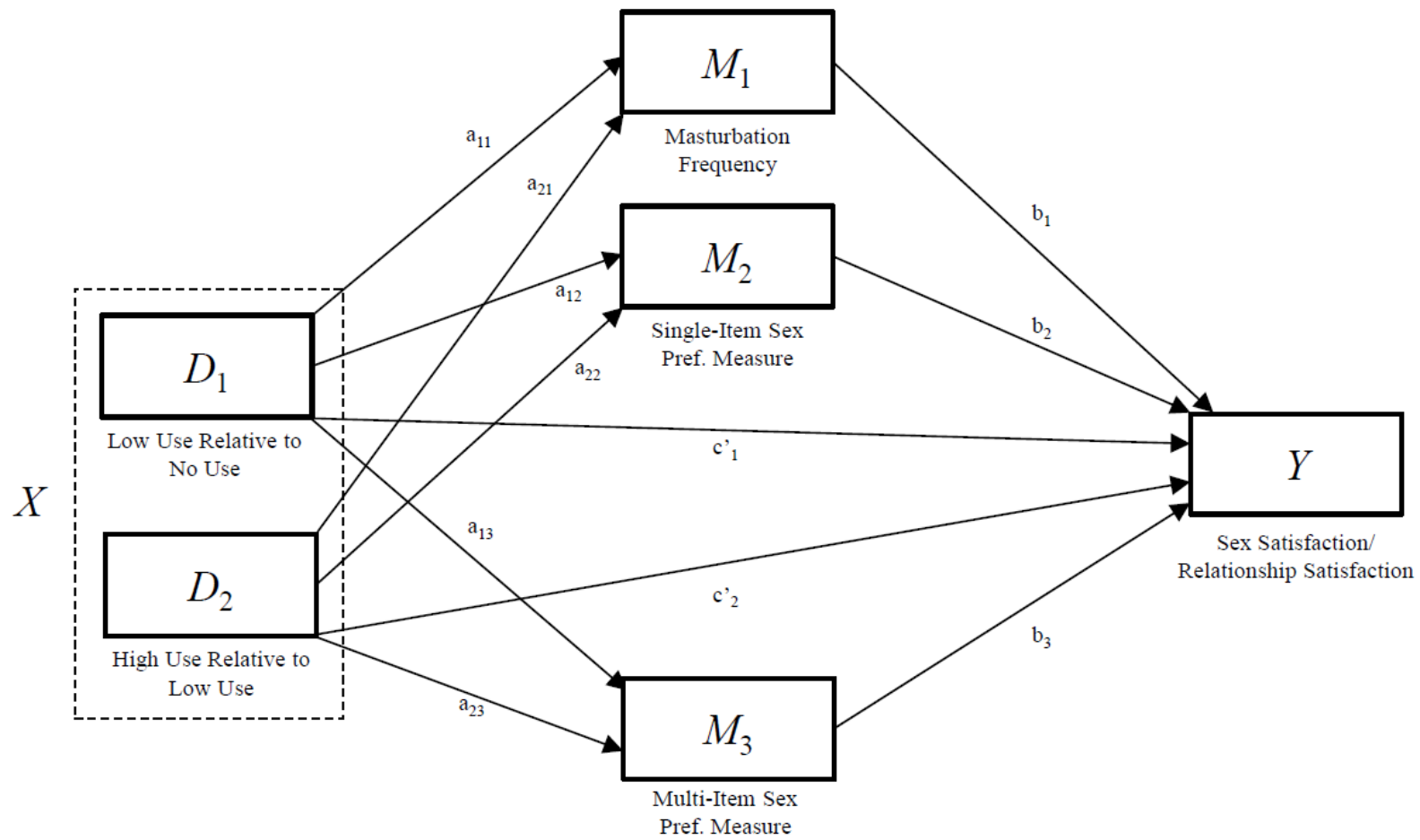
Figure 1. Conceptual diagram for models assessing the effect of pornography use on sexual satisfaction (model 1) and relationship satisfaction (model 2) through the three mediators. The models controlled for age, relationship length, and religiosity (these variables have been omitted from diagram to save space).