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Pornography Consumption and Satisfaction: A Meta-Analysis

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A classic question in the communication literature is whether pornography consumption affects consumers' satisfaction. The present paper represents the first attempt to address this question via meta-analysis. Fifty studies collectively including more than 50,000 participants from 10 countries were located across the interpersonal domains of sexual and relational satisfaction and the intrapersonal domains of body and self satisfaction. Pornography consumption was not related to the intrapersonal satisfaction outcomes that were studied. However, pornography consumption was associated with lower interpersonal satisfaction outcomes in cross-sectional surveys, longitudinal surveys, and experiments. Associations between pornography consumption and reduced interpersonal satisfaction outcomes were not moderated by their year of release or their publication status. But analyses by sex indicated significant results for men only.

Keywords: Pornography, Sexually Explicit Media, Satisfaction, Meta-Analysis.

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Does consuming pornography have any discernable impact on consumers' satisfaction? And if so, is this impact negative or positive? These questions have stimulated a large number of studies, but uncertainty about their answers remains among communication scholars.

In early papers, authors primarily hypothesized that pornography had detrimental effects on satisfaction (e.g., Kenrick, Gutierrez, & Goldberg, 1989; Weaver, Masland, & Zillmann, 1984; Zillmann & Bryant, 1988). This hypothesis was based on two assumptions. First, that satisfaction is a subjective state influenced by comparisons to others and their experiences. Second, that pornographic actors are more sexually attractive and skilled than most consumers and their partners and that the gratifications from sex depicted in pornography exceed the gratifications that most consumers experience in their own lives. In more recent papers, however, it has become common for authors to reason that pornography may enhance the satisfaction of consumers

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(e.g., Kvalem, Traeen, & Iantaffi, 2015; Morrison, Bearden, Harriman, Morrison, & Ellis, 2004; Traeen et al., 2014). One reason for this shift in thinking has been that consumers report primarily positive effects when asked directly about how pornography has affected them.

For example, in a series of studies, Hald and colleagues (Hald & Malamuth, 2008; Hald, Smolenski, & Rosser, 2013; Mulya & Hald, 2014) found that when queried about how pornography has impacted them, consumers report that their use has increased their satisfaction with their sexual knowledge, outlook, efficacy, skill, relations, experiences, and even their life in general. People who consume pornography more frequently and for longer durations are especially likely to perceive such positive impacts (Hald & Malamuth, 2008; Mulya & Hald, 2014). One interpretive option for such results is to take them at face value and conclude that pornography has predominantly positive effects on consumers and more regular and intense consumption only enhance these positive effects. However, the authors of these studies caution that these self-perceived effects may also be due to rationalization, justification, and biased optimism. It is common for people to rationalize and justify, and to perceive themselves as personally less susceptible to, any negative impacts of behaviors that provide them with immediate and powerful rewards (Chapin, 2001; Dillard, McCaul, & Klein, 2006; Jamieson, Mushquash, & Mazmanian, 2003; Pickard, 2016). It is also common for people to believe that they are personally unaffected by any pernicious effects that others may experience from using media with antisocial elements (Perloff, 2009; Sun, Pan, & Shen, 2008). Such perceptions may reflect a self-enhancement bias, a desire to reduce cognitive dissonance, or a psychological reactance against the insinuation that they should stop consuming the media in question (Bushman & Huesmann, 2014; Taylor & Huesmann, 2014).

Because of the validity threat posed by asking pornography consumers directly how pornography has affected them, most scholars have preferred to investigate the nature and extent of pornography's influence on satisfaction through pornography exposure experiments or surveys correlating separate measures of pornography use and satisfaction. The present paper provides a meta-analytic review of this literature. Specifically, the present paper reports results of meta-analyses on experimental and correlational survey studies of pornography consumption and relational, sexual, self, and body satisfaction.

Terminology and organizational framework

A survey of the literature on pornography and satisfaction indicates that researchers have been interested in two basic questions: "Does pornography affect consumers' satisfaction with their interactions with others?" and "Does pornography affect consumers' satisfaction with themselves?" In other words, research on pornography and satisfaction has been interested in consumers' satisfaction with their relations with others (abbreviated as *interpersonal* satisfaction in the present manuscript) and satisfaction with themselves (abbreviated as *intrapersonal* satisfaction in the present manuscript).

This dual interest was previewed by probably the best-known study in this area, Zillmann and Bryant's (1988) experiment on the effects of prolonged exposure to pornography on sexual satisfaction. The central findings of the study involved the first question of whether pornography impacts consumers' satisfaction with their interactions with others. This is reflected in their summary of key results, which states that "after consumption of pornography, subjects reported less satisfaction with their intimate partners — specifically with these partners' affection, physical appearance, sexual curiosity, and sexual performance proper" (p. 438). But the paper also foreshadowed the second question of whether pornography impacts satisfaction with oneself, which was explored in later studies. In their concluding discussion, Zillmann and Bryant wondered whether "consumers grant themselves sexual adequacy, even superior status in the sexual realm" or "are intimidated by the looks and actions of their gender peers in pornography and come to perceive themselves ... as deficient and inadequate" (p. 451).

Relational and sexual satisfaction are the interpersonal satisfaction variables most frequently investigated in pornography studies (Muusses, Kerkhof, & Finkenauer, 2015; Szymanski & Stewart-Richardson, 2014). Relational satisfaction is defined as participants' contentedness with their romantic relationships (e.g., Willoughby, Carroll, Busby, & Brown, 2016). Sexual satisfaction is defined as participants' contentedness with their sexual lives (e.g., Morgan, 2011). On the other hand, the most frequently investigated intrapersonal satisfaction variables in pornography studies are body and self satisfaction (Kvalem et al., 2015; Morrison et al., 2004). Self satisfaction is defined as participants' positive regard for themselves overall (self-esteem, e.g., Rasmussen, Ortiz, & White, 2015) or for their sexual self specifically (sexual self-esteem, e.g., Morrison et al., 2004). Body satisfaction is defined as participants' contentedness with their overall body or with specific body parts (e.g., Burnham, 2013; Peter & Valkenburg, 2014). The terms "relationship," "sexual," "body," and "self" in reference to satisfaction were often used in the studies meta-analyzed (e.g., Hill, 2011; Kvalem et al., 2015; Maddox, Rhoades, & Markman, 2011; Minarcik, 2010). However, the abbreviating title or phrase chosen for a variable by the authors of a study was not the deciding factor in whether or not results associated with it were included. Rather, the contents of its measurement items and their correspondence with the paper's conceptual definitions were the deciding factors.

Finally, following the recent meta-analyses of Hald, Malamuth, and Yuen (2010) and Wright, Tokunaga, and Kraus (2016), pornography was defined as media intended to sexually arouse consumers through the depiction of nudity or explicit sexual behavior. This definition aligns with both early and more recent studies of pornography and satisfaction (see Maddox et al., 2011; Muusses et al., 2015; Zillmann & Bryant, 1988).

Pornography and interpersonal satisfaction

A number of theoretical frameworks have been used to craft hypotheses about pornography and interpersonal satisfaction outcomes, most commonly predicting adverse effects. Social comparison theory posits that feelings of satisfaction

are, in part, determined by comparisons between one's own and others' situations (Festinger, 1954; Suls, Martin, & Wheeler, 2002). Upward comparisons (i.e., comparisons to superior situations) can result in decreased satisfaction. Scholars have variously asserted that pornography consumers will, in comparison to pornographic depictions, find the physical appearance, performance, enthusiasm, availability, responsiveness, and adventurousness of their actual or potential sex partners lacking (Doran & Price, 2014; Kenrick et al., 1989; Lambert, Negash, Stillman, Olmstead, & Fincham, 2012; Muusses et al., 2015; Peter & Valkenburg, 2009; Poulsen, Busby, & Galovan, 2013; Zillmann & Bryant, 1988; see also Brosius, Weaver, & Staab, 1993; Jensen & Dines, 1998).

Some studies have incorporated similar arguments from a sexual scripts perspective (Poulsen et al., 2013; Rowell, 2011). Sexual scripts are socially constructed guidelines for sexual encounters, can be influenced by pornography, and address the questions of who one should have sex with, how the sex should unfold, and what the consequences of the sex should be (Gagnon & Simon, 2005; Wright & Donnerstein, 2014). The basic position has been that reduced sexual satisfaction is likely if pornography consumers contrast the sexual attractiveness of their partners with actors in pornography, evaluate how their sexual encounters unfold against the positively planned and framed encounters depicted in pornography, and juxtapose their own and their partners' levels of bliss and elation postsex with the rapture and delight exhibited by pornographic performers (Stulhofer, Busko, & Landripet, 2010; Willoughby et al., 2016). The majority of this research has used the scripting concept heuristically, as opposed to testing particular tenets of theoretical models designed specifically to explain the effects of sexual media, such as the sexual script acquisition, activation, application model ($\text{}_3\text{AM}$; Wright, 2011, 2014; Wright & Bae, 2016; Wright, Malamuth, & Donnerstein, 2012).

Because sexual satisfaction is strongly predictive of relational satisfaction, any effect of pornography on the former likely impacts the latter (Bridges & Morokoff, 2011). But some authors have suggested that there may also be direct effects of pornography on relational satisfaction (Doran & Price, 2014; Poulsen et al., 2013). The investment model of commitment (Rusbult, 1983) can be used to theorize that people who are relationally satisfied are also more committed to their partner and more invested in their relationship (Etcheverry, Le, Wu, & Wei, 2013). Environmental factors that reduce relational investment and relational commitment may, therefore, reduce relational satisfaction. If pornography displaces partnered sex (reducing investment) and primes the possibility of a better relationship or encourages the pursuit of extrarelational encounters (reducing commitment), it may lower relational satisfaction (Doran & Price, 2014; Lambert et al., 2012; Muusses et al., 2015; Poulsen et al., 2013). Gender role conflict theory (O'Neil, Helms, Gable, David, & Wrightsman, 1986) was also referenced to predict a negative effect (Szymanski & Stewart-Richardson, 2014). Gender role conflict occurs when the rigid internalization of gender roles results in interpersonal dispute. Popular pornography often displays hypermasculine men and hyperfeminine women (Bridges, Wosnitzer, Scharrer, Sun,

& Liberman, 2010; Klaassen & Peter, 2015). Conflict and relational disappointment may result if romantic partners fail to meet pornography consumers' expectations for hypergendered behavior (Doran & Price, 2014).

Hypotheses predicting that more pornography consumption will be associated with less interpersonal satisfaction are at odds with the perceptions of pornography consumers, however. Pornography consumers are significantly more likely to perceive positive than negative effects on their sex life, for example, and disagree with the notion that pornography has adversely impacted their relationships (Hald & Malamuth, 2008; Mulya & Hald, 2014). Consistent with this, the findings of an early experiment suggested that exposing people to sexually explicit content could increase their positive feelings toward their partner (Dermer & Pyszczynski, 1978). The first research question of the present meta-analysis asks:

RQ1: Is pornography consumption associated with relational and sexual satisfaction?

Pornography and intrapersonal satisfaction

Similar to studies of interpersonal satisfaction outcomes, studies of intrapersonal satisfaction outcomes have typically referenced social comparison theory and/or sexual script theory to predict reduced satisfaction effects due to upward comparisons by consumers to idealized actors and sexual encounters in pornography. Arguments about detrimental effects on body satisfaction have been based on the position that men in pornography have large, "preternaturally erect" penises (Morrison et al., 2004, p. 145), flat stomachs, and muscular physiques while women are slender and beautiful, with perky breasts, smooth vulvas, and petite labia (Bramwell, 2002; Duggan & McCreary, 2004; Morrison, Ellis, Morrison, Bearden, & Harriman, 2006; Peter & Valkenburg, 2014; Schick, Rima, & Calabrese, 2011; Vandenbosch & Eggermont, 2013). Detrimental effects on self satisfaction have been rooted in the stance that performers in pornography have enviable stamina, virility and technique, the capacity to delay orgasm interminably or climax on call, the ability to attract numerous attractive partners, and the attributes of traditional masculinity (e.g., status, dominance) and femininity (e.g., desired by others, youthful; Doornwaard et al., 2014; Frable, Johnson, & Kellman, 1997; Kvaalem et al., 2015; Morrison et al., 2004; Morrison et al., 2006; Tylka, 2014; Vandenbosch & Eggermont, 2013).

On the other hand, there are several reasons to believe that pornography either has no impact or even a positive impact on consumers' intrapersonal satisfaction. First, as indicated previously, after finding in their experiment that pornography exposure reduced participants' satisfaction with partners across a variety of domains, Zillmann and Bryant (1988) speculated that consumers' upward comparisons may center on their partners, not on themselves. Second, Traeen et al. (2014) and Kvaalem et al. (2015) reasoned that consumers could just as readily learn from, model, and focus on the similarities between themselves and actors in pornography, thereby increasing positive self perceptions, as make ego-threatening upward comparisons. Third, and consistent with the positions of Traeen et al. and Kvaalem et al., when asked directly about pornography's effects on them, many consumers report positive results in areas

such as learning new sexual techniques, discovering new sexual desires, and experimenting with new sexual behaviors; they also deny negative effects such as increased performance anxiety (Hald & Malamuth, 2008; Hald et al., 2013; Mulya & Hald, 2014). Fourth, although in a subsequent survey the authors found the opposite association (Morrison et al., 2006), in an early survey on the topic Morrison et al. (2004) found that pornography consumption correlated positively with sexual self-esteem. Consequently, the second research question of the present meta-analysis asks:

RQ2: Is pornography consumption associated with body and self satisfaction?

Potential moderators

Findings regarding pornography consumption and satisfaction may not be uniform across participants, samples, and methods. The examination of moderating variables in a meta-analysis is determined by the characteristics of the located studies. The moderators that can be tested are limited by the samples and methods reported.

Sex

A common suggestion in the literature is that the effects of pornography on satisfaction may differ for men and women. The majority of authors highlighted reasons why adverse effects may be more likely for men. Regarding interpersonal satisfaction, many authors surmised that negative associations would be more likely for men given findings indicating that men are more likely to consume pornography in solitude for self-stimulation while women are more likely to view pornography with partners and findings suggesting that solitary consumption is more detrimental to relationships than coviewing (Bridges & Morokoff, 2011; Daneback, Traeen, & Mansson, 2009; Maddox et al., 2011; Muusses et al., 2015; Poulsen et al., 2013; Traeen & Daneback, 2013). Satisfaction is higher when couples have sex more frequently (Doran & Price, 2014). Coviewing may encourage coupled sex and increase satisfaction while solitary consumption for masturbatory purposes may displace coupled sex and decrease satisfaction (Bridges & Morokoff, 2011; Maddox et al., 2011; Manning, 2006). Consequently, men's solitary consumption of pornography may displace sex with their partner and lead to decreased satisfaction while women's coupled pornography consumption may increase their partnered sex and their satisfaction. That the content of pornography viewed by men may be more likely to emphasize nonrelational, objectifying, and gender-stereotypical sex was another reason suggested for why men's interpersonal satisfaction may be more negatively affected (Bridges & Morokoff, 2011; see Malamuth, 1996, and Salmon, 2012, for a discussion of the origins of gender differences in sexual content preferences). Sex that is solely for physical pleasure, that treats partners as objects to be acquired rather than individuals to connect with, and that emphasizes men's dominance and women's submission may ultimately leave men emotionally unfilled, alienated from their partners, and sexually and relationally dissatisfied (Brooks, 1995; Doran & Price, 2014; Stock, 1997; Tylka, 2014; Willoughby et al., 2016).

Intrapersonally, three reasons why men may be more adversely affected were put forth. First, because the ability to obtain sex with multiple physically attractive partners is more central to men's masculine sense of self than is the ability to have casual sex with uninvested partners is for women's feminine sense of self, men may be more likely to make upward comparisons to performers in pornography than women (Peter & Valkenburg, 2009; Vandenbosch & Eggermont, 2013). Second, because idealized, perfected depictions of women's bodies are near ubiquitous in media, women may be more able to "ignore or confront" such imagery than men (Duggan & McCreary, 2004, p. 47). Third, it is more socially acceptable for women to discuss body image issues than it is for men, so men may be more likely to internalize their insecurities (Duggan & McCreary, 2004; Vandenbosch & Eggermont, 2013).

Not all studies that have examined sex as a moderator have found an interaction effect, however (Peter & Valkenburg, 2009; Zillmann & Bryant, 1988), and theorizing in the body-image literature does not suggest that men are more impacted than women (American Psychological Association, 2007; Tiggemann, 2013). Accordingly, this meta-analysis' third research question asks:

RQ3: Do associations between pornography consumption and satisfaction differ by sex?

Year

It was rare for a study in the present meta-analysis to argue that more recent investigations should produce larger effect sizes. Yet some academic (Dines, 2010; Jensen, 2007) and much popular discourse (Maltz & Maltz, 2008; Paul, 2005) suggests that negative impacts on consumers and their relationships have become more pronounced over time as advances in communication technology such as the Internet have made pornography, in general, and dehumanizing and aggressive pornography, in particular, more accessible. A recent meta-analysis of pornography and sexual aggression, however, did not find that effect sizes differed in studies conducted pre and post Internet (Wright et al., 2016). The effect sizes were constant between the time periods, indicating that pornography consumption was associated with an increased likelihood of sexually aggressive behavior across time. Consequently, this meta-analysis' fourth research question asks:

RQ4: Do associations between pornography consumption and satisfaction vary by year?

Method

Different research methods allow for varying levels of causal inference and ecological generalization (Babbie, 2004; Hocking, Stacks, & McDermott, 2003). Experimental studies provide the best evidence of cause, as they can demonstrate that variables change together systematically (covariation), that a cause temporally precedes its effect (time-order), and that no third-variable is responsible for the covariation between the independent and dependent variables (nonspuriousness). Social psychological experiments, however, are often critiqued as lacking real-world applicability, especially in pornography research (Linz & Malamuth, 1993). Cross-sectional survey

studies are more ecologically valid, as they simply correlate participants' responses and do not contain any manipulations, but reverse causality and unmeasured third-variable confounds are possibilities. Longitudinal surveys maintain the advantage of ecological validity but also address the reverse causation threat. Thus, it is when the results of experiments, cross-sectional surveys, and longitudinal surveys align that the most powerful evidence of a media effect is demonstrated (Wright, 2011). Accordingly, this meta-analysis' fifth research question asks:

RQ5: Do associations between pornography consumption and satisfaction vary by method?

Publication status

It is critical to compare unpublished and published studies for two reasons. First, published studies may be of superior quality, having been evaluated by peer reviewers (Neuman, Davidson, Joo, Park, & Williams, 2008). Second, unpublished studies may be more likely to report null correlations if journal editors and reviewers favor significant findings over nonsignificant findings (Rothstein & Bushman, 2012). This meta-analysis' sixth research question asks:

RQ6: Do associations between pornography consumption and satisfaction vary by publication status?

Method

Literature search

The study's authors conducted the literature search as part of an ongoing effort to archive and review studies on the effects of sexual media. The search for the current study continued until the end of 2015. We used electronic database (e.g., Academic Search Premier, All Academic, Cinahl Complete, EbscoHost, Communication & Mass Media Complete, ERIC, Google Scholar, JSTOR, Medline, ProQuest, PsycINFO, PubMed, Sociological Abstracts) and ancestral (e.g., Ezzell, 2014; Hald, Seaman, & Linz, 2014; Harkness, Mullan, & Blaszczyński, 2015; Owens, Behun, Manning, & Reid, 2012; Short, Black, Smith, Wetterneck, & Wells, 2012) searches to locate published and unpublished scientific reports. We used the following search terms and their combinations: pornography [pornography, sexually explicit media/materials, SEM, erotica, sexual content, sexual media] and satisfaction [satisfaction, dissatisfaction, partner, couple, relationship, body, body image, self, self-concept, self-esteem]. Many of the electronic databases (e.g., All Academic, Google Scholar, ProQuest) included unpublished studies, such as theses, dissertations, and works presented at conferences. Ancestral (i.e., reference section) searches were also potential sites for the location of unpublished studies. After this compilation effort, we contacted multiple leading media sex scholars and asked them to indicate omissions. None were identified. Not all papers that included measures germane to the present investigation reported the results required for analysis. Whenever contact information for

the authors of these papers was locatable, they were contacted and asked to provide additional information. Papers whose authors generously provided such information are identified by a “†” in the reference section.

Criteria for inclusion in the meta-analysis were twofold. First, the study had to include a quantitative assessment of pornography exposure. As an example of a typical self-report assessment, Doornwaard et al. (2014) asked participants “How often do you use the Internet to view a porn Web site (a Web site with pictures or movies that show nudity or people having sex)?” (p. 1105). In manipulated exposure experiments, pictures of nude models or videos of explicit sexual acts were common stimuli (e.g., Kenrick et al., 1989; Weaver et al., 1984; Zillmann & Bryant, 1988).

Second, the study had to include a quantitative assessment of relational, sexual, self, and/or body satisfaction. Twenty-four studies measured relational satisfaction. As an illustration of a typical relational satisfaction index, Maddox et al. (2011) asked participants about their relational happiness, thoughts about relational dissolution, and overall perceptions of how well their relationship was going. Twenty-eight studies measured sexual satisfaction. As an illustration of a typical sexual satisfaction assessment, Peter and Valkenburg (2009) asked participants how happy and how satisfied they were with their sex life. Self satisfaction assessments came from nine studies that measured either self-esteem in general or sexual self-esteem specifically. Regarding general self-esteem, Rasmussen et al. (2015) utilized Rosenberg’s Self-Esteem Scale and Daneback et al. (2009) assessed participants’ habitually negative self-perceptions. As illustration of a typical sexual self-esteem item, Traeen et al. (2014) asked participants about their level of agreement with the statement “I am better at sex than most other people” (p. 17). Body satisfaction assessments came from 16 studies that measured either body satisfaction in general (e.g., satisfaction with “body build” — Burnham, 2013) or satisfaction with specific body parts (e.g., penis, breasts — Peter & Valkenburg, 2014).

The studies meeting these criteria are overviewed in Tables 1 and 2. In total, 50 studies from 47 papers were identified. Doran and Price (2014) used the General Social Survey (GSS) to assess married U.S. adults’ pornography consumption and relational satisfaction. They analyzed data between 1973 and 2010. Because the GSS is publicly available, we replicated their analyses using data up until 2014 (Smith, Marsden, & Houtem, 2014).

Moderator variables

We coded four potential moderator variables: biological sex of participants, the year the study was released, the method of the study, and whether or not the study was published. We coded the biological sex of participants as male or female. We used the citation year provided by the study’s reference to code the year of the study. Studies’ methods were coded as cross-sectional survey, longitudinal survey, or experiment. Studies included either published journal articles or unpublished student theses.

Table 1 Overview of Studies in Meta-Analysis

Study by Year	Age of Sample	Sex of Sample ^{ab}	Design of Study ^c	Report Type	Country of Study
1. Derner and Pyszczynski (1978)	Adults	M	Experiment	Article	United States
2. Weaver et al. (1984)	Adults	M	Experiment	Article	United States
3. Zillmann and Bryant (1988)	Adults	M, F	Experiment	Article	United States
4. Kenrick et al. (1989)	Adults	M, F	Experiment	Article	United States
5. Amelang and Pielke (1992), Study 1	Adults	M, F	Experiment	Article	Germany
6. Amelang and Pielke (1992), Study 2	Adults	M, F	Experiment	Article	Germany
7. Duggan and McCreary (2004)	Adults	M	CS Survey	Article	Canada
8. Morrison et al. (2004)	Adults	M, F	CS Survey	Article	Canada
9. Deloy (2006)	Adults	M	CS Survey	Thesis	United States
10. Morrison et al. (2006)	Adults	M	CS Survey	Article	Canada
11. Dellner (2008)	Adults	M, F	CS Survey	Thesis	United States
12. Hosley, Canfield, O'Donnell, and Roid (2008)	Adults	M	CS Survey	Article	United States
13. Daneback et al. (2009)	Adults	M, F	CS Survey	Article	Norway
14. Peter and Valkenburg (2009)	Adolescents	M, F	L Survey	Article	Netherlands
15. Minarcik (2010)	Adults	M, F	CS Survey	Thesis	United States
16. Stulhofer et al. (2010)	Adults	M	CS Survey	Article	Croatia
17. Bridges and Morokoff (2011)	Adults	M, F	CS Survey	Article	United States
18. Hill (2011)	Adults	F	CS Survey	Thesis	United States
19. Maddox et al. (2011)	Adults	M, F	CS Survey	Article	United States
20. Morgan (2011)	Adults	M, F	CS Survey	Article	United States
21. Rowell (2011)	Adults	F	Experiment	Thesis	United States
22. Johnston (2012)	Adults	M, F	CS Survey	Thesis	United States
23. Lambert et al. (2012), Study 1	Adults	M, F	CS Survey	Article	United States
24. Lambert et al. (2012), Study 3	Adults	M, F	Experiment	Article	United States
25. Lambert et al. (2012), Study 5	Adults	M, F	CS Survey	Article	United States
26. Stulhofer, Busko, and Schmidt (2012)	Adults	M, F	CS Survey	Article	Croatia

Table 1 *Continued*

Study by Year	Age of Sample	Sex of Sample ^{a,b}	Design of Study ^c	Report Type	Country of Study
27. Vandenbosch and Eggermont (2012)	Adolescents	F	CS Survey	Article	Belgium
28. Burnham (2013)	Adults	F	CS Survey	Thesis	United States
29. Emmers-Sommer, Hertlein, and Kennedy (2013)	Adults	M, F	CS Survey	Article	United States
30. Poulsen et al. (2013)	Adults	M, F	CS Survey	Article	United States
31. Stana (2013)	Adults	M, F	CS Survey	Thesis	United States
32. Traeen and Daneback (2013)	Adults	M, F	CS Survey	Article	Norway
33. Vandenbosch and Eggermont (2013)	Adolescents	M	CS Survey	Article	Belgium
34. Brown (2014)	Adults	M, F	CS Survey	Thesis	United States
35. Doornwaard et al. (2014)	Adolescents	M, F	L Survey	Article	Netherlands
36. Kvalrem, Traeen, Lewin, and Stulhofer (2014)	Adults	M, F	CS Survey	Article	Norway, Sweden
37. Laier, Pekal, and Brand (2014)	Adults	F	CS Survey	Article	Germany
38. Peter and Valkenburg (2014)	Adolescent, adult mix	M, F	L Survey	Article	Netherlands
39. Smith et al. (2014)	Adults	M, F	CS Survey	Article/GSS ^d	United States
40. Szymanski and Stewart-Richardson (2014)	Adults	M	CS Survey	Article	United States
41. Traeen et al. (2014)	Adults	M	CS Survey	Article	United States
42. Tylka (2014)	Adults	M	CS Survey	Article	United States
43. Carvalheira, Traeen, and Stulhofer (2015)	Adults	M	CS Survey	Article	United States
44. Kvalrem et al. (2015)	Adults	M	CS Survey	Article	Portugal, Croatia, Norway
45. Muusses et al. (2015)	Adults	M, F	L Survey	Article	Norway
46. Rasmussen et al. (2015)	Adults	M, F	CS Survey	Article	Netherlands
47. Sun: Germany (2016)	Adults	M, F	CS Survey	Article	United States
48. Sun: Korea (2016)	Adults	M, F	CS Survey	Article	Germany
49. Sun: United States (2016)	Adults	M, F	CS Survey	Article	Korea
50. Willoughby et al. (2016)	Adults	M, F	CS Survey	Article	United States
					United States

^aM = Male, F = Female. ^bAlthough females and males may have both been sampled, results for each sex were not always reported. ^cCS = Cross-sectional, L = Longitudinal. ^dGeneral Social Survey; analysis followed Doran and Price (2014)

Table 2 Measures of Satisfaction^{a,b}

Study by Year	Relational Satisfaction	Sexual Satisfaction	Body Satisfaction	General Self Satisfaction	Sexual Self Satisfaction
1. Dermer and Pyszczynski (1978)	Love for partner	Partner's sexual receptivity	—	—	—
2. Weaver et al. (1984)	—	Partner's sexual appeal	—	—	—
3. Zillmann and Bryant (1988)	—	Sexual happiness	—	—	—
4. Kenrick et al. (1989)	Love for partner	Partner's sexual attractiveness	—	—	—
5. Amelang and Pielke (1992), Study 1	Love for partner	Partner's sexual receptivity	—	—	—
6. Amelang and Pielke (1992), Study 2	Love for partner	Partner's sexual receptivity; passionate love	—	—	—
7. Duggan and McCreary (2004)	—	—	Muscularity satisfaction	—	—
8. Morrison et al. (2004)	—	—	Genital satisfaction	—	Sexual self-esteem
9. Deloy (2006)	Affection; autonomy; conflict management; equality; intimacy	Sexual activity satisfaction	—	—	—
10. Morrison et al. (2006)	—	—	Body and genital satisfaction	—	Sexual self-esteem
11. Dellner (2008)	Relationship assessment	Sexual inventory	—	—	—
12. Hosley et al. (2008)	Marital satisfaction	—	—	—	—
13. Daneback et al. (2009)	—	—	—	Habitual self-perceptions	—
14. Peter and Valkenburg (2009)	—	Sexual satisfaction	—	—	—
15. Minarcik (2010)	—	Sexual satisfaction	—	—	—

Table 2 *Continued*

Study by Year	Relational Satisfaction	Sexual Satisfaction	Body Satisfaction	General Self Satisfaction	Sexual Self Satisfaction
16. Stulhofer et al. (2010)	Relational intimacy	Sexual life satisfaction, sexual boredom	—	—	—
17. Bridges and Morokoff (2011)	Relationship satisfaction	Sexual satisfaction	—	—	—
18. Hill (2011)	—	—	Body image, shame, shape; genital satisfaction	—	—
19. Maddox et al. (2011)	Dedication; relational adjustment	Sexual satisfaction	—	—	—
20. Morgan (2011)	Relationship satisfaction	Sexual satisfaction	—	—	—
21. Rowell (2011)	—	Sexual satisfaction	Body attitudes	—	—
22. Johnston (2012)	Relationship satisfaction	Sexual satisfaction	—	—	—
23. Lambert et al. (2012), Study 1	Relational commitment	—	—	—	—
24. Lambert et al. (2012), Study 3	Relational commitment	—	—	—	—
25. Lambert et al. (2012), Study 5	Relational commitment	—	—	—	—
26. Stulhofer et al. (2012)	Relational intimacy	—	—	—	—
27. Vandenbosch and Eggermont (2012)	—	—	Appearance ideals	—	—
28. Burnham (2013)	—	—	Bodily attitudes	—	Sexual self-esteem
29. Emmers-Sommer et al. (2013)	Relational commitment	—	—	—	—
30. Poulsen et al. (2013)	Relationship satisfaction	Sexual quality	—	—	—
31. Stana (2013)	—	—	Body self-consciousness	—	Sexual self-esteem
32. Traeen and Daneback (2013)	—	Sexual satisfaction	—	—	—
33. Vandenbosch and Eggermont (2013)	—	—	Appearance ideals	—	—
34. Brown (2014)	—	Sexual satisfaction	—	—	—
35. Doornwaard et al. (2014)	—	Sexual experience satisfaction	Physical self-esteem	—	—

Table 2 *Continued*

Study by Year	Relational Satisfaction	Sexual Satisfaction	Body Satisfaction	General Self Satisfaction	Sexual Self Satisfaction
36. Kvaalem et al. (2014)	—	—	Genital satisfaction	—	Sexual self-esteem
37. Laier et al. (2014)	—	Sexual satisfaction	—	—	—
38. Peter and Valkenburg (2014)	—	—	Body, stomach, breast or penis satisfaction	—	—
39. Smith et al. (2014)	Marital happiness	—	—	—	—
40. Szymanski and Stewart-Richardson (2014)	Dyadic adjustment quality	Sexual satisfaction	—	—	—
41. Traeen et al. (2014)	—	—	—	—	Sexual self-esteem
42. Tylka (2014)	Romantic attachment	—	Body fat and muscularity satisfaction; body appreciation	—	—
43. Carvalheira et al. (2015)	Relationship intimacy	Sexual boredom	—	—	—
44. Kvaalem et al. (2015)	—	Sexual relationship self-esteem	—	—	Sexual partner self-esteem
45. Muusses et al. (2015)	Dyadic adjustment quality	Sexual satisfaction	—	—	—
46. Rasmussen et al. (2015)	—	—	—	Self-esteem	—
47. Sun: Germany (2016)	—	Sexual satisfaction	Genital satisfaction	—	—
48. Sun: Korea (2016)	—	Sexual satisfaction	Genital satisfaction	—	—
49. Sun et al. (2016a, 2016b): United States (2016)	—	Sexual satisfaction	Genital satisfaction	—	—
50. Willoughby et al. (2016)	Relationship satisfaction	—	—	—	—

^aHyphens (—) indicate that the study either did not measure or report applicable results for that particular category of satisfaction. ^bThe titles in the table reflect the variable names used in each study with the goal of facilitating readers' ability to locate the variables in the original report. Because the title of a variable and the actual phenomenon measured by its items can differ, we used the content of the items, not the variable name chosen by the study author, when deciding which variables were applicable.

The specific numbers of effect sizes for each moderator test of each satisfaction comparison are reported in the results section. Moderator analyses were conducted only when three or more effect sizes for each subgroup being compared were available.

Effect size extraction and correction for measurement error

We reviewed papers for their effect size estimates. In many instances, the Pearson correlation coefficient, r , between pornography consumption and satisfaction was reported. Some studies, however, reported an unadjusted odds ratio, t value, and/or F value to represent the relationship between pornography consumption and satisfaction. In these cases, the effect sizes were transformed into the common effect size, r .

Measurement error, which attenuates effect sizes, was a study artifact that we corrected in this meta-analysis (Schmidt & Hunter, 2015). Because attenuation from measurement error can occur disproportionately across subgroups of studies, correcting for measurement error is particularly important for moderator analyses. The alpha reliabilities reported in each study were used in the correction equation. When a reliability coefficient was not reported for a measure, the number of reported items was used in the Spearman-Brown formula to estimate its reliability. The average number of items of a construct across all studies in the meta-analysis was used in the Spearman-Brown formula when neither the number of items nor the reliability was reported. The average number of items and single-item alphas used to estimate the reliability in the meta-analysis of pornography consumption and the indicators of interpersonal satisfaction were as follows: pornography consumption ($\alpha_{\text{single-item}} = .71$, $M_{\text{item}} = 2$) and interpersonal satisfaction ($\alpha_{\text{single-item}} = .68$, $M_{\text{item}} = 8$). The average number of items and single-item alphas for the pornography consumption and intrapersonal satisfaction meta-analyses were: pornography consumption ($\alpha_{\text{single-item}} = .57$, $M_{\text{item}} = 4$) and intrapersonal satisfaction ($\alpha_{\text{single-item}} = .59$, $M_{\text{item}} = 11$).

Results

Analytic approach

We used random-effects model meta-analyses to estimate the combined effect of the corrected correlations extracted from the studies. Random-effects models assume that the true effect size can vary across studies beyond variance attributable to sampling error (Anker, Reinhart, & Feeley, 2010; Borenstein, Hedges, Higgins, & Rothstein, 2009; Hedges & Vevea, 1998). The random-effects model estimates the mean of a distribution of correlations between pornography consumption and satisfaction drawn from a superpopulation of effect sizes. To test the proposed moderators, subgroup analyses were undertaken using a mixed-effects model approach. In this approach, the average correlations within each subgroup are estimated using random-effects models and a fixed-effect model compares the average correlations between or among different subgroups (Table 3).

Table 3 Uncorrected and Corrected Correlations by Category

Study by Year	Interpersonal Satisfaction		Intrapersonal Satisfaction	
	<i>r</i>	<i>r</i> ²	<i>r</i>	<i>r</i> ²
1. Dermer and Pyszczynski (1978)	.193	.194		
2. Weaver et al. (1984)	-.287	-.294		
3. Zillmann and Bryant (1988)	-.364	-.402		
4. Kenrick et al. (1989)	-.250	-.261		
5. Amelang and Pielke (1992), Study 1	.021	.022		
6. Amelang and Pielke (1992), Study 2	-.105	-.107		
7. Duggan and McCreary (2004)			-.065	-.083
8. Morrison et al. (2004)			.165	.200
9. Deloy (2006)	-.180	-.190		
10. Morrison et al. (2006)			-.223	-.255
11. Dellner (2008)	-.085	-.089		
12. Hosley et al. (2008)	-.125	-.125		
13. Daneback et al. (2009)			-.055	-.057
14. Peter and Valkenburg (2009)	-.120	-.126		
15. Minarcik (2010)	-.287	-.290		
16. Stulhofer, Busko, and Landripet (2010)	.068	.075		
17. Bridges and Morokoff (2011)	-.017	-.017		
18. Hill (2011)			-.041	-.042
19. Maddox et al. (2011)	-.117	-.124		
20. Morgan (2011)	-.130	-.130		
21. Rowell (2011)	.042	.044	.019	.020
22. Johnston (2012)	.031	.031		
23. Lambert et al. (2012), Study 1	-.200	-.225		
24. Lambert et al. (2012), Study 3	-.410	-.418		
25. Lambert et al. (2012), Study 5	-.140	-.160		
26. Stulhofer et al. (2012)	-.021	-.026		
27. Vandenbosch and Eggermont (2012)			-.130	-.142
28. Burnham (2013)			.218	.259
29. Emmers-Sommer et al. (2013)	-.009	-.010		
30. Poulsen et al. (2013)	-.059	-.067		
31. Stana (2013)			.127	.136
32. Traeen and Daneback (2013)	-.030	-.031		
33. Vandenbosch and Eggermont (2013)			-.180	-.197
34. Brown (2014)	-.095	-.103		
35. Doornwaard et al. (2014)	-.154	-.154	.158	.167
36. Kvaalem et al. (2014)			.080	.087
37. Laier et al. (2014)	.043	.043		

Table 3 Continued

Study by Year	Interpersonal Satisfaction		Intrapersonal Satisfaction	
	<i>r</i>	<i>r</i> '	<i>r</i>	<i>r</i> '
38. Peter and Valkenburg (2014)			-.073	-.086
39. Smith et al. (2014)	-.050	-.050		
40. Szymanski and Stewart-Richardson (2014)	-.145	-.152		
41. Traeen et al. (2014)			-.090	-.093
42. Tylka (2014)	-.280	-.292	-.180	-.188
43. Carvalheira et al. (2015)	-.085	-.092		
44. Kvaalem et al. (2015)	-.080	-.084	.020	.022
45. Muusses et al. (2015)	-.120	-.124		
46. Rasmussen et al. (2015)			-.005	-.005
47. Sun: Germany (2016)	-.190	-.190	-.015	-.015
48. Sun: Korea (2016)	-.140	-.140	-.045	-.045
49. Sun et al. (2016a, 2016b): United States (2016)	-.168	-.168	-.114	-.114
50. Willoughby et al. (2016)	-.090	-.096		

Overall association results

Research questions one and two asked about the overall associations between pornography consumption and the indicators of interpersonal and intrapersonal satisfaction. Results for these research questions are presented next.

Research question 1: Relational and sexual satisfaction

Thirty-seven effect sizes were extracted from studies that examined the relationship between pornography consumption and interpersonal satisfaction. In some studies, more than one correlation could be extracted. Combining multiple effects from the same study in a meta-analysis violates the independence of effects assumption and biases estimates of sampling variance (Cheung & Chen, 2008). In these cases, the pooled within-study corrected correlation was used as the effect-size estimate, and the samplewise-adjusted corrected sample sizes used for the weights (see Cheung & Chan, 2014). The indicators of interpersonal satisfaction in this meta-analysis were relational and sexual satisfaction. The total sample for this meta-analysis was 46,524, with an average sample size of 1,257 (*Mdn* = 434) per study. The cumulative effect size across the cases demonstrated a significant negative association between pornography consumption and interpersonal satisfaction, $r = -.10$, 95% CI $[-.13, -.08]$, $p < .001$, random-effects variance (τ) = .004. The effect sizes in the meta-analysis were heterogeneous, $Q(36) = 52.83$, $p = .04$, $I^2 = 31.86$, suggesting that the variation across the correlations may be explained by moderating variables.

We conducted a subgroup analysis to test whether the effect sizes of studies measuring relational satisfaction differed from studies measuring sexual satisfaction.

Because some cases reported correlations between pornography consumption and both relational and sexual satisfaction, the assumption of independence of effect sizes would be violated if all correlations were used in the subgroup analysis. To overcome this methodological limitation, the meta-analysis was treated as a two-level multilevel model, with individual correlations at Level 1 nested within studies at Level 2 (see Cheung, 2014; Field, 2015; Konstantopoulos, 2011). The multilevel model was specified as $y_i = \beta_0 + \beta_1$ (Interpersonal Satisfaction Type) $+ u_i + e_i$. Relational satisfaction was coded as “0” and sexual satisfaction was coded as “1” in the regression model. The results demonstrated that the average effect size of the 24 correlations of pornography consumption and relational satisfaction ($r = -.09$, 95% CI $[-.12, -.05]$) was not significantly different from the average effect size of the 28 correlations of pornography consumption and sexual satisfaction ($r = -.11$, 95% CI $[-.14, -.07]$), $\beta = -.04$, $SE = .05$, $p = .32$.

Research question 2: Self and body satisfaction

To estimate the relationship between pornography consumption and intrapersonal satisfaction, we calculated a weighted mean correlation across the 20 effect sizes extracted from the studies. Body and self satisfaction were the indicators of intrapersonal satisfaction. The total sample for this meta-analysis was 12,427, with an average of 621 ($Mdn = 575$) participants per study. The average effect size of the relationship between pornography consumption and intrapersonal satisfaction was nonsignificant, $r = -.03$, 95% CI $[-.08, .03]$, $p = .401$, $\tau = .015$. The test of homogeneity showed no significant variance across the correlations, $Q(19) = 19.34$, $p = .44$, $I^2 = 1.76$. The nonsignificant homogeneity test indicated that these studies shared a common true effect size and no third variables moderate this relationship. Accordingly, no follow-up subgroup analyses were conducted for this meta-analysis.

Moderation results

Research questions three through six asked whether associations between pornography consumption and satisfaction were moderated by other variables. Moderator tests for the intrapersonal satisfaction variables were not justified due to the nonsignificance of the homogeneity test. Moderator tests for the interpersonal satisfaction variables were justified, however, and are presented next. Because the results for relational and sexual satisfaction were empirically indistinguishable, and because doing so allowed for a more comprehensive analysis of potential moderators, these studies were grouped into a single pool.¹

Research question 3: Sex

Biological sex of the participants was examined as a moderator of the relationship between pornography consumption and the indicators of interpersonal satisfaction. The mixed-effects model subgroup analysis indicated that sex was a significant moderator in the relationship between pornography consumption and interpersonal satisfaction, $Q_b = 24.82$, $Z_{diff} = 4.98$, $p < .001$. The mean correlation for men ($r = -.13$, 95%

CI $[-.16, -.10]$, $k = 29$), which was significant, was significantly different from the nonsignificant average correlation for women ($r = -.01$, 95% CI $[-.05, .02]$, $k = 22$).

Research question 4: Year

We used the year the study was disseminated as a moderator of the relationship between pornography consumption and the indicators of interpersonal satisfaction. Study year was treated as a continuous variable in a maximum-likelihood meta-regression. The goal of this test was to see if the strength and/or direction of the association changed as studies became more recent. Because the effect size drawn from the (GSS; Smith et al., 2014) reflected data aggregated across four decades, we excluded it from this analysis. The results of the meta-regression demonstrated that year was not a significant moderator for the associations between pornography consumption and interpersonal satisfaction ($\beta = .03$, $SE = .002$, $p = .86$).

Research question 5: Method

The method of the study was also explored as a potential moderator of the relationship between pornography consumption and the indicators of interpersonal satisfaction. Method was not a significant moderator, $Q_b(2) = 0.62$, $Z_{diff} = 0.79$, $p = .73$. The mean effect of studies using cross-sectional survey designs ($r = -.10$, 95% CI $[-.13, -.07]$, $k = 26$) was not significantly different from longitudinal survey designs ($r = -.14$, 95% CI $[-.23, -.04]$, $k = 3$) or experimental designs ($r = -.12$, 95% CI $[-.21, -.03]$, $k = 8$).²

Research question 6: Publication status

We examined the possibility that results from unpublished papers differed from published papers by testing whether report type was a moderator. We categorized cases into either an unpublished paper or published paper group. The subgroup analysis for the relationship between pornography consumption and the indicators of interpersonal satisfaction was not significant, $Q_b = 0.29$, $Z_{diff} = 0.54$, $p = .59$. The average correlation of the six unpublished studies ($r = -.09$, 95% CI $[-.16, -.01]$) was not significantly different from the mean correlation of the 31 published studies ($r = -.11$, 95% CI $[-.14, -.08]$). Rosenthal's fail-safe N , a metric of how many studies with null findings must be included to make the overall correlation nonsignificant, was 3,228. The association between effect size and its standard error, represented by Begg and Mazumdar's rank correlation, was nonsignificant, Kendall's $\tau = -.21$, $p = .06$. In sum, publication bias was not a significant concern.

Discussion

This paper presented results from meta-analyses of survey and experimental studies on pornography consumption and sexual and relational satisfaction (summarized as interpersonal outcomes) and body and self satisfaction (summarized as intrapersonal outcomes). In an overall, combined-sample analysis of relational and sexual satisfaction studies, the consumption of pornography was associated with lower interpersonal satisfaction. Analyses broken down by interpersonal satisfaction type indicated that

associations between pornography consumption and sexual satisfaction and pornography consumption and relational satisfaction were indistinguishable, leading to the grouping of these studies together into a single pool.

Associations between pornography consumption and interpersonal satisfaction did not vary by publication status, year of release, or method. Consuming pornography was associated with lower interpersonal satisfaction in results from published and unpublished studies, regardless of the year the study was circulated, and regardless of the method. Sex was a significant moderator in a mixed-effects model subgroup analysis, however, and only the negative correlation for males was significant.

As with the interpersonal results, analyses broken down by intrapersonal satisfaction type indicated that associations between pornography consumption and body satisfaction and pornography consumption and self satisfaction were indistinguishable, supporting the grouping of these studies together into a single pool. Analysis of these intrapersonally oriented results indicated a negative, but null, overall relationship and a homogeneity among the effect sizes. Thus, no further moderator analysis was undertaken.

Several inferences can be drawn from these results. First, contrary to the statements of consumers when asked directly about how pornography has positively impacted them (Hald & Malamuth, 2008; Mulya & Hald, 2014), it seems unlikely that an increase in the frequency and intensity of consumption would, on the average, lead to a corresponding increase in satisfaction with oneself or one's sexual or romantic relationships. The results of the studies analyzed in the present paper, whose designs seem less likely to trigger defensive and rationalizing responses, suggest that women's satisfaction would on average be unaffected while men's sexual and relational satisfaction would on the average be adversely affected.

Second, we can infer from the lack of a moderating effect for year that increasing access to pornography in general and extreme pornography in particular has not on average resulted in larger detrimental effects on consumers' satisfaction. This does not mean that an increase in access opportunities or a shift toward more violent and dehumanizing content preferences would not adversely affect a particular consumer. It means only that the increased availability of pornography (both standard and extreme) does not appear in and of itself to have changed the nature of pornography-satisfaction associations. Third, we can infer that a publication bias has not affected research on pornography and satisfaction.

There are many important questions that remain unaddressed by the extant literature. As one example, too few studies included mechanism tests for any type of mediational meta-analysis. Mediation tests are needed to evaluate the appropriateness of the theories that have been proposed (e.g., Gagnon & Simon, 2005; O'Neil et al., 1986; Rusbult, Martz, & Agnew, 1998; Suls et al., 2002). Future studies could address whether and which particular social comparison dynamics (e.g., upward comparisons to partners' physical beauty, performance, eagerness, readiness, receptiveness, adventurousness) help to explain associations between men's pornography consumption and lower interpersonal satisfaction (Doran & Price, 2014; Kenrick et al., 1989;

Lambert et al., 2012; Muusses et al., 2015; Peter & Valkenburg, 2009; Poulsen et al., 2013; Zillmann & Bryant, 1988). Future studies could also explore whether there are particular masculine sexual scripts (e.g., for multiple partners or for youthful partners) that trigger feelings of dissatisfaction in men when they view pornography (Brooks, 1995; Malamuth, 1996). They could also test whether there is veracity to hypotheses derived from the investment model of commitment that pornography consumption reduces men's interpersonal satisfaction by priming the option of a better relationship, inspiring the pursuit of extrarelational encounters, and supplanting partnered sex (Doran & Price, 2014; Lambert et al., 2012; Muusses et al., 2015; Poulsen et al., 2013). Future studies could also examine whether using pornography leads to interpersonal conflicts and corresponding reductions in interpersonal satisfaction, as gender role conflict theory would predict (Brooks, 1995; Doran & Price, 2014; Szymanski & Stewart-Richardson, 2014).

Additional moderation analysis is also needed. That the average associations between women's satisfaction and pornography consumption were not significant does not mean that certain subsets of women less frequently studied are not impacted, for example. Perhaps women who aspire to hyperfemininity but view the performances in pornography as unattainable are affected (Vandenbosch, 2015). It is conceivable that only women with precarious self and body esteem are impacted (Doornwaard et al., 2014). It may be the case that solitary consumption adversely affects the relationships of women as much as men but is rarer and thus harder to detect with conventional sampling procedures (Daneback et al., 2009). It may also be the case that dehumanizing, aggressive, gender-rigid content impacts women in addition to men, but women's consumption is more infrequent and therefore less likely to impact associations generated from entire samples (Sun, Wright, & Steffen, 2015). This may also explain why the average interpersonal association was significant for men but not for women.

The discussions of several authors also suggested a need for comparative analyses by sexual orientation, particularly among men (Duggan & McCreary, 2004; Kvaem et al., 2015; Peter & Valkenburg, 2014; Szymanski & Stewart-Richardson, 2014; Traeen & Daneback, 2013; Vandenbosch & Eggermont, 2013). Reasons cited were differential levels of pornography consumption, masturbation to pornography, acceptance of pornography, use of pornography for orientation validation, concern over body image, and ascriptions of masculinity to muscularity. Discussion of additional potential moderators can be found in Wright (2011, 2014) and Wright and Bae (2016).

Conclusion

To conclude, the present meta-analysis addressed a classic question in the communication literature: Is there an association between pornography consumption and satisfaction? Although many questions about possible mediating mechanisms and contingent effects remain, the study provided several important answers. First, there appears to be no overall or global association between women's pornography

consumption and the elements of satisfaction studied by researchers to date. If women's satisfaction in these domains is positively or negatively affected, it is for certain subgroups less frequently studied or under circumstances not yet identified. Men as a group, on the other hand, do demonstrate lower sexual and relational satisfaction (but apparently not self and body satisfaction) as a function of their pornography consumption. While there may be a reciprocal element to these dynamics (i.e., lower sexual and relational satisfaction leading to pornography consumption), the convergence of results across cross-sectional survey, longitudinal survey, and experimental results points to an overall negative effect of pornography on men's sexual and relational satisfaction.

Notes

- 1 We also conducted four random-effects model meta-analyses on the relationships between pornography consumption and relational, sexual, body, and sexual self-esteem satisfaction independently (data for general self-esteem indicators were available from only two studies so no independent meta-analysis was conducted). The cumulative correlations between pornography consumption and relational satisfaction ($r = -.09$, 95% CI $[-.12, -.05]$, $k = 24$, $Q(23) = 47.49$, $p = .002$) and sexual satisfaction ($r = -.11$, 95% CI $[-.14, -.07]$, $k = 28$, $Q(27) = 31.74$, $p = .24$) were significant, but pornography consumption was related to neither body satisfaction ($r = -.02$, 95% CI $[-.08, .05]$, $k = 16$, $Q(15) = 15.29$, $p = .43$) nor sexual self-esteem satisfaction ($r = .04$, 95% CI $[-.08, .16]$, $k = 7$, $Q(6) = 10.87$, $p = .09$). The findings from the moderator tests, where there were enough studies to conduct them, paralleled the main analyses presented in the results section. These results are available as a supplemental online table.
- 2 We also examined whether the type of pornography measurement in the survey studies moderated the relationship between pornography exposure and the indicators of interpersonal satisfaction. We grouped studies by whether pornography consumption was measured with a single-item dichotomous measure, a single-item continuous measure, or a summated scale. The mixed-effects model subgroup analysis showed that pornography measurement was not a significant moderator, $Q_b(2) = 3.84$, $p = .14$. The average correlation of studies where pornography was measured with a single-item dichotomous measure ($r = -.05$, 95% CI $[-.13, .03]$, $k = 4$) did not significantly differ from studies that used single-item continuous ($r = -.12$, 95% CI $[-.16, -.09]$, $k = 21$) and multi-item ($r = -.07$, 95% CI $[-.14, .01]$, $k = 4$) measures.

Supporting Information

Additional supporting information may be found in the online version of this article:
Table S1 Mean Correlations and Moderator Tests

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*Indicates a paper included in the meta-analysis.

†Indicates a paper whose authors generously provided additional results.

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