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Article in Archives of Sexual Behavior · April 2014

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Experimental Effects of Exposure to Pornography: The Moderating Effect of Personality and Mediating Effect of Sexual Arousal

Gert Martin Hald · Neil N. Malamuth

Received: 17 August 2012 / Revised: 30 June 2013 / Accepted: 11 January 2014
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Abstract Using a randomly selected community sample of 200 Danish young adult men and women in a randomized experimental design, the study investigated the effects of a personality trait (agreeableness), past pornography consumption, and experimental exposure to non-violent pornography on attitudes supporting violence against women (ASV). We found that lower levels of agreeableness and higher levels of past pornography consumption significantly predicted ASV. In addition, experimental exposure to pornography increased ASV but only among men low in agreeableness. This relationship was found to be significantly mediated by sexual arousal with sexual arousal referring to the subjective assessment of feeling sexually excited, ready for sexual activities, and/or bodily sensations associated with being sexually aroused. In underscoring the importance of individual differences, the results supported the hierarchical confluence model of sexual aggression and the media literature on affective engagement and priming effects.

Keywords Pornography · Personality · Sexual arousal · Violence against women · Rape myth

Introduction

In the controversy about effects of exposure to pornography, attitudes have long held a central role, particularly attitudes supporting violence against women (ASV). By ASV, we refer to positive affective responses to acts such as rape and other types of sexual aggression, evaluative cognitions justifying these acts, and behavioral predispositions or attractions toward such aggressive acts (Hald, Malamuth, & Yuen, 2010).

Generally, data from a wide variety of experimental and correlational studies have converged to show that pornography consumption may increase ASV and related attitudes (Allen, Emmers, Gebhardt, & Gierya, 1995; Hald et al., 2010; Malamuth, Hald, & Koss, 2012; Peter & Valkenburg, 2009). In confluence with other factors, ASV and related attitudes have also been shown to be risk factors for sexually aggressive behaviors (Malamuth, Addison, & Koss, 2000; Seto, Maric, & Barbaree, 2001). Importantly, though, when such studies have examined individual differences, they consistently indicate that the effects of exposure to pornography on sexual aggression and ASV are evident only for a subgroup of male users, namely those already predisposed to sexual aggression (Kingston, Malamuth, Fedoroff, & Marshall, 2009; Malamuth et al., 2012; Seto et al., 2001; Vega & Malamuth, 2007).

Nonetheless, a number of cross-cultural studies investigating aggregate level criminal rape statistics have not found associations between pornography availability and such sexual crime statistics (see Diamond, 2009; Diamond, Jozifkova, & Weiss, 2011; Kutchinsky, 1991). Further, based on a review on the relationship between pornography and sexual aggression, Ferguson and Hartley (2009) suggested that “it is time to discard the hypothesis that pornography contributes to increased sexual assault behavior” implying that pornography consumption may not be linked to sexual aggression or its antecedents.

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Previous studies that have included individual differences in personality as moderators of the relationship between pornography and dependent variables have used a wide variety of personality or related measures (Williams, Cooper, Howell, Yuille, & Paulhus, 2009). These have generally been used to assess aspects of antisocial tendencies by measuring various “lower order” personality or related characteristics (Vega & Malamuth, 2007; Williams et al., 2009). By “lower order” traits, we refer to specific personality characteristics while by “higher order” traits we refer to groups of personality characteristics that have been shown to share common properties and are intercorrelated (Ash-ton, Lee, Goldberg, & de Vries, 2009). Thus, a major short-coming in previous research has been the omission to include “higher order” relevant personality traits/dimensions with the ability to encompass these previously identified lower order personality characteristics under one heading (Funder, 2007). By doing so, results from studies including personality could be more directly and easily compared. Further, higher order personality measures often hold wide practical applicability in clinical settings and are therefore often included as part of a general assessment battery. Thus, identifying individuals susceptible to effects of pornography, if any, by use of higher order personality measures may hold wider practical applicability than by use of more specified lower order personality or related measures.

For this study, we used the well-validated Five Factor Model (FFM) of personality (Costa & McCrae, 1992) and selected the dimension of Agreeableness to investigate moderating mechanisms of personality in the relationship between experimental exposure to pornography and ASV. The dimension of agreeableness was chosen because it entails the personality traits most clearly relevant to an exploitative approach to sexuality and conflict in relationships (e.g., antagonism, coldness, hostility, suspiciousness, disagreeableness, unfriendliness, and self-interest) (Malamuth, 2003; Voller, Long, & Aosved, 2009). Further, because previous research indicates that agreeableness is correlated with characteristics associated with sexual aggression, such as psychopathy and narcissism (see Jonason, Li, Webster, & Schmitt, 2009), and because low agreeableness has been shown to be predictive of such variables as men’s perceptions of women’s sexual exploitability (Lewis, Easton, Goetz, & Buss, 2012).

The general theoretical framework guiding the present study, as well as much of the previous research in this area, is the hierarchical confluence model of sexual aggression (HCM) (see Malamuth, 2003). The HCM considers the effects of pornography in the context of personality factors and individual differences that correlate with sexually aggressive attitudes and behaviors (Hald, Seaman, & Linz, 2014). Central to the HCM is the contention that it is the confluence or interaction of risk factors that is most relevant to the prediction of sexually aggressive attitudes and behaviors (Malamuth et al., 2000; Vega & Malamuth, 2007). Consequently, the HCM contends that for a small subgroup of users, who already score high on other known risk factors of sexually aggression, pornography consumption may

add “fuel to the fire” and increase the risk of sexually aggressive attitudes and behaviors. Thus, pornography consumption may increase the risk of sexually aggressive attitudes and behaviors by aiding the creation, reinforcement, or priming of (pre-existing) sexually aggressive attitudes, cognitions, and emotions (Malamuth et al., 2012). The HCM has gained considerable support in various cross-sectional and longitudinal studies using both non-criminal and criminal populations as well as various ethnic populations in North America and abroad (see Hald et al., 2014).

Denmark, where the present study was conducted, is among the countries in the world with the lowest known sexual crime rates and fear of violence against women (Yodanis, 2004). Indeed, Denmark has been ranked as among the most peaceful nations in the world (see <http://www.visionofhumanity.org/#/page/our-gpi-findings>). Accordingly, in Denmark, one might expect that there would be a relatively low number of men with high levels of proclivity to actually sexually aggress. For such societies, the HCM would predict little or no effects of pornography consumption on extreme outcome measures such as sexual aggression because of relatively little “fire to fuel” (Malamuth et al., 2000). However, the core contention of the HCM may still hold true for less “extreme” outcomes such as ASV in such presumed low risk samples. The present study was the first to empirically test this possibility.

The HCM proposes that the mechanism mediating the effects of pornography for “high risk” individuals is largely an activation or priming of an “associative network” of emotions, cognitions, and attitudes that may facilitate the use of sexually aggressive tactics under some circumstances (Hald et al., 2014). Therefore, while the initial primary effect of pornography exposure is to generate sexual arousal, it is contended that, for certain individuals, such arousal activates the “associative network” of sexually aggressive tendencies and attitudes, including ASV.

The idea that exposure to pornography may activate certain kinds of attitudes is consistent with the media literature on affective engagement (Clare & Schnall, 2005; Ward, 2002) and priming effects (Hansen & Krygowski, 1994; Roskos-Ewoldson, Roskos-Ewoldsen, & Dillman Carpentier, 2009). In this literature, affective activation as a mediator of cognitive and attitudinal impacts of stimuli is considered central. This is especially relevant for pornography, since pornography is designed primarily to activate the affect of sexual arousal and associated pleasurable responses which are considered essential for affective engagement and mediation. This study was the first to directly experimentally test the extent to which affective engagement in the form of sexual arousal mediated effects of non-violent pornography on attitudes, if any. Following Senn and Radtke (1990), non-violent pornography refers to pornographic materials without any overt coercive content, but which may sometimes portray or imply acts of submission and/or coercion by the positioning of the models, use of props or display of unequal power relationships. In contrast, violent pornography

refers to pornographic materials in which non-consensual, coercive, and/or violent sexual relations are explicitly portrayed (Hald et al., 2010).

Previous work on the relationship between pornography and ASV has predominately used male samples (Allen, Emmers, et al., 1995; Allen, D'Alessio, & Brezgel, 1995; Hald et al., 2010), probably because the vast majority of sexual aggression is committed by men. However, we find it important to also study possible effects of exposure to pornography in females. First, prevalence studies of pornography consumption, cross-culturally, show that a sizable proportion of women use pornography (30–86 %) (Hald et al., 2014). Second, women with higher ASV or related attitudes may more readily accept sexual aggressive or associated behaviors as “standard fare” and thus avoid reporting or rejecting such ASV related behaviors even when they are clearly at odds with personal boundaries or values. This may adversely affect areas related to sexuality, crime, gender equality, gender roles, and self enhancement (see Edwards, Turchik, Dardis, Reynolds, & Gidycz, 2011; Sanchez, Fetterolf, & Rudman, 2012).

Based on the theoretical framework and previous research summarized above, we proposed the following four hypotheses:

Hypothesis 1 Lower levels of agreeableness will predict higher ASV.

Hypothesis 2 Higher levels of past pornography consumption will predict higher ASV.

Hypothesis 3 The interaction between experimental exposure to pornography and agreeableness will predict ASV over and above agreeableness, exposure condition, and past pornography consumption. Only individuals low in agreeableness will evidence increased ASV as a function of exposure to pornography.

Hypothesis 4 Sexual arousal will mediate significant associations, if any, between experimental exposure to pornography and ASV.

Method

Participants

Using Statistics Denmark, a stratified sample of 350 young adults aged 18–30 years was randomly drawn among all young adults living in the city of Aarhus ($N = 291,720$), the second largest city in Denmark. Statistics Denmark contains detailed information on the Danish society. The sample was stratified according to gender (equal male/female ratio), age, place of birth (Denmark), and citizenship (Danish).

A total of 201 participants, 100 men and 101 women, were included in the final sample. Mean age of male participants was 24.64 years ($SD = 3.76$). Mean age of female participants was 24.39 years ($SD = 3.72$).

Sociodemographic characteristics of the 201 participants were checked against the general population of young adults aged 18–30 living in Aarhus and Denmark, respectively, using Statistics Denmark. Sociodemographically, participants included in the final sample were found to be representative of young Danish adults, locally as well as nationally.

Procedure

All 350 randomly selected young adults were contacted once by ordinary mail and invited to participate in an experiment related to sexuality and media effects against a compensation of DKK 250 (approx. US \$40) or 3 bottles of wine. Seventeen letters were returned to sender, address unknown. Among the remaining 333 potential participants, a total of 229 returned a pre-made form of consent of participation. Thus, the response rate was 67.2 % for women and 70.2 % for men.

All 229 potential participants were contacted by phone and an appointment for participation in the experiment was made. Exclusion criteria included bi- or homosexuality, very poor sight, severe hearing problems, currently suffering from a sexual inhibitory problem, having ever been convicted of a sexual crime, having ever reported a sexual crime, having ever been officially diagnosed with a mental impairment severely affecting judgment and/or cognition, currently receiving psychological or psychiatric treatment, or currently being under the care of a legal guardian. The exclusion criteria were chosen to comply with the ethical guidelines set forth by The Scientific Ethical Committee of the County of Aarhus and because the exposure material was heterosexual in content. Nine women and 11 men were excluded on this basis. Only the first 100 eligible participants of each gender were offered participation in the experiment.

Following inclusion in the experiment, participants were sent a letter containing practical information, a brief non-specific and non-revealing description of the experiment, and two background questionnaires: The Pornography Consumption Questionnaire (PCQ) and The Danish Personality Item Pool Questionnaire (D-IPIP-Q). Participants were asked to complete these two questionnaires before arriving at the experimental setting located at Aarhus University. Upon arrival, participants were greeted by a same gender research assistant and taken to the experimental rooms. Participants were then randomly assigned to either a control group or an experimental group, asked to sign a form of consent, paid compensation, given standard information on how to operate the technical equipment and complete the outcome measure questionnaires, exposed to approximately 30 min of pornographic video stimuli (experimental group) or emotionally neutral video stimuli (control group), and given time to complete the outcome measure questionnaires. Participants were alone during the exposure and response phases. One participant decided to break off the experiment prematurely and was thus debriefed, excluded from the experiment, and replaced by another participant.

Measures

Scales not available in Danish were translated from English into Danish using back translation. Subsequently, scales were subjected to psychometric validation (e.g., factor- and reliability analyses). Translated scales' psychometric properties were comparable to those found with English speaking samples. Details are available from the first author.

The Danish Personality Item Pool Questionnaire (D-IPIP-Q)

Agreeableness was measured using a 20 item scale from the International Personality Item Pool Scale (IPIP). Each item includes a statement regarding the self. Participants' respond to each item using a 7 point Likert scale where 1 = very inaccurate description and 7 = very accurate description. Examples include "love to help others" and "am indifferent to the feelings of others."

Using principal factor analyses, the scree plot and the Kaiser-Guttman rule both suggested that only one common factor should be extracted for the 20 item scale. Cronbach's α for the scale was .88. The IPIP scales used measure the construct of Agreeableness from the "Big Five" in the same way as the more widely used NEO PI-R test (Costa & McCrae, 1992). Goldberg (1999) has found that the interreliability of the IPIP scales with the NEO scales is generally high.

The reliability and validity of the IPIP scales have been documented in numerous cross-cultural and international published studies, including studies using Danish samples (Goldberg et al., 2006). Examples and further psychometric details are available from the IPIP website (<http://ipip.ori.org/>).

Past Pornography Consumption

The Pornography Consumption Questionnaire (PCQ) (see Hald, 2006) was used to assess past pornography consumption. The stem of the PCQ includes a definition of pornography, items related to socio-demographic characteristics (12 items), exposure patterns and frequency of pornography use (24 items), development in pornography consumption patterns (10 items), personal and interpersonal context of pornographic exposure (21 items), money spent on pornographic material (6 items), self-perceived effects of pornography consumption (64 items), and sexual behavior (4 items) (see also Hald, 2006). For this study we followed Hald (2006) and included the following four items from the PCQ to measure past pornography consumption: (1) average time of use in minutes per week during the past year, (2) frequency of use during the past year, (3) percentage of times pornography consumption has been used when having sexual activity on one's own during the past year, and 4) most recent exposure to pornography during the past year.

Accordingly, based on an unrotated principal axis factor analysis the four highly correlated variables were combined into

a single "past pornography consumption" measure. The scree plot and the Kaiser-Guttman rule both suggested that only one common factor should be extracted. Consequently, the scores of the first unrotated factor were calculated using regression method and used in all subsequent analyses.

Multiple indicators of past pornography consumption were used in lieu of a single indicator as this may yield a better overall estimate of past pornography consumption (see Hald, 2006; Short, Black, Smith, Wetterneck, & Wells, 2012).

Attitudes Supporting Violence Against Women

An ASV composite score was created by summing the z -scores of two scales: (1) The Acceptance of Interpersonal Violence Scale (3 items) and (2) The Rape Myth Acceptance Scale (12 items) (Burt, 1980). Originally, the AIV contained 6 statements regarding the use of interpersonal violence in relationships, e.g., "Being roughed up is sexually stimulating to many women" (Burt, 1980). Responses were given on a 7-point Likert scale where 1 = strongly disagree and 7 = strongly agree. Cronbach's α for the AIV full scale was .56. In the current study, three of the six items were used (Items 2, 4, and 6 of the original scale) following Ogle, Noel, and Maisto (2009) psychometric validation of the scale showing two independent factors. Accordingly, the selected items (i.e., Items 2, 4, and 6) specifically assessed the use of force in sexual violence as a means of sexually arousing the woman and/or having intercourse with her by use of force. Cronbach's α for the three items in the current study was .57.

The RMAS investigated rape myth acceptance by measuring the degree to which participants believe in stereotypical rape myths and endorse rape (e.g., "A woman who goes to the home or apartment on their first date implies that she is willing to have sex"). Responses were given on a 7-point Likert scale where 1 = strongly disagree and 7 = strongly agree. The Danish version of the RMAS consisted of 12 statements. The original scale consists of 13 items. However, due to psychometric considerations (low intercorrelations with other included items and low factor loadings) Item 2 from the original scale was excluded in the Danish version of the scale used here. Cronbach's α for the RMAS was .68. The intercorrelation between the three item AIV scale and the RMAS 12 item scale was $r = .47$, $p < .001$, $df = 198$.

Although the internal consistency of the scale was in the lower than desirable range, factor analyses clearly indicated that items of both the AIV and RMAS loaded on the same common factor. Further, especially for the AIV, the lower than desirable Cronbach's α was fully consistent with that found in many other studies, including the original publication (Burt, 1980). In addition, the low alpha was most likely due to the relatively few number of items as alpha is directly related to the number of scale items and fewer items usually result in lower alpha coefficients (see Streiner & Norman, 1989).

The Sexual Arousal Scale (SAS)

The SAS includes 6 items assessing various aspects of sexual arousal. Participants were asked to respond to each item using a 5-point Likert scale where 1 = not at all and 5 = to a very large extent. Examples of items include “To what extent did you feel sexually excited during the exposure material” and “To what extent did you feel ready for sexual activity during the exposure material”?

The scale was adapted from Mosher, Barton-Henrey, and Green (1988). Cronbach’s α for the SAS was .83.

Manipulation Check Scale

Participants were asked to indicate the degree to which they “found the video material pornographic” by providing a mark on a 10 cm line. The line was anchored by “not at all pornographic” and “extremely pornographic”.

Experimental Material (Experimental Group)

The experimental material consisted of a videotape made up from 2 min of “black screen” followed by a 17-minute sex scene from LATEX and an 8-minute sex scene from GIGANTIC, two of the most widely circulated and sold hardcore pornographic movies in Denmark at the time of the experiment. In order to minimize order effect, a second video tape in which the order of the sex scenes was reversed was created. The sexual acts portrayed included oral sex, vaginal sex, anal sex, double penetration, and facial cumshots with consenting parties. The story line from LATEX portrayed a man having sex with his female partner. The story line from GIGANTIC portrayed a female engaging in sex with her husband and a friend of her husband. In both scenes, sexual acts were initiated and decided by the male/males and no explicit violence or degradation was used (see also Bridges, Wosnitzer, Scharrer, Sun, & Liberman, 2010), and both genders showed signs of sexual pleasure throughout the scenes.

Control Material (Control Group)

Excerpts from two emotionally neutral, high-quality documentaries, “The Blue Planet” and “The Elements: Wind & Water”, were used.

Following the same procedure as with the experimental material, two different, yet in content identical, videotapes were created. The structure and running time of the videotapes were identical to those containing the pornographic material.

Results

Background Check

To ensure that participants in the experimental group did not differ significantly from participants in the control group on

included key variables, the two groups were compared in terms of age, education, relationship status, age of first exposure to pornography, past pornography consumption, and personality (Big Five). No significant differences between the two groups were found for any of the variables.

Manipulation Check, Sexual Arousal, and Attitudes Supporting Violence Against Women

See Table 1 for means and SD of the manipulation check, sexual arousal, and ASV against women.

Across gender, compared to participants in the control group, participants in the experimental group rated the exposure material as significantly more pornographic: men: $t(93) = 20.78$, $p < .001$, Cohen’s $d = 4.30$; women: $t(98) = 23.11$, $p < .001$, Cohen’s $d = 4.67$, and experienced significantly more sexual arousal during exposure: men: $t(98) = 15.49$, $p < .001$, Cohen’s $d = 3.13$; women: $t(98) = 12.32$, $p < .001$, Cohen’s $d = 2.49$. For ASV, comparing men in the experimental group with men in the control group and likewise for women, no significant between group main differences were found: men: $t(96) = 1.12$; women: $t(98) < 1$. However, as evident from Table 1 significant between group differences in ASV was found among men low in agreeableness. Thus, men low in agreeableness in the experimental group were found to hold significantly higher ASV scores

Table 1 Attitudes supporting violence against women (ASV), sexual arousal, and pornographic manipulation check scores

Variable	Control group			Experimental group		
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>
ASV mean score ^a	34.09	8.93	99	35.08	9.10	99
Men (Overall)	34.18	9.36	49	36.41	10.25	49
Low agreeableness	33.45	8.89	22	43.66	10.49*	18
Moderate agreeableness	36.07	10.05	15	35.26	6.76	19
High agreeableness	33.17	9.76	12	27.33	5.94	12
Women	34.00	8.60	50	33.78	7.69	50
Low agreeableness	36.53	8.72	15	37.11	5.80	9
Moderate agreeableness	31.69	6.52	13	34.33	7.28	21
High agreeableness	33.63	9.45	22	31.70	8.51	20
Sexual arousal scores ^b	6.31	.73	99	16.59	5.23**	99
Men	6.45	.96	49	16.76	4.56**	49
Women	6.18	.48	50	16.42	5.86**	50
Pornographic manipulation check ^c	.18	.34	96	6.92	2.11**	99
Men	.16	.28	46	6.68	2.12**	49
Women	.20	.39	50	7.16	2.09**	50

Numbers in parentheses represent *n*/cell. Missing values excluded

^a Absolute range, 15–101

^b Absolute range, 6–30

^c Absolute range, 0–10

* $p < .05$; ** $p < .01$

compared to men low in agreeableness in the control group, $t(38) = 3.33, p = .002$, and the magnitude of this difference was large, Cohen's $d = 1.08$.

Test of Hypotheses

Multiple Regression Analyses

Gender has consistently been found to be a strong differentiating variable in research focusing on the key variables included here, i.e., pornography, ASV, and agreeableness (Costa, Terracciano, & McCrae, 2001; Hald, 2006; Hald et al., 2010). Accordingly, the hierarchical multiple regression analysis conducted to test the first, second, and third study hypotheses was stratified by gender to increase the model fit (Andersen & Skovgaard, 2010).

Initially, independent variables were centered and interaction terms were created by multiplying the centered variables included in the interaction term (Aiken & West, 1991). In the first step of the regression analysis Agreeableness was entered. Secondly, past pornography consumption was entered. Third, exposure group (control vs. experimental) was entered. Fourth, all two-way interactions were entered. Fifth, the three-way interaction was entered. All single variables were forced entered into the analyses. All interactions were entered using step-wise entry and an F probability criterion of .05 for entry and .10 for removal.

As evident from Table 2, for women, the final model showed that lower agreeableness and higher past pornography consumption significantly predicted ASV against women.

For men, the final model also showed that lower agreeableness and higher past pornography consumption entered significantly. In addition, the predicted interaction between agreeableness and exposure group entered significantly. Graphical probing and simple slopes analyses of the interaction following Aiken and West (1991) showed that the effect of exposure to pornography on ASV was different across different levels of agreeableness. For men high in agreeableness (i.e., one SD above the mean agreeableness score) and average in agreeableness (i.e., at the mean agreeableness score), the impact of experimental exposure to pornography on ASV was non-significant (both $ps > .05$). However, for men low in agreeableness (i.e., one SD below the mean agreeableness score), the effect of experimental exposure to pornography on ASV was significant, $t(94) = 2.68, p < .001$, and moderately increased ASV (Cohen's $d = .55$).

These results for men were identical when repeating the analyses by dividing men into three groups based on their placement in the distribution of agreeableness, with men scoring in the 0–33rd percentile being classified as low in agreeableness, men scoring in the 34–66th percentile as moderate in agreeableness, and men scoring in the 67–100th percentile as high in agreeableness. The reason for using this division of men was to maximize the statistical power in the mediation analyses presented below while following the lead of comparable research in

Table 2 Hierarchical regression analyses predicting attitudes supporting violence against women

	ΔR^2	β
Men		
Step 1	.11**	
Agreeableness		-.18**
Step 2	.06*	
Past pornography consumption		2.50*
Step 3	.02	
Exposure group		2.44
Step 4	.05*	
Agreeableness \times Exposure group		-.26*
Total R^2	.23**	
n	98	
Women		
Step 1	.05*	
Agreeableness		-.13
Step 2	.07**	
Past pornography consumption		3.36**
Step 3	.00	
Exposure group		-.07
Total R^2	.12**	
n	100	

Missing values excluded listwise

** $p < .01$; * $p < .05$

this area that also used this classification approach (see Hald, Lange, & Malamuth, 2013; Malamuth et al., 2012). Overall, then, the findings provided clear support for males for the first three hypotheses.

Mediation Analyses

Due to the finding in the regression analyses of significant effects of experimental exposure to pornography on ASV among men only, the following sexual arousal mediation analyses were limited to men. Thus, to test the fourth hypothesis, the analytic framework of Edwards and Lamberts (2007) was employed. Essentially, Edwards and Lambert present a general analytical framework for combining moderation and mediation within the same model that integrates moderated regression analysis and path analysis. This framework clarifies how moderator variables influence the paths that constitute the direct, indirect, and total effects of mediated models. As in Edwards and Lambert, in the present analyses, we achieved this by combining two linear regressions: one for ASV and one for sexual arousal.

We separated the effect of exposure on ASV into an indirect effect component mediated through sexual arousal and a direct effect component, i.e., the effect not mediated through sexual arousal. Both components were allowed to be moderated by level of agreeableness and adjusted for past pornography consumption.

Table 3 Mediation analysis of sexual arousal among men

Variables	Mediated through sexual arousal i.e. indirect effect (95 % CI)	Not mediated through sexual arousal i.e. direct effect (95 % CI)	Total effect (95 % CI)
Low in agreeableness ($n = 33$)	12.42 (2.04, 23.57)*	-4.77 (-17.05, 7.42)	7.66 (.85, 14.46)*
Moderate in agreeableness ($n = 33$)	3.24 (-8.83, 15.58)	-1.47 (-14.89, 12.00)	1.78 (-4.66, 8.17)
High in agreeableness ($n = 32$)	7.47 (-1.01, 16.59)	-10.97 (-21.64, .43)	-3.49 (-10.14, 3.14)

Effect of exposure to pornography stratified by level of agreeableness and adjusted for past pornography consumption. For each subgroup the total mediated effect of sexual arousal on the experimental exposure-attitudinal relationship (right column) was separated into a mediated part (left column) and a direct part (middle column)

* $p < .05$

As shown in Table 3, the results showed a significant indirect effect and a significant total effect of experimental exposure to pornography on ASV against women for men low in agreeableness only. This both confirmed the findings of the regression analysis and was consistent with the fourth hypothesis that for men low in agreeableness sexual arousal may be a primary mediator of the relationship between experimental exposure to pornography and ASV (MacKinnon & Fairchild, 2009; Shrout & Bolger, 2002).

Discussion

Using a representative sample of young Danish adults and a randomized experimental design, we found that for both men and women lower agreeableness and higher past pornography consumption significantly predicted higher levels of ASV against women. These findings supported the first two hypotheses described above. For males only, and in keeping with the third hypothesis, we found the predicted moderating effect of agreeableness on the relationship between experimental exposure to pornography and ASV. Specifically, it was found that laboratory exposure to pornography significantly increased ASV only among men low in agreeableness. Finally, we found evidence consistent with the fourth hypothesis, namely that for men low in agreeableness, sexual arousal mediated the significant effect of exposure to pornography on ASV in a laboratory setting.

Overall, the findings were consistent with the predictions made by the HCM and the media literature on affective engagement and priming effects as described in the Introduction. Specifically, support was found for the added “fuel to the fire” contention by the HCM that pornography may prime “pre-existing” sexually aggressive attitudes (here ASV) and behaviors among the subgroup of users most likely to already hold such attitudes (here low in agreeableness participants) even in peaceful societies such as Denmark where rates of sexual crimes and the presumed number of men with high levels of proclivity to actually sexually aggress are relatively low (Kingston & Malamuth, 2011; Malamuth, 2003). Further, findings were consistent with the core contention of the media literature on affective engagement and

priming effects. This contention is that affective activation (here, sexual arousal) may be an important mediator of significant exposure-attitudinal relationships involving an “associative network” of emotions, cognitions, and attitudes.

More generally, the results also fit core presumptions of dominating models of aggression, such as the General Aggression Model (GAM) (Anderson & Bushman, 2002; Bushman & Anderson, 2002). Built on the theorizing of observational learning (Bandura, 1973), information processing, hostile attribution bias (Huesmann, 1998), and neoassociationism (Berkowitz, 1984), the GAM states that following the viewing of violence on television, “aggressive” cognitions are activated, the behavioral effects of which depend on individual- and contextual factors, such as personality characteristics, level of arousal, and the situational context (Coyne, Linder, Nelson, & Gentile, 2012). On a subgroup level, this may also extend to pornography where pre-existing cognitions and ASV may similarly be activated after exposure to pornography and the behavioral implication determined by individual- and contextual differences, including personality and sexual arousal as shown here (Hald et al., 2014). Importantly, in this regard, such an “individual difference” may also include gender. Thus, in the current experiment, effects of exposure were evident only among men classified as being low in agreeableness but not their female counterparts or women in general. More generally, this result was consistent with pornography research which shows gender to be a strong differentiating variable (see Hald, 2006; Stulhofer, Busko, & Schmidt, 2012).

The results demonstrated the importance of considering individual differences when investigating effects of pornography on ASV or related associations (Imhoff, Bergmann, Banse, & Schmidt, 2013; Krahe & Möller, 2010). Further, the results challenge the reliance on aggregate level data only by showing that on a subgroup level pornography may influence attitudes (Kingston & Malamuth, 2011) and that such effects may be suppressed at an aggregate level of investigation.

Although the findings suggest that, for low agreeable men, sexual arousal, generated by exposure to pornography, primes ASV, we cannot rule out the possibility that for these men a similar effect might occur following exposure to any sexually

arousing stimuli. Such an effect may be viewed as consistent with the arousal-affect hypothesis originally proposed by Zillmann (1971) (see also Zillmann, Bryant, Comisky, & Medoff, 1981). Derived from excitation-transfer theory (see Zillmann, 1983), the arousal-affect hypothesis contends that arousal entails both an excitation component and an affective component (Felson, 1996). Accordingly, if for low agreeable men sexual arousal per se is associated with negative emotions that activate certain associative networks (that includes ASV), this may occur regardless of the source of the sexual arousal. To test this hypothesis, it would be necessary in future research to include a condition wherein sexual arousal was stimulated by a source that was very different from pornography. If feasible, this might consist of arousal generated by a regular sexual partner of the research participant.

In the present study, we chose to use non-violent pornography, as contrasted to other types of pornography, primarily for three reasons. First, non-violent pornography is the type of pornography most frequently produced and consumed (Hald, Kuyper, Adam, & De Wit, 2013; Hald et al., 2014). Accordingly, the results of this study may be relevant to a larger group of consumers than if violent pornography had been used. Second, non-violent pornography was judged to be the most suitable for testing the “activation” or priming model because it does not portray any direct “messages” pertaining to the types of content assessed by our measures of ASV. In other words, using violent or degrading pornography (see Bridges et al., 2010) may have made it more difficult to assess if the effects of exposure on attitudes were due to a priming of ASV-related attitudes held prior to the experiment or “residuals” of pro-ASV messages and attitudes portrayed in violent pornography. Third, the few previous studies conducted on pornography induced sexual arousal and sexually aggressive outcomes have all used violent pornography. These studies suggest that sexual arousal is positively correlated with self-reported likelihood of committing sexual aggression (Davis, Norris, George, Martell, & Heiman, 2006; Malamuth, Feshbach, & Jaffe, 1977; Malamuth, Heim, & Feshbach, 1980) predictive of men’s propensity to commit rape (Lalumiere, Quinsey, Harris, Rice, & Trautrimas, 2003) and influence sexual decisions including the willingness to engage in rape supportive behaviors (Ariely & Loewenstein, 2006). Thus, using non-violent pornography may enable comparison with such similar previous research using violent pornography.

In this regard, it should be noted that, while studies investigating links between pornographic induced sexual arousal and more general aggressiveness have shown increased aggression as a function of such arousal (Jaffe, Malamuth, Feingold, & Feshbach, 1974), some studies have found the opposite effect. That is, pornographic induced arousal may have an inhibitory effect on subsequent aggression (Baron & Bell, 1977; Zillmann, 1971).

At least five limitations pertain to this study. First, although the experiment used the largest sample to date for this kind of

experimental research, some of the stratified analyses suffered from small cell sizes. This limits the power of the analyses, increases the risk of Type II errors, and potentially affects the reliability of the study’s findings. Second, the study utilized a sample of young adults. Consequently, the results may not translate to other age groups and therefore not be generalized to the population at large. Third, the study demonstrated only a short-term effect of exposure to non-violent pornography in a laboratory setting. Accordingly, this effect may not prevail over time, generalize to real world setting, or be different in magnitude across different kinds of exposure materials. However, the fact that there was a significant association between pornography exposure outside the laboratory and ASV was consistent with the possibility that effects might endure beyond the short term although the direction of the association could not be asserted within the present study design. Fourth, an alternative explanation for the findings of experimental exposure effects of pornography on ASV among low in agreeableness men was that the results were due to exposure to arousing content and not pornography per se and/or that it is not the “sexual” nature of the arousal but arousal per se that is the true mediator of the exposure effects found. However, this alternative explanation has been effectively negated in the early research on exposure to pornography and effects on aggressive responses (Donnerstein & Hallam, 1978; Jaffe et al., 1974). Nonetheless, the only way to dismiss such general arousal effects potentiating preexisting dominant responses would be to demonstrate discrete effects of pornography versus equivalently arousing nonsexual stimuli. Accordingly, we encourage future experimental research on this topic to include further controls for such possible mediation or possibility. Fifth, the ASV scores of the sample generally appeared low, i.e. below the scale mean. Although generally comparable with other studies using scales similar to those used here (see Hald et al., 2010), it is not surprising that the scores were not very high since we specifically chose the country of Denmark where we expected ASV rates to be relatively low in light of the overall support for general equality in this country (Hald, 2006). Certainly, in a country where ASV scores are relatively high we would actually expect even stronger effect than found in this study. Thus, we encourage future studies to oversample participants likely to be high on ASV to see if the results from this or similar studies are, in fact, fully comparable with the results from studies using samples such as that used here.

In summary, the present study highlighted the moderating influence of personality and affective states on attitudes in media research and underscored the importance of measuring both relevant traits (herein agreeableness) and states (herein sexual arousal). Further, the study provided at least three advances in pornography and related research. First, this study was the first study to simultaneously assess and examine the role of previous pornography consumption in naturalistic settings with experimentally manipulated exposure to pornography in the laboratory and assess their association with ASV against women. Both the

correlational data from naturalistic environments and the experimental data from exposure in the laboratory suggest that pornography exposure may be linked to higher ASV at least among some men. Second, this was the first study to show a key moderating effect of the “higher order” personality dimension/factor of agreeableness on the pornography exposure-attitudinal relationship. It revealed that exposure to pornography may increase ASV only among the subgroup of individuals most likely to already hold high levels of such attitudes. Third, this research demonstrated a previously hypothesized (Allen, Emmers, et al. 1995), but never experimentally investigated, mediation effect of sexual arousal on the significant relationships found between non-violent pornographic exposure and ASV.

Acknowledgments The study was supported, in part, by grants from The Health Insurance Foundation and The Augustinus Foundation.

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