



Self-Perceived Sexual Health Effects of Pornography Consumption
*A cross-sectional study among adult Norwegian pornography
consumers*

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Abstract

Introduction. Studies on pornography and sexual health-related subjects are centered around a negative effect paradigm and an effects tradition. Yet, with its widespread availability, pornography is most likely taking up a place in many persons' sexual lives. Therefore, it is important to draw a complete, balanced image. Studying peoples' perceptions of the effects of their pornography consumption supplements the studies on pornography and sexual functioning or satisfaction.

Objectives. The purpose of this study was to describe and analyze the association between the frequency of pornography consumption and the self-perceived effects of pornography use among adult Norwegian pornography users. We also assessed whether this association was mediated by perceived pornographic realism and if there were differences in the associations between men and women.

Methods. Data from a cross-sectional study among Norwegian adult pornography consumers were used, which included 1,317 male and 584 female participants. The data were collected in 2020 by Kantar Norway and made available for secondary analysis by the University of Oslo.

Results. A higher pornography frequency and considering pornography to be more realistic were associated with more positive self-perceived effects of pornography. Participants that watched more pornography tended to consider it to be more realistic. The association between pornography frequency and the self-perceived effects was partially mediated by perceived pornographic realism. Generally, the associations tested were slightly stronger for women than for men, yet, the differences were small.

Conclusion. People might perceive pornography to be beneficial for their sexual lives, however, attention should be paid to the degree of pornography's realism. Considering pornography to be realistic might be associated with positive self-perceived effects, nonetheless, not all pornography is realistic. This study showed the importance of focusing on pornography and porn literacy in sexual health interventions. Furthermore, additional studies with large, adult, representative samples are required to fully grasp the complexity of the associations between pornography and sexual health-related topics.

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Introduction

Pornography is slowly taking up an increasingly large place within the experience of sexuality, with over 91% of Norwegians having encountered pornography at least once in their lives (Kvalem et al., 2014, p. 7). In September 2022, three adult websites (xvideos, Pornhub, and xnxx) ranked respectively 10th, 12th, and 13th on the most visited websites worldwide list, with all-in-all seven adult websites that were in the top 50 (Similarweb, n.d.). In 2017, Pornhub celebrated its 10th anniversary and reported that it grew from 134 hours of videos uploaded on its website in 2007, to 476,291 hours in 2016, and from 1 million daily visits in 2007, to 75 million daily visits in 2017 (Pornhub, 2017). In 2021, Pornhub's most popular female performer had well over 1 *billion* views (Pornhub, 2021). These statistics illustrate the growing popularity of pornography in today's world.

Pornography is derived from the Greek word describing stories about or by prostitutes (Ribner, 2014). From a thematic analysis, Ashton et al. (2019) suggested the following definition: "Material deemed sexual, given the context, that has the primary intention of sexually arousing the consumer, and is produced and distributed with the consent of all persons involved" (p. 157). However, some material might be produced without sexual intentions but still considered arousing by some, and not all erotic material circulates with the consent of the people involved. Additionally, with 97 categories on Pornhub, the biggest supplier of online pornography, it is difficult to make a definition that is covering everything (Rothman, 2021).

The debate around the effects of pornography consumption, which is frequently called "the sex wars" or "porn wars", ignited in the USA in the 1970s (Altman & Watson, 2019, p. 260). In 1972, Mary Calderone stated that pornography can be positive for public health and that its potentially harmful effects are dependent on context and people (Rothman, 2021). This awarded her the title "witch, mistress of the Devil, prostitute of hell" by Christian groups (ibid., p. 5). Years later, in 1986, Surgeon General Koop organized a conference, during which experts composed a report on the topic of pornography and health. Surgeon Koop summarized the report with: "Pornography does stimulate attitudes and behavior that lead to gravely negative consequences for individuals and for society" (Koop, 1987, p. 945). Consequently, this was fuelling the debate about pornography as a public health issue and strengthening the claims for strict laws. Sadly, Koop had misinterpreted the report, as it described that there were no clear associations found between pornography and adverse health effects (Rothman, 2021).

In Norway in the 1970s, a similar movement started with a group of feminists, who after visiting a strip club, founded The New Feminists movement. They saw the strip club as pornography and degrading for women and wrote an opinion piece about their experience in *Dagbladet*. This led to a public campaign around the vision that “pornography is the theory, rape is the practice” (Korsvik, 2021, p. 231). Currently, in the Nordics, sexuality is widespread accepted and nudity has been left relatively unrestricted (Træen et al., 2004). However, in Norway, pornography has been subject to strict laws. For instance, focusing on genitals or ejaculation was considered offensive and not legally accepted (Regjeringen, n.d.). Although this law has been loosened to legalize a larger share of pornography, the production and distribution of pornography remain illegal (Lovdata, n.d.). Currently, there is an ongoing debate if this law should be further released to make space for Norwegian-produced (ethical) pornography (Unge Høyre, 2022). Nevertheless, Norwegian feminist groups, such as *Kvinnegruppa Ottar*, continue advocating against the *pornokultur*: The pornography culture (Mobæk, 2022).

Similar to the public debate, the literature on pornography has been focused on the negative associations between pornography and the consumers’ sexual lives and behaviors (McCormack & Wignall, 2017). This negative-effect paradigm does not reflect the multi-faceted aspects of pornography consumption and additional research is required to fully grasp the complexities around the association between people’s pornography usage and sexual health-related subjects (ibid.). An avenue to a better understanding of this relationship is the study of the self-perceived effects of pornography consumption, as this assesses the effects of pornography from the users’ perspective. This concept was introduced by Hald and Malamuth (2008), who found that generally, people believed pornography had positive effects on their lives. However, since this study, the field of the self-perceived effects of pornography has not been explored extensively, leaving room for further studies (Koletić et al., 2021).

Furthermore, Hald and Malamuth (2008) suggested that, while studying the self-perceived effects, it is important to consider the degree pornography is perceived to be realistic. Pornography can provide people with sexual scripts that tell them how to behave in (sexual) situations (Simon & Gagnon, 1973). Perceived pornographic realism is argued to influence the extent these scripts are applied to one’s life (Wright & Štulhofer, 2019). For example, depictions of condoms in pornography were associated with increased condom use among consumers of pornography (Schrimshaw et al., 2016) and people reported that, through pornography, they learned new skills and about their sexual selves (McCormack &

Wignall, 2017). Alternatively, people that acquired their sexual knowledge from pornography had a higher chance of holding incorrect sexual beliefs (Wright et al., 2022) and pornography was associated with “rape myth” acceptance (Foubert et al., 2011). Put differently, not all pornography is realistic or should be applied to people’s lives, yet, pornography has also been associated with positive, educational qualities. Consequently, taking perceived pornographic realism into account can be informative for interventions on porn literacy.

The WHO has stressed that in sexual health a “positive and respectful approach to sexuality and sexual relationships” and “mental and social well-being” are essential elements (WHO, n.d.). Pornography could be considered a tool for improving sexual health. For example, in a qualitative study, people reported that pornography had improved their communication on sexual subjects, made them more comfortable during sex, and more inclined to experiment sexually (Kohut et al., 2017). Additionally, the self-reported negative effects (such as having unrealistic ideas about sex or less interest in having sex) were indicated less frequently (ibid.). Yet, potential self-perceived negative effects of pornography could be declined sexual satisfaction and needing pro-longed sexual stimulation to reach a climax (Dwulit & Rzymiski, 2019). Therefore, next to clinical results, the study of the self-perceived effects is an interesting layer in the debate and literature around pornography consumption, as it focuses on the perceptions of people around their pornography consumption. These perceptions tell us how pornography makes people feel and what messages they take from pornography, which can be used for sexual health interventions and educational programs.

As such, I came into contact with Bente Træen, who is an expert on sexual health and oversees many data-collection projects in this area. We sought to match my research objectives with the data she had available. She had recently finalized the collection of expansive data on sexual health among a large, representative sample of adult Norwegians. This survey consisted of over 60 questions covering a variety of aspects of sexual health and well-being. After looking at the gaps in the literature and the data available, I constructed my research questions and objectives. The multitude of the survey’s questions allowed for a myriad of projects and for formulating my own aims and objectives.

Against this background, the overall purpose of this study is to explore the association between pornography consumption frequency and the self-perceived effects of pornography, as well as the mediating role of perceived pornographic realism in this association. To do this, data is drawn from the 2020 Sexual Health Study, which included a cross-sectional sample of

1,901 adult (18-85 years) Norwegian pornography users. Additionally, as the outcomes of studies on pornography consumption and sexual health were often different according to gender, we will look at men and women separately and assess if they differ significantly from each other in the associations studied (Sommet & Berent, 2022; Štulhofer et al., 2022). In summary, this study aims to better understand the implications of pornography on an individual level and the factors – perceived realism and gender – that might play a role in this association.

Literature Review

The Negative Effect Paradigm and the Effects Tradition

When searching SCOPUS and Web of Science for studies on pornography consumption and sexual health-related subjects (and subsequently the self-perceived effects), two patterns stood out: The negative effect paradigm and the effects tradition. Brooks (1995) argued that pornography involving the portrayal of women would lead to sexist attitudes among men, which was called the “centerfold syndrome”. However, aspects of this hypothesis have been critiqued (Wright, 2012). Yet, this work exemplifies the “effects tradition” in pornography research, which means that there is a strong focus on the effects of pornography (Miller et al., 2018, p. 470).

Studies have been dedicated to the potential risks associated with pornography consumption, such as casual or rough sexual behavior (Braithwaite et al., 2015; Vandenbosch & van Oosten, 2018; Vogels & O’Sullivan, 2019; Wright et al., 2021), sexual aggression or sexism (Krahé et al., 2022; Miller et al., 2020), problematic pornography consumption frequency or patterns (Malki et al., 2021; Sharpe & Mead, 2021). For instance, in a cross-sectional study, pornography consumption was found to be associated with engaging in risky sexual actions and aggressive behavior (Krahé et al., 2022). Similarly, scholars have focused on problematic pornography consumption and its associations with increased violence and turning toward illegal pornography, i.e. child sexual abuse material (Sharpe & Mead, 2021). Also, pornography is linked to believing in “rape myths” (Foubert et al., 2011). Rape myth acceptance refers to people believing that the victim might be to blame after rape or would lie about being raped. However, when controlling for sexist attitudes, there was no association between pornography and rape myth acceptance (Borgogna et al., 2022). These topics point toward a negative effect paradigm in the current academic literature on pornography consumption (McCormack & Wignall, 2017), as few studies were conducted on positive outcomes such as improved body image (Vogels, 2019), increased self-esteem (Kvalem et al.,

2014), or enhanced sexual functioning (Komlenac & Hochleitner, 2022; Sommet & Berent, 2022). However, pornography consumption can be an avenue toward a more fulfilling sex life (McCormack & Wignall, 2017) and the “effects tradition” should be complemented with studies on the self-perceived effects of one’s pornography consumption.

The Self-Perceived Effects of Pornography Consumption

In a systematic review of pornography and sexual health, a higher pornography frequency was found to be associated with improved comfort, self-acceptance, and reduced anxiety (Hakkim et al., 2022). Yet, the authors also found that regularly, pornography was related to adverse outcomes, such as increased sexism and sexual objectification (ibid.). An earlier systematic review identified contradictory outcomes in the literature concerning pornography consumption and sexual health, with some studies reporting positive and others negative associations between pornography and sexual satisfaction and functioning (Hoagland & Grubbs, 2021). With most studies in the field of pornography focussing on the effects of pornography, such as sexual functioning, performance, and satisfaction, the self-perceived effects of pornography have been represented to a lesser extent (Beáta et al., 2021; Charig et al., 2020; Hoagland & Grubbs, 2021; Sommet & Berent, 2022). Studying pornography’s effects from the consumers’ perspective should complement the “harm-oriented climate” (Koletić et al., 2021, p. 344). This will create a more comprehensive context on how pornography makes people feel and supplements the studies on people’s sexual functioning and satisfaction. Hald & Malamuth (2008) introduced this topic with the development of the Pornography Consumption Effects Scale (PCES), which was split into negative and positive self-perceived effects. In this study among Danish men, it was found that overall, the self-perceived effects of pornography consumption were considered to be more positive than negative.

The negative effect paradigm is also apparent in the studies on the self-perceived effects of pornography consumption. Studies have often focused on self-perceived pornography addiction and depression (Maddock et al., 2019; Sommantico et al., 2021) or on the need for more time and impulses to climax (Dwulit & Rzymiski, 2019). Miller et al. (2018) reported that infrequent consumers of pornography and more religious people were more likely to perceive pornography as harmful for their general and sex life. However, in their study, generally, the positive effects outweighed the negative effects (ibid.). In a cross-sectional study in Sweden, a pornography consumption frequency of three times a week was associated with self-perceived sexual discontent (Malki et al., 2021). In a sample of Polish

university students, younger age at the time of the first encounter with pornography was associated with self-perceived negative effects, as well as a BMI over 25, and 15.5% reported being addicted to pornography (Dwulit & Rzymiski, 2019, p. 8). However, the majority did not identify negative effects and a quarter reported benefits of pornography on their relationship's quality (ibid.). Furthermore, studies found that pornography use was associated with increased self-perceived sexual pleasure, a better understanding of sexual preferences and acts, a higher satisfaction with sexual life and relationships, improved understanding of sexual preferences and identity, and enhanced self-perceived sexual health (Dwulit & Rzymiski, 2019; Kvaalem et al., 2014; Lippmann et al., 2023). In a qualitative study, people reported positive self-perceived effects of pornography, such as improved communication, feeling more comfortable sexually, and being more inclined to experiment, while self-reported negative effects (such as unrealistic ideas about sex or not feeling like having sex) were indicated less frequently (Kohut et al., 2017).

Studies on the effects of pornography consumption have regularly focussed on sub-groups of the lesbian, gay, bi, trans, or queer (LGBTQ+) community. For example, Hald et al. (2013) reported that 97% of the men who have sex with men (MSM) expressed positive effects of pornography on their sex lives and sexuality. This result was comparable to a study of Norwegian MSM (Hald et al., 2015). Additionally, studies on this topic have frequently been among samples of young adults or adolescents (Kvaalem et al., 2014; Peter & Valkenburg, 2010; Vogels, 2019). Mulya and Hald (2014) found positive self-perceived effects of pornography among Indonesian university students, yet, in a study with Danish adults congruent results emerged (Hald & Malamuth, 2008). However, Mulya and Hald's (2014) study found more negative than positive self-perceived effects on people's attitudes toward sex, which was dissimilar to Hald and Malamuth's (2008) study. Štulhofer et al.'s (2022) reported that 61.7% of German adults indicated that pornography did not have an impact on their sexuality (p. 5). The disparate outcomes might emerge from the samples' cultural differences. Štulhofer et al. (2021) called for more studies on the self-perceived effects of pornography consumption, to increase the variety of the studies' cultural contexts.

Norway is an interesting setting for such research, as the country is balancing between its history with rigid laws and the more contemporary approach to sexual freedom (Sabo, 2005). For example, in Oslo, the shops selling erotica that were previously found in the backstreets, are currently moving towards the city center (Træen et al., 2004). Also, the Nordic countries are often seen as having reached a high level of gender equality and

expressing little resistance towards nudity and sexuality (Træen et al., 2004). Nonetheless, in Norway, pornography has been subjected to multiple restrictions and Norwegian women have conveyed negative attitudes towards pornography (e.g., that it should be banned) (ibid.). However, in a sample of adult Norwegians, 90% indicated that they had encountered pornography (Træen et al., 2004, p. 198), which was also found among queer Norwegians (Træen & Daneback, 2013). Landripet & Štulhofer (2015) found that over 57% of Norwegian men consumed pornography multiple times per week (p. 1137). Yet, in a sample of heterosexual Norwegian couples, 61.7% percent indicated that both of them did not use pornography over the past 12 months (Daneback et al., 2009, p. 750). Kvalem et al. (2014) studied mainstream and non-mainstream pornography separately, among Swedes and Norwegians, and for both categories, increased pornography consumption was associated with more positive self-perceived effects of pornography. In a study in Norway, identifying as female, not exclusively heterosexual, and being older were predictors of more positive self-perceived effects of pornography (Koletić et al., 2021). Alternatively, a younger age of first encounter with pornography was associated with more negative self-perceived effects (ibid.).

In studying the self-perceived effects of pornography, there are some biases and limitations that should be addressed. Biased optimism or cognitive dissonance might lead to people underreporting the self-perceived negative effects of pornography consumption for themselves (Hald et al., 2015; Miller et al., 2018). Similarly, the third-person effect is also identified as a potential bias in the study of self-perceived effects, which means that someone might underestimate the negative effects of pornography for themselves (Hald & Malamuth, 2008). Furthermore, certain elements in pornography should be treated with caution and the consumer must be mindful of which aspects of pornography one brings into their lives. For example, pornography could promote condom use (Schrimshaw et al., 2016), yet, also promote “rape myth” acceptance (Foubert et al., 2011). Therefore, porn literacy, to distinguish the realistic elements from unrealistic ones, is crucial.

The Mediating Role of Perceived Pornographic Realism

Scholars have been investigating what is mediating the association between pornography consumption and sexual health-related outcomes. Mediating factors that have been suggested are perceived pornographic realism (Charig et al., 2020; Krahé et al., 2022), sexual flexibility (Komlenac & Hochleitner, 2022), and genital appearance satisfaction (Kvalem et al., 2014). There is a need for more research on the variables influencing the association, and in particular, the role of perceived pornographic realism should be explored

more extensively (Hald & Malamuth, 2008; Kvaalem et al., 2014; Peter & Valkenburg, 2010). Perceived pornographic realism encompasses the idea that what one sees in pornography can be applied in or is close to real life, which can be influenced by sexual experience, critical thinking (Peter & Valkenburg, 2010), and parental education on pornography (Taylor, 2022). Frequently, the reason to watch pornography is for sex education (Maas et al., 2023). However, as mentioned before, pornography has been associated with adverse sexual health, such as increased condomless sex, aggression, and sexism (Krahé et al., 2022; Miller et al., 2020; Schrimshaw et al., 2016). Therefore, taking information directly from pornography might be risky. People that consider pornography to be realistic might be more prone to copy the attitudes and behavior they see in pornography into their own lives (Tan et al., 2022). In a study on the source of information of sexual knowledge and false sexual beliefs, people that got the majority of their information from pornography had a higher chance of holding incorrect sexual beliefs (Wright et al., 2022). Therefore, while studying the self-perceived effects, it is informative to take into account the degree of perceived pornographic realism.

Two main theories have been seeking to explain perceived pornographic realism: The sexual scripting theory (Simon & Gagnon, 1973) and the acquisition, activation, and application model (3AM) (Wright, 2011). The sexual scripting theory revolves around the scripts people acquire as a recipe for how to behave, react, or act in a sexual situation (Simon & Gagnon, 1973). Simon and Gagnon (ibid.) laid down the importance of a script by arguing that “without the proper elements of a script that defines the situation, names the actors, and plots the behavior, nothing sexual is likely to happen” (p. 13). They argued that even though all elements that might lead to a sexual act are there (e.g., someone one is attracted to is present or passion), without a script it is unlikely that something sexual will occur. Scripts are useful to establish the right order of actions, tackle new situations, and understand and send the right signals. Both theories have been examining the way people acquire and apply knowledge about (sexual) behavior. The 3AM model, which is also centered around (sexual) scripts, is built on the acquisition, activation, and application of a script. Acquisition refers to the learning of a new script. After the acquisition, an event might trigger the activation of the script, which could, but not necessarily, result in its application (Wright, 2011). For example, perceived realism has been associated with engaging in condomless sex, as one might be informed, through pornography, of the script of not using a condom during sex (Wright et al., 2021).

It is often thought that people realize that pornography is not always similar to what one might experience in real life (Peter & Valkenburg, 2010). However, generally, there is a positive association between pornography frequency and perceived realism (Peter & Valkenburg, 2010; Vogels, 2019). In other words, the more one watches pornography, the more it will occur to them as realistic. In a longitudinal study, perceived realism declined between the two time points, while pornography consumption grew (Wright & Štulhofer, 2019). This might imply that with increased sexual experience, perceived realism decreases. Nonetheless, this study was among adolescents, and these paths might not be linear over one's lifetime. In deciding if a script should, or should not, be applied, consequences, rewards, and punishments play essential roles (Wright, 2011). Even if in pornography the application of a script is portrayed positively, cultural, social, or religious expectations might inhibit the application of the script (Wright, 2011).

Among Scandinavian young adults, Kvale et al. (2014) found that there was a positive association between pornography frequency and perceived realism, and between perceived realism and the self-perceived effects. In other words, increased pornography frequency was associated with considering pornography to be more realistic and regarding pornography as realistic with pornography having a more positive self-perceived effect. This is similar to Mulya & Hald's (2014) study, which established that increased perceived realism was associated with more positive self-perceived effects of pornography consumption. Štulhofer et al. (2010) investigated the link between pornography and sexual scripting. They asked what people considered important in pornography and what was important in their real-life sexual experiences, and compared the scores. They found that more overlap of what one considers as important in pornography and in real-life was associated with sexual satisfaction (ibid.). In a qualitative study, pornography was considered as expanding people's sexual identities and techniques (McCormack & Wignall, 2017). Namely, the scripts people acquired from pornography translated into the augmentation of people's sexual horizons (ibid.). A study among American men having sex with men found that the portrayal of condom use in pornography was associated with more frequent condom use by the viewers (Schrimshaw et al., 2016). These studies illustrate that the outcomes of studies on perceived realism and the self-perceived effects are instrumental for interventions and education on porn literacy (Krahé et al., 2022). Scholars have recommended that pornography should be included in comprehensive sex education and that professionals should be taught on the handling of this topic (Grubbs et al., 2023). Despite a consensus on the importance of perceived realism, the

studies' results are incongruent depending on the setting, outcome, and study design (Charig et al., 2020).

Aims and Objectives

From the literature study, the gaps that were identified in this field were three-fold. First, despite the relevance of looking into the self-perceived effects of pornography, studies in this area were relatively scarce. Second, more research is needed on the mediating factors in the association between pornography consumption and sexual health-related outcomes, in particular on perceived realism (Hald & Malamuth, 2008; Kvaalem et al., 2014; Peter & Valkenburg, 2010). Third, in previous studies, the individuals studied include, quite frequently, college or university students (Braithwaite et al., 2015; Zohor Ali et al., 2021), adolescents (Nguyen et al., 2020), high-school students (Mattebo et al., 2013), heterosexuals (Landripet & Štulhofer, 2015; Miller et al., 2020), or a sub-group of the LGBTQ+ community (Nelson et al., 2014). This study will add to this with a large representative sample of adult Norwegian pornography consumers. Additionally, this study will address the gaps in the literature by looking at the association between pornography frequency and the self-perceived effects, as well as at perceived pornographic realism as a mediator. Yet, because of the cross-sectional nature of this study, it is not possible to comment on causality. Finally, we will look into the association for men and women separately and test if there are statistically significant differences.

The objectives of the study are to:

1. Describe and analyze the relationship between the frequency of pornography consumption and the self-perceived effects of pornography use;
2. Assess whether the relationship between the frequency of pornography consumption and the self-perceived effects of pornography use is mediated by perceived pornographic realism;
3. Explore if there are statistically significant differences in the association between men and women.

Methodology

Data Collection, Design, and Population

The participants for this cross-sectional study were reached through the KANTAR/Norsk Gallup's web panel¹. This web panel included over 40,000 active partakers who have been randomly selected based on the national phone registry. The sample was

¹ See <https://www.galluppanelet.no/>

representative of 98% of the Norwegian population that has access to the internet. There was no possibility of self-recruitment and the panel's members were frequently contacted to participate in voluntary and anonymous questionnaires. Gallup provided only small incentives for participants, so they did not boost participation. These incentives were points participants could exchange for small gifts. The members of the Gallup Panel came from varied backgrounds concerning age, gender, and socio-economic characteristics, and also differed in political and cultural beliefs.

In March 2020, a probability sample of 4,160 out of 11,685 participants in the KANTAR/Norsk Gallup's web panel responded to an e-mail with the request to complete a questionnaire on sexual health, thus reflecting a response rate of 35.6%. The information from the questionnaire was supplemented with background information about the participants that Kantar had stored. The questionnaire was sent to people to fill in digitally and on their own. Over half (51%) did this on their mobile phones. From this sample, the participants that indicated that they were pornography consumers were selected. After excluding the missing values for the exposure and the outcome, the participants were between 18 and 85 years old ($N=1,901$) with a mean age of 43.5 ($SD=15.3$) years old. The sub-sample included more men (69.3%) than women (30.7%). The sample was leaning towards being university educated (63.0%), non-religious (65.4%), and either married, cohabitating, or in a registered partnership (62.6%) (see Table 1).

The study was per the ethical and privacy guidelines laid down by the Personal Data Act, the Norwegian Data Protection Authority, Norway's Market Research Association, the European Society for Opinion and Market Research, and the EU Privacy Regulations (GDPR). Kantar did not provide information on the participants' identity and the data cannot be linked to individuals. The data they provided was "statistically processed" or data in which "it is not possible to see what individuals have answered" (Kantar, n.d.). Additionally, they had "routines" for anonymizing the data, information was automatically deleted, and it was processed by a small group (ibid.). For this project, the University of Oslo offered this anonymized data for secondary analysis.

Before answering the questions related to pornography, people were presented with the following definition: "By pornography is meant any type of professionally produced material that shows or describes genitals, and clear and distinct sexual acts. Please note that nude pictures of men and women posing or acting naked ... which do not contain "clear sexual acts" – are not considered pornography" (definition taken from Hald, 2006). The

questions on pornography consumption, the self-perceived effects, and perceived pornographic realism were only shown to the participants that indicated that they had previously consumed pornography.

Measures

Frequency of Pornography Consumption

The frequency of the participants' pornography consumption over the last 12 months could be answered along eight points: "Never" (1), "Once" (2), "A couple of times" (3), "Several times a year" (4), "About once a month" (5), "About once a week" (6), "Several times a week" (7), and "Daily" (8). This question was drawn from the German Sex Survey 2019 (Matthiesen et al., 2021).

Self-Perceived Effects of Pornography Consumption

Respondents' self-perceived effects of pornography consumption were measured with 11 items (Rosser et al., 2013). The heading was "How has pornography affected the following issues to a good or bad extent?". The items were: "Your relationship with your own body", "Your knowledge of sexual acts", "Your masturbation frequency", "Your attitudes towards sex", "How frequently you are looking for sex partners", "Your interest in trying new sexual acts or positions", "Your interest in having protected intercourse", "Your understanding of what you like to do sexually", "Your interest in having unprotected intercourse", "Your pleasure when having sex with your partner(s)", and "Your understanding of your sexual orientation". The answers were given on a 5-point Likert scale and a higher outcome was interpreted as a more positive self-perceived effect of one's pornography consumption. The construct had a high internal consistency (Cronbach's alpha = 0.91).

Perceived Pornographic Realism

This variable was developed out of four items from Rosser et al. (2013). The items included: "I think pornographic depictions of sex are realistic", "One can learn a lot about sex when watching pornography", "Pornography helps me (helped me) learn how to behave when I have sex with someone", and "Pornographic sex is equal to sex in real life". Answers were given on a 5-point Likert scale ranging from completely disagree (1) to completely agree (5). Thus, a higher score reflected considering pornography to be more realistic and educational. The internal consistency was good (Cronbach's alpha = 0.78).

Confounders

The confounders included were age (continuous), gender (man (0), woman (1)), education, religion, and marital status. Education was split between people with no university

education (6-13 years of school) (0) and people with a university education (a Bachelor's degree or higher) (1). Religion was separated into people that did not affiliate with a specific religion (0) and religious affiliation (Catholicism, Islam, Protestantism, etc.) (1). Marital status had been divided into participants that were unmarried, separated, or widowed (0) and people that were married, cohabitating, or having a registered partnership (1). The choice of confounders was based on previous studies that identified that these variables might influence pornography frequency and sexual health-related outcomes (Chen et al., 2015; Dwulit & Rzymiski, 2019; Miller et al., 2018). The confounders were dichotomized to facilitate the statistical analyses.

Statistical Analysis

The statistical analyses were done in STATASE 17 (StataCorp, 2021). Twelve people that indicated the "other" category when asked about their gender were dropped, due to complexities with multi-group analyses with a low number of participants. As we were interested in pornography consumers, the participants that indicated that they had never watched pornography were not included (~16%). Participants that did not respond to the questions regarding their pornography use frequency (~3%) and the self-perceived effects (~30-33% missing) were excluded. For the latter, the range in percentages indicated that the missing values per question varied. Thus, there were participants that answered part of the questions, but not all, that covered the self-perceived effects. As we only included the participants that answered all 11 questions, the missing values were higher than 33%. The missing values for the confounders and perceived pornographic realism were below 5% and were estimated through the full-information maximum likelihood method (FIML). FIML is one of the methods that is suitable to deal with missing values in structural equation modeling (SEM) (Olinsky et al., 2003). All in all, this resulted in a sub-sample of 1,901 participants. As robust checks, this analysis' output was compared to two alternative models. First, the output was assessed along a model with all missing values excluded (without FIML estimation) (see Tables 11 and 12, model 1). Bootstrapping with 5000 repetitions was applied (Hayes, 2009). Second, the model was compared to one with all missing values estimated through FIML (except for the exposure) (see Tables 11 and 12, model 2). Due to computational issues because of the complexity of the models, bootstrapping was only applied in the models without FIML estimations.

Descriptive analyses were conducted for the socio-demographic characteristics of the pornography-consuming sub-sample with and without the missing values excluded for the

exposure and the outcome (see Table 1). For readability, pornography frequency was divided into three categories in Table 3: Never/once, infrequent, and frequent. Yet, for the final analysis pornography frequency was used with the original eight choices. Similarly, the mediating variable's and outcome's sum scores were used for the descriptive statistics, however, for the structural equation model, they were treated as a latent construct. ANOVA and T-tests were done to identify differences in pornography consumption patterns by age, education, gender, marital status, and religious affiliation. A factor analysis was conducted to identify possible underlying constructs. Also, correlation matrixes – separated by gender – covering all variables and their statistical significance were created (see Tables 4 and 5).

Structural equation analyses were done to explore the association between pornography frequency and the self-perceived effects of pornography, and the mediating role of perceived realism. SEM can be used for both longitudinal studies and cross-sectional studies (Lei & Wu, 2007). It is also referred to as a path analysis, as the analysis is based on arrows going into the variables and it is often portrayed in path diagrams. In this path analysis, a misunderstanding is that one seeks to establish causation, yet, it is “to determine if the causal inferences of a researcher are consistent with the data” (Bollen, 1989, p. 38). As this study included a mediation analysis, SEM was a particularly useful type of regression analysis because the indirect, direct, and total effects could easily be determined (Hallgren et al., 2019). The direct effect is the association between the predictor and the outcome variable, while the indirect follows the path that goes through the mediating variable (Ullman & Bentler, 2013). The indirect and direct effects and the statistical significance of the paths were assessed to evaluate the mediation.

The assumptions a SEM model must adhere to – a normal distribution of the data, specification of the correct model, and a large sample – were evaluated, as well as the model fit, which is an essential factor in SEMs (Lei & Wu, 2007; Ullman & Bentler, 2013). Multi-group analyses were executed as we were interested in the differences between men and women (Chin et al., 2012). To test these differences, we estimated two models. The first had restricted parameters (i.e., the same) for men and women. In the second, these parameters were allowed to differ between men and women. Through likelihood ratio (LR) tests, the model fit of the two models were compared to assess if there were statistically significant differences between men and women (Bentler & Bonett, 1980; Ryu & Cheong, 2017).

Results

Descriptive Statistics

Table 1

Socio-Demographic Characteristics of the Pornography Using Sub-sample, Before and After Excluding the Missing Values for the Exposure and the Outcome

	Total study participants sub- sample % (N) ^a	Participants included for analysis % (N) ^b
Gender		
Male	58.2 (2035)	69.2 (1317)
Female	41.8 (1459)	30.7 (584)
Religious affiliation		
None	62.6 (2140)	65.4 (1227)
Yes	37.4 (1280)	34.6 (650)
Education		
No university education	36.1 (1256)	37.0 (700)
University educated	63.9 (2221)	63.0 (1193)
Marital status		
Unmarried, separated, widowed	36.8 (1284)	37.5 (712)
Married, cohabitating, partnership	63.2 (2210)	62.5 (1189)
Age		
<30 years	21.4 (749)	22.4 (426)
30-44 years	30.9 (1079)	35.8 (681)
45-59 years	23.8 (832)	24.7 (469)
60+ years	23.9 (834)	17.1 (325)
Age in years <i>M</i> (<i>SD</i>)	45.8 (16.6)	43.5 (15.3)

Note. ^aThis sample included all pornography consumers in the sample, without the missing values excluded. ^bThis sample depicted the pornography users with the missing values omitted for the exposure and the outcome.

In Table 1, the socio-demographic characteristics of the sub-sample of pornography consumers without the missing values for the exposure and the outcome excluded were compared to the one in which those were omitted. The latter sub-sample was used in the final analyses. Among the missing values there were more women, which tilted the gender balance to more men (69.2%) than women (30.7%) in the final sample. The sub-sample's age ($M=43.5$) also dropped slightly, which meant that there were more older people that did not answer the pornography-related questions. For the other variables, the distribution was relatively similar when comparing the total sample of pornography consumers to the final sample.

Table 2

Distribution of the Missing Values of the Selected Variables

Variable	Missing	
	N	%
Education	17	0.49
Religion	74	2.12
Pornography frequency	113	3.23
Self-perceived effects	1050-1170	30.05-33.49
Perceived realism	83-165	2.38-4.72

Note. For the self-perceived effects and perceived realism, a range of percentages of missing was given because the percentages of missing values varied per item.

As described in Table 2, the missing values were mostly due to participants that did not answer one of the questions regarding the self-perceived effects of pornography. These were around 30% missing, while for other variables the missing values were below 5%. For gender, age, and marital status there were no missing values.

Table 3

Frequency of Pornography Consumption in the Past 12 Months by Gender, Religious Affiliation, Educational Level, Marital Status, and Age among Study Sample

	Never/Once % (N)	Infrequent ^a % (N)	Frequent ^b % (N)	<i>p</i>
Gender				.00***
Male	3.3 (43)	38.4 (506)	58.3 (768)	
Female	14.0 (82)	71.4 (417)	14.6 (85)	
Religious affiliation				.00***
None	6.0 (73)	46.0 (565)	48.0 (589)	
Yes (Catholic, Islam, etc.)	7.8 (51)	53.1 (345)	39.1 (254)	
Education				.59
No university education	6.0 (42)	48.7 (341)	45.3 (317)	
University educated	6.9 (82)	48.5 (579)	44.6 (532)	
Marital status				.00***
Unmarried, separated, widowed	6.2 (44)	42.1 (300)	51.7 (368)	
Married, cohabitating, partnership	6.8 (81)	52.4 (623)	40.8 (485)	
Age				.00***
< 30	8.2 (35)	47.0 (200)	44.8 (191)	
30-44	4.8 (33)	39.8 (271)	55.4 (377)	
45-59	5.5(26)	50.3 (236)	44.1 (207)	
60+	9.5 (31)	66.5 (216)	24.0 (78)	

Table 3 (continued)

	Men <i>M</i> (SD)	Women <i>M</i> (SD)	<i>p</i>
Pornography frequency	5.47 (1.68)	3.79 (1.40)	.00***
Self-perceived effects	2.62 (0.82)	2.23 (0.81)	.00***
Perceived realism	2.33 (0.77)	2.01 (0.71)	.00***

Note. ^aInfrequent: A couple of times a year to once a month, ^bFrequent: Once a week to daily. *** $P < 0.001$.

As displayed in Table 3, men tended to watch pornography more frequently ($M=5.47$) than women ($M=3.79$). Men reported that the self-perceived effects of their pornography consumption were slightly positive ($M=2.62$), while for women this was somewhat negative ($M=2.23$). Both women ($M=2.01$) and men ($M=2.33$) perceived pornography to be slightly unrealistic, as lower scores indicated a lesser degree of perceived realism. For gender, religious affiliation, age, and marital status there were statistically significant differences in pornography consumption frequency among the groups. There was no statistically significant difference between being university-educated and not university-educated. Over the past 12 months, men tended to watch pornography more frequently than women, as 58.3% of men were frequent pornography consumers, while among women this was only 14.6%. People above 60 years old were predominantly infrequent pornography consumers (66.5%), while over half (55.4%) of the people between 30 and 44 years frequently watched pornography. Participants that indicated not being affiliated with a religion were slightly more frequent viewers of pornography (48.0% versus 39.1%). Married people consumed pornography less frequently (40.8%) than unmarried people (51.7%).

Correlations Between the Selected Variables

Table 4

Pearson Correlations Between the Study's Main Variables for Men

	1	2	3	4	5	6
1. Age						
2. Education	.01					
3. Marital status	.22***	.04				
4. Religious	.23***	.01	.07**			
5. Self-perceived effects	-.22***	-.07**	-.15***	-.05		
6. Perceived realism	.03	-.06*	-.09***	.05	.46***	
7. Pornography frequency	-.38***	.05	-.18***	-.18***	.37***	.14***

Note. *** $P < 0.001$, ** $P < 0.01$, * $P < 0.05$.

As shown in Table 4, for men, perceived realism ($r=.46$) and pornography frequency ($r=.37$) were positively associated with the self-perceived effects of pornography. Age was negatively associated with the self-perceived effects of pornography ($r=-.22$) and pornography frequency ($r=-.38$). In other words, men that considered pornography to be more realistic and were more frequent consumers considered the effects of pornography on their sexual lives as more positive. The older men were, the more negative they perceived the effects of their pornography consumption and the less frequently they watched pornography.

Table 5*Pearson Correlations Between the Study's Main Variables for Women*

	1	2	3	4	5	6
1. Age						
2. Education	.03					
3. Marital status	.17***	.05				
4. Religious	.19***	-.01	.12**			
5. Self-perceived effects	-.04	-.07	-.15***	-.05		
6. Perceived realism	.05	-.16***	-.11*	-.01	.54***	
7. Pornography frequency	-.15***	-.04	-.13**	-.12**	.35***	.20***

Note. *** $P < 0.001$, ** $P < 0.01$, * $P < 0.05$.

As indicated in Table 5, similar to men, for women a higher pornography frequency was positively associated with considering the effects of pornography to be more positive ($r=0.35$) and assessing pornography as more realistic ($r=0.20$). Additionally, a higher degree of self-perceived realism was associated with more positive self-perceived effects ($r=.54$). Thus, watching more pornography was associated with viewing it as a positive addition to one's sexual life and realistic. Considering pornography as more realistic was related to perceiving the effects of pornography to be more positive.

Factor Analysis and Distribution of the Items

Table 6*Factor Analysis of the Items of the Self-Perceived Effects of Pornography*

	Factor loading
Your relationship with your own body	0.63
Your knowledge of sexual acts	0.75
Your masturbation frequency	0.67
Your attitudes towards sex	0.79
How frequently you are looking for sex partners	0.66
Your interest in trying new sexual acts or positions	0.75
Your interest in having protected intercourse	0.60

	Factor loading
Your understanding of what you like to do sexually	0.80
Your interest in having unprotected intercourse	0.70
Your pleasure when having sex with your partner(s)	0.77
Your understanding of your sexual orientation	0.77

As depicted in Table 6, all 11 items of the self-perceived effects of pornography loaded on one factor. This suggested a good internal validity of the construct we used to create the self-perceived effects of pornography consumption. Furthermore, it showed that there were no underlying constructs that loaded on a separate factor. Consequently, the items were combined to create one construct that represented the self-perceived effects of pornography.

Table 7

Means and Standard Deviations of Items Used to Assess the Self-Perceived Effects of Pornography

	Men		Women	
	<i>M</i>	SD	<i>M</i>	SD
Your relationship with your own body	2.19	1.06	2.03	1.06
Your knowledge of sexual acts	2.91	1.13	2.43	1.15
Your masturbation frequency	3.23	1.16	2.53	1.20
Your attitudes towards sex	2.65	1.07	2.24	1.05
How frequently you are looking for sex partners	2.02	1.10	1.67	0.92
Your interest in trying new sexual acts or positions	2.95	1.21	2.49	1.14
Your interest in having protected intercourse	2.17	1.13	1.98	1.08
Your understanding of what you like to do sexually	2.96	1.16	2.61	1.22
Your interest in having unprotected intercourse	2.29	1.15	1.75	0.97
Your pleasure when having sex with your partner(s)	2.67	1.23	2.38	1.21
Your understanding of your sexual orientation	2.78	1.27	2.35	1.23

Note. *M* = Mean, *SD* = Standard deviation.

The means and standard deviations of the items related to the self-perceived effects of pornography were relatively similar and were centered around the middle of the Likert scale, which ranged from one to five (see Table 7). For men, the question on the frequency of

looking for sex partners scored on the lower end ($M=2.02$), while the question related to masturbation frequency scored on the higher end ($M=3.23$). Put differently, pornography was perceived to have a slightly negative effect on the frequency that men were looking for sex partners and a slightly positive effect on one's masturbation frequency. Among women, the effect of pornography on the frequency of looking for sex partners was also answered as more negative ($M=1.67$). In general, women considered the self-perceived effects of pornography as slightly negative.

Table 8

Means and Standard Deviations of Items of Perceived Pornographic Realism

	Men		Women	
	<i>M</i>	SD	<i>M</i>	SD
I think pornographic depictions of sex are realistic	2.21	0.91	1.90	0.85
One can learn a lot about sex when watching pornography	2.96	1.06	2.66	1.11
Pornography helps me (helped me) learn how to behave when I have sex with someone	2.29	1.07	1.84	0.97
Pornographic sex is equal to sex in real life	1.87	0.83	1.60	0.74

Note. *M* = Mean, SD = Standard deviation.

The four items that were used to measure perceived realism were also concentrated around the middle of the 5-point Likert scale, as indicated in Table 8. Both men ($M=1.87$) and women ($M=1.60$) considered pornography to be slightly unequal to sex in real life and somewhat agreed that one can learn a lot about sex from pornography ($M_{men}=2.96$, $M_{women}=2.66$). The participants disagreed slightly on thinking that pornography is realistic ($M_{men}=2.21$, $M_{women}=1.90$) and that it can help them to learn how to behave when having sex ($M_{men}=2.29$, $M_{women}=1.84$).

The Model Fit and Assumptions of Structural Equation Models

Table 9

Model Fit Structural Equation Model, With and Without Mediation

	RMSEA	CFI	TLI
Without mediation	0.087	0.868	0.847
With mediation	0.084	0.848	0.823

In SEM, it is important that the model fit is sufficient (Ullman & Bentler, 2013). For the RMSEA, a value below .10 is necessary, and ideally below .06, while for the CFI this would preferably be close to .95 (Lei & Wu, 2007). The values depicted in Table 9 are for the models with the missing values for the exposure and the outcome excluded. For both models, the RMSEA was below .10, and close to 0.06, and the CFI was close to .95, which indicated an acceptable model fit (Lei & Wu, 2007).

Figure 1

Test of Normal Distribution of Pornography Frequency

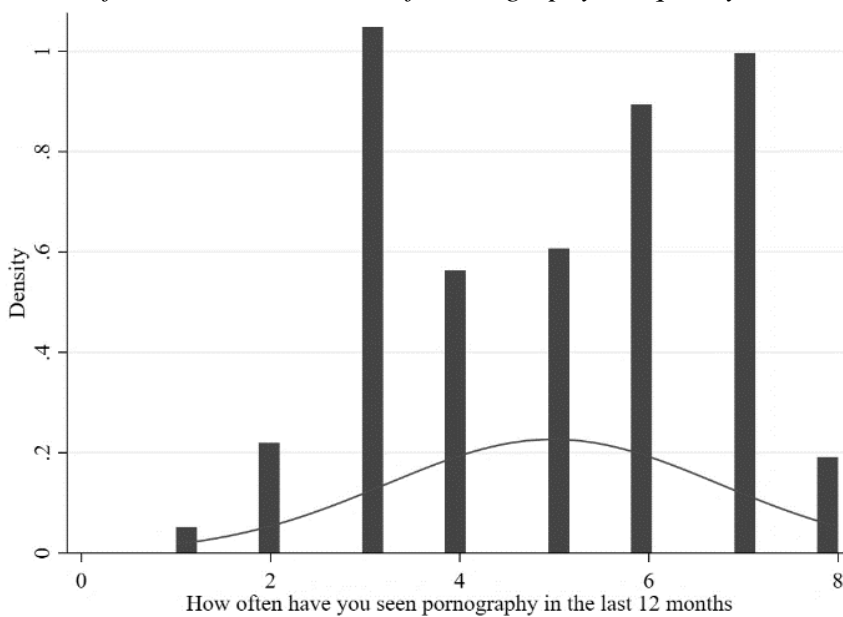


Figure 2

Test of Normal Distribution of the Sum Variable of the Self-Perceived Effects

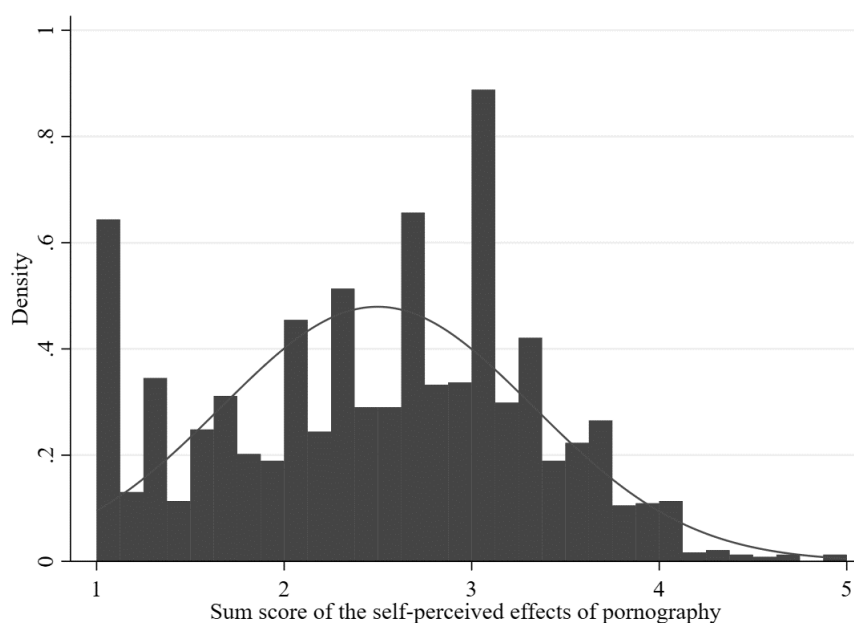
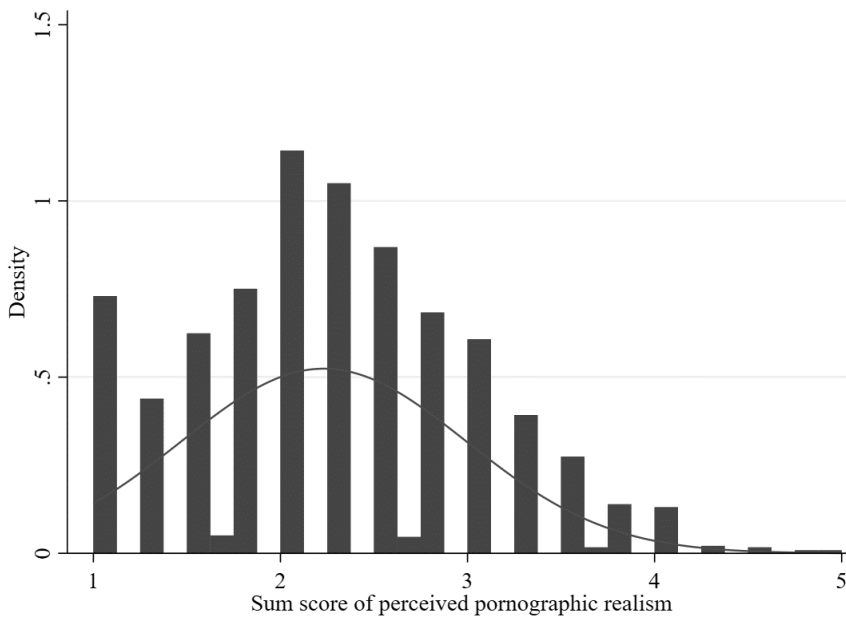


Figure 3

Test of Normal Distribution of the Sum Variable of Perceived Pornographic Realism

**Table 10**

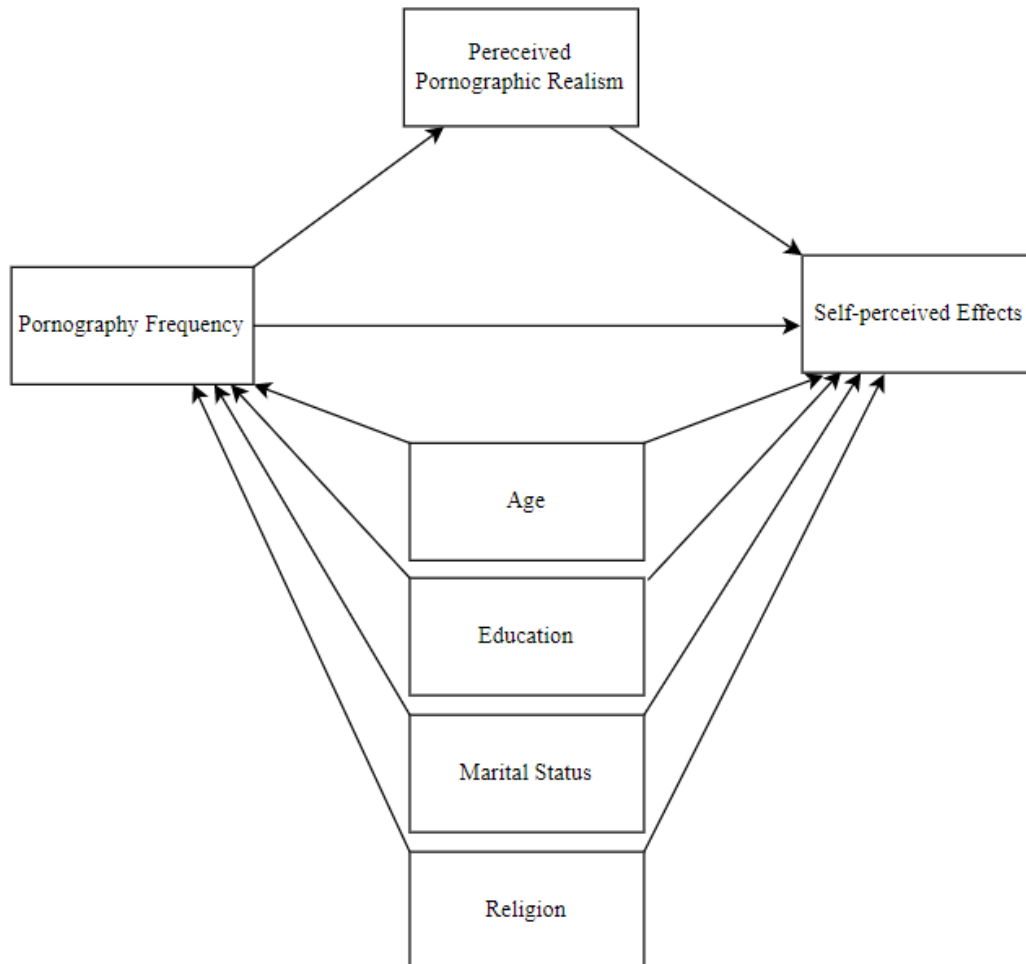
Distribution of the Main Variables

Variable	Pr (skewness)	Pr (kurtosis)	Prob>chi2
Pornography frequency	0.022	0.000	0.000
Self-perceived effects	0.031	0.000	0.000
Perceived realism	0.000	0.025	0.000

We tested if the models complied with the assumptions SEM should adhere to: A normal distribution of the data, the correct model specification, and a large sample (Lei & Wu, 2007). To test if the data were normally distributed, histograms, kdensity plots, and mvtests were conducted. However, as depicted in Figures 1, 2, and 3, these indicated that the data were not completely normally distributed. Furthermore, the mvtests and the p -values for the skewness and kurtosis (as shown in Table 10), were statistically significant, which indicated non-normality. Consequently, when the data are not normally distributed, it is preferred that there are at least 200 to 400 observations (Lei & Wu, 2007). In this study, the sample for both men and women exceeded the 400 observations. Thus, the sample was large enough for conducting structural equation analyses.

Figure 4

Conceptual Model to be Tested in This Study with Pornography Frequency as a Predictor and Self Perceived Effects of Pornography as the Outcome, Perceived Pornographic Realism as a Mediator, and Age, Education, Marital Status, and Religion as Confounders.



For the assumption regarding the correct model specification, the confounders were included as “a common cause of both the exposure and the outcome” (Tennant et al., 2021, p. 622). The other paths followed the direction as was argued in this study’s aims and objectives, which was depicted in Figure 4. The exposure and mediating variables (as these were not observed variables) were constructed from the questions as described in the measures. In SEM, when variables are not single, observed items, but constructed from multiple items, paths are drawn from the construct to the separate items, as depicted in Figure 5 (see Appendix A). In conclusion, the model fit of the models was sufficient and the assumptions structural equation models must comply to, were fulfilled.

Missing Values Analysis of the Model without Mediation

Table 11

Coefficients of Pornography Frequency on the Self-Perceived Effects of Pornography

	Men				Women			
	<i>b</i>	SE	CI	β	<i>b</i>	SE	CI	β
Model 1 ^a	0.14	0.01	0.11-0.16	0.37	0.16	0.02	0.12-0.20	0.36
Model 2 ^b	0.13	0.01	0.11-0.15	0.43	0.15	0.02	0.12-0.19	0.44
Model 3 ^c	0.13	0.01	0.11-0.15	0.36	0.16	0.02	0.12-0.20	0.36

Note. The outcome of the structural equation model, confounders included were age, education, religious affiliation, and marital status. *b* = Unstandardized coefficient, SE = Standard error, CI = 95% Confidence interval, β = Standardized coefficient. ^a $N_{men}=1,238$, $N_{women}=532$, ^b $N_{men}=1,966$, $N_{women}=1,415$, ^c $N_{men}=1,317$, $N_{women}=584$.

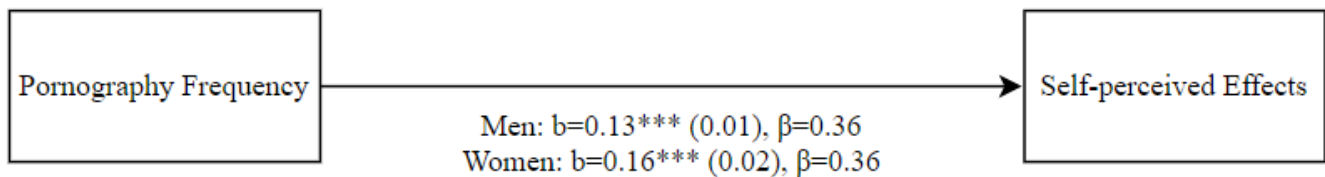
All coefficients were $p < 0.001$.

As described in the methods, three models were tested. First, the model with all missing values excluded and with bootstrapping times 5000 was assessed (Hayes, 2009). Second, we tested the model with all missing values (except for the exposure, whose missing values were removed) estimated through FIML. Third, we evaluated the model with the missing values for the exposure and the outcome excluded and the missing values for the confounders estimated through FIML. Thus, the outputs of these three models were presented in Table 11. FIML is less reliable with missing values that exceed 30% (Olinsky et al., 2003). The missing values for the outcome were on the high end for the estimation through FIML, while for the confounders these were within an acceptable range. Because of this, and as the outputs were relatively similar, we continued with the third model, with only the missing values for the confounders estimated through FIML.

Main Results: The Association between Pornography Frequency and the Self-Perceived Effects

Figure 6

Standardized and Unstandardized Coefficients of Pornography Frequency on the Self-Perceived Effects of Pornography, Separated by Gender



Note. b is the unstandardized and β is the standardized coefficient, standard errors are in parentheses. $N_{\text{men}}=1317$, $N_{\text{women}}=584$.

$*** p < 0.005$.

Using multi-group analysis, we found a statistically significant positive association between pornography frequency and the self-perceived effects for both men ($b=0.13$, 95%CI=[0.11, 0.15]) and women ($b=0.16$, 95%CI=[0.12, 0.20]). In other words, for both men and women, more pornography consumption was associated with perceiving the effects of pornography on one's life as more positive. Regarding gender differences, the model fit of the model in which all parameters were allowed to vary (the unconstrained model) was compared to the restricted model's fit (the constrained model). We found that there were statistically significant differences between men and women in the model tested. The association was slightly stronger for women, as compared to men, yet, these differences were relatively small.

Missing Values Analysis of the Model with Mediation

Table 12

Coefficients of Pornography Frequency on the Self-Perceived Effects and with Perceived Realism as a Mediator, Separated by Gender

	Men			Women		
	<i>b</i>	SE	CI	<i>b</i>	SE	CI
Model 1 ^a						
Direct effects						
Frequency → Self-perceived effects	0.10	0.01	0.08-0.12	0.08	0.02	0.05-0.12
Frequency → Perceived realism	0.06	0.01	0.03-0.08	0.09	0.02	0.06-0.12
Perceived realism → Self-perceived effects	0.52	0.05	0.42-0.62	0.82	0.12	0.60-1.06
Indirect effect						
Frequency → Self-perceived effects	0.03	0.01	0.01-0.04	0.07	0.02	0.04-0.11
Total effect						
Frequency → Self-perceived effects	0.13	0.01	0.11-0.15	0.16	0.02	0.12-0.20
Model 2 ^b						
Direct effects						
Frequency → Self-perceived effects	0.10	0.01	0.08-0.11	0.09	0.01	0.06-0.12
Frequency → Perceived realism	0.06	0.01	0.04-0.07	0.11	0.01	0.08-0.13
Perceived realism → Self-perceived effects	0.50	0.04	0.43-0.57	0.65	0.06	0.54-0.77
Indirect effect						
Frequency → Self-perceived effects	0.03	0.00	0.02-0.04	0.07	0.01	0.05-0.09
Total effect						
Frequency → Self-perceived effects	0.12	0.01	0.10-0.14	0.16	0.02	0.13-0.20
Model 3 ^c						
Direct effects						
Frequency → Self-perceived effects	0.09	0.01	0.07-0.11	0.09	0.02	0.06-0.13
Frequency → Perceived realism	0.06	0.01	0.04-0.08	0.09	0.02	0.05-0.12
Perceived realism → Self-perceived effects	0.52	0.04	0.43-0.60	0.79	0.09	0.61-0.98
Indirect effect						
Frequency → Self-perceived effects	0.03	0.01	0.02-0.04	0.07	0.01	0.04-0.10
Total effect						
Frequency → Self-perceived effects	0.12	0.01	0.10-0.15	0.16	0.02	0.12-0.20

Note. Outcomes of structural equation models. Included confounders were age, education, religion, and marital status. b = Unstandardized coefficient, SE = Standard error, CI = 95% Confidence interval. ^a $N_{male}=1,238$, $N_{female}=532$, ^b $N_{male}=1,966$, $N_{female}=1,415$, ^c $N_{male}=1,317$, $N_{female}=584$.

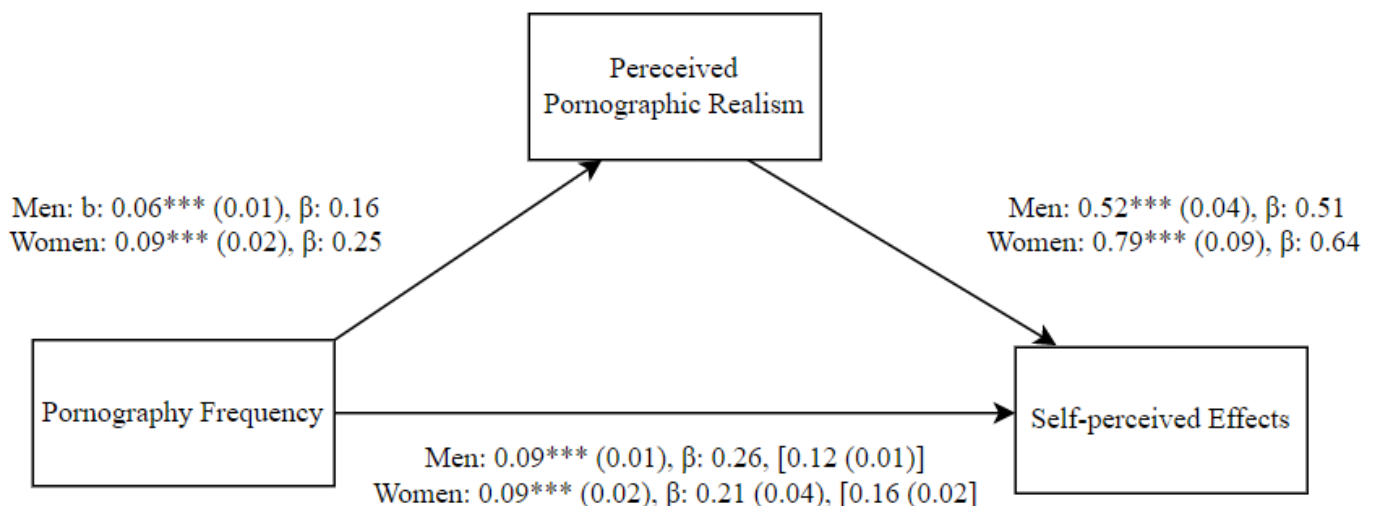
The significance of all coefficients is $p < 0.001$.

Similar to the previous analysis, model 1 was conducted with the missing values excluded for the outcome, exposure, mediating variable, and confounders (and bootstrapping times 5000). Model 2 was designed to estimate all missing values through FIML, except for the exposure. Model 3 was done with the missing values for the exposure and the outcome excluded and the missing values for the mediator and confounders estimated with FIML. Comparable to the previous analysis, the output was similar and the missing values for the exposure were on the high end for being estimated, therefore, we proceeded with the latter model (see Table 11).

Main Results: The Mediated Association

Figure 7

Standardized and Unstandardized Coefficients of Pornography Frequency on the Self-Perceived Effects Separated by Gender, with Perceived Pornographic Realism as a Mediator



Note. The effects are the direct effects and the total effects are in square brackets. b is the unstandardized and β is the standardized coefficient, the standard errors are in parentheses.

$N_{men}=1,317$, $N_{women}=584$.

$*** p < 0.005$.

In the structural equation model, the mediator (perceived pornographic realism) was added, and the direct, indirect, and total effects were estimated. Perceived pornographic realism was mediating the association between pornography frequency and the self-perceived effects for women ($b_{\text{indirect effect}} = 0.07$, 95% CI=[0.04, 0.10]), as well as for men ($b_{\text{indirect effect}} = 0.03$, 95% CI=[0.02, 0.04]). The result was slightly stronger for women than for men. The proportion of the total association mediated was 25% for men and 44% for women, which, in particular among the female participants, was substantial. Pornography frequency remained positively and significantly related to self-perceived effects for both women ($b_{\text{direct effect}} = 0.09$, 95% CI=[0.06, 0.13]) and men ($b_{\text{direct effect}} = 0.09$, 95% CI=[0.07, 0.11]), which indicated a partial mediation. Yet, the direct and indirect effects for men and women were relatively small. In other words, a higher the pornography frequency was (weakly) associated with more positive self-perceived effects, which could partially be explained by considering pornography to be realistic.

Similar to the previous analysis, the model fit of the restricted and unrestricted models was compared. We found statistically significant differences between men and women in the model. The association between pornography frequency and perceived realism was faintly stronger for women ($b_{\text{direct effect}} = 0.09$, 95% CI=[0.05, 0.12]) than for men ($b_{\text{direct effect}} = 0.06$, 95% CI=[0.04, 0.08]). However, for both men and women, the association was relatively weak. Similarly, the association between perceived realism and self-perceived pornography effects was stronger for women ($b_{\text{direct effect}} = 0.79$, 95% CI=[0.61, 0.98]) than it was for men ($b_{\text{direct effect}} = 0.52$, 95% CI= [0.43, 0.60]). Thus, for both men and women increased pornography frequency was associated with considering pornography to be more realistic. Assessing pornography to be realistic was associated with more positive self-perceived effects. Put differently, men and women differed significantly in the associations between pornography frequency, perceived realism, and the self-perceived effects of pornography, with generally, slightly stronger associations for women.

Discussion

This study aimed to describe the association between pornography consumption frequency and its self-perceived effects on one's sexual life. As often studies focussed on pornography consumption and sexual functioning or satisfaction (Hoagland & Grubbs, 2021; Sommet & Berent, 2022), this study added to a slowly growing body of literature on the self-perceived effects of pornography. With 1,901 adult pornography consumers from across Norway, this study provided an interesting insight into the association between pornography and the degree

people feel it influenced aspects of their sexual lives. Increased pornography use was associated with perceiving the effects of the consumption as more positive for both men and women. In other words, the results suggested that pornography can, albeit to a small extent, function as a positive addition to one's sexual life. Furthermore, this association was significantly different between men and women and partially mediated by perceived pornographic realism. This meant that the associations were overall slightly stronger for women and part of the relationship between pornography frequency and the self-perceived effects could be explained by increased perceived pornographic realism.

This study's findings are in line with the literature on the self-perceived effects of pornography consumption. Similar to the studies conducted on this topic, the results showed a positive association between pornography frequency and its self-perceived effects (Dwulit & Rzymiski, 2019; Hald, Malamuth, et al., 2013; Hald & Malamuth, 2008; Kvalem et al., 2014; Lippmann et al., 2023). The measures that were used in these studies to assess the self-perceived effects of pornography ranged from scales similar to the current study's instrument (Kvalem et al., 2014), the Pornography Consumption Effect Scale (PCES) (Hald et al., 2013), or a composite of sexual health-related items (e.g. quality of the relationship, changes in stimuli required to climax, or learning about sexual preferences) (Dwulit & Rzymiski, 2019; Lippmann et al., 2023). Yet, the results were similar to the current study's outcome, confirming that, generally, people perceived the effects of pornography on a variety of sexual health-related outcomes as positive. This was also confirming qualitative results, which stated that pornography made people feel better about multiple aspects of their sexual health and lives (Kohut et al., 2017).

In a study in Germany, Štulhofer et al. (2022) found that religious upbringing was associated with negative self-perceived effects of pornography and that men had a larger chance of recounting negative self-perceived effects. Consequently, when studying pornography, it is important to consider gender and the studies' context. Studies on this topic were conducted in Indonesia, Poland, the USA, and Scandinavia (Dwulit & Rzymiski, 2019; Hald, Smolenski, et al., 2013; Hald & Malamuth, 2008; Mulya & Hald, 2014). Also, often these studies were among students (Dwulit & Rzymiski, 2019; Mulya & Hald, 2014), men having sex with men (Hald, Smolenski, et al., 2013), heterosexual men (Miller et al., 2020), hardcore pornography consumers (Hald & Malamuth, 2008), or young adults (Kvalem et al., 2014). Generally, these studies established that people perceived the effects of pornography on their sexual lives as positive. This study supplemented this body of literature with a large,

representative sample of adult Norwegian pornography users and confirmed that the literature's findings might also be applicable beyond sub-groups of populations. The Norwegian context of this study created an interesting ground for such investigation, due to the country's history with restrictions, combined with a certain openness towards sexuality (Træen et al., 2004). Yet, this study's results can apply to settings that experienced similar developments.

In the literature, regularly, different results are found in men and women (Hald & Malamuth, 2008; Kvaem et al., 2014; Štulhofer et al., 2012; Zohor Ali et al., 2021), which was also found in our study. Statistically significant differences between men and women were found in the association between pornography frequency and the self-perceived effects. However, the differences were relatively small. The association between the variables tested was slightly stronger for women than for men. In Kvaem et al's (2014) study, for mainstream pornography, the association between pornography consumption and the self-perceived effects was slightly stronger for men, contrary to our study's results. However, as increasingly more women consume pornography, the results of more recent studies might differ from previous studies (Koletić et al., 2021). Furthermore, among the missing values in our study were many women, which could have created a bias among the women that were included.

Alternatively, men watched more pornography and they tended to perceive the effects as more positive, which is in line with the literature on these subjects (Hald & Malamuth, 2008; Kvaem et al., 2014; Zohor Ali et al., 2021). This difference between men and women might be explained by that Norwegian women have a more negative attitude toward pornography (Træen et al., 2004). Also, even though the pornography supply is diversifying, pornography is often developed with the male consumer in mind (Wright & Štulhofer, 2019). Furthermore, cultural gender norms and expectations likely play a role in how women perceive the effects of pornography (Dwulit & Rzymiski, 2019).

The questions within the measurement of the self-perceived effects of pornography covered a variety of aspects of sexual health, such as the experience of one's sexuality, interest in protected intercourse, and the relationship with one's body. These are elements that fall within the WHO's definition of sexual health, which covers, among others, "a positive ... approach to sexuality and sexual relationships" and "mental ... well-being" (WHO, n.d.). Studying how people's pornography consumption makes them feel about their sexual lives, experiences, and attitudes, is insightful to fully grasp the relationship between pornography and the impact it may have on people's sexual lives. Increased pornography consumption was

associated with people perceiving the effects of pornography on different areas of their (sexual) lives as more positive. Therefore, including the topic of pornography in sex education or interventions could be beneficial for the stimulation of people's sexual identities, behavior, and pleasure. However, as shown by Wright et al. (2022), using pornography as a source of information can be related to incorrect assumptions about sex. Therefore, attention should be directed to the discrepancies between pornography and real life, as the degree of realism in pornography might vary and pornography literacy is imperative.

The Mediating Role of Perceived Realism

Perceived pornographic realism has frequently been suggested as a potential mediator in the association between pornography consumption and sexual health-related outcomes (Charig et al., 2020; Krahe et al., 2022). We investigated if this was a mediator in the association between pornography frequency and the self-perceived effects of pornography and we found that this association was partially mediated by perceived realism for men and women. This partial mediation displays the complexity of these concepts and what goes on behind these associations. In this study, pornography frequency was associated with increased realism and increased realism with more positive self-perceived effects. In other words, a higher pornography consumption was associated with considering pornography to be more realistic, and considering pornography to be more realistic was associated with perceiving its effects to be more positive.

This study indicated that a higher degree of perceived realism – considering pornography to be more realistic and educational – was partially mediating the association between pornography and the self-perceived effects of pornography. This is following the studies related to this topic, as perceived realism was found to be (partially) mediating the association between pornography consumption and (women's) body image (Vogels, 2019) and the self-perceived effects of pornography (Kvalem et al., 2014; Mulya & Hald, 2014). Put differently, through perceiving pornography to be more realistic, pornography consumption was associated with a better body image among women and more positive self-perceived effects of pornography (Kvalem et al., 2014; Mulya & Hald, 2014; Vogels, 2019). Yet, these studies were conducted among women (Vogels, 2019), young adults (Kvalem et al., 2014), or in Indonesia (Mulya & Hald, 2014), which could be considered a more conservative study setting. Though, the results were comparable with this study's findings. Charig et al. (2020) reported that perceived realism was not mediating the association between pornography consumption and, among others, sexual or body satisfaction. Nonetheless, this study was

conducted among a convenience sample of heterosexual, cis-gender adults, which might have constituted a specific sub-sample of the population.

In the literature, increased pornography frequency was frequently associated with considering pornography to be more realistic (Peter & Valkenburg, 2010; Vogels, 2019). However, both these studies were conducted among young adults. In a longitudinal study among adolescents, Wright and Štulhofer (2019) found that perceived realism declined, while sexual experience grew. Therefore, it is important to study perceived realism in a large, representative sample of adult pornography consumers. This study encompassed people between 18 and 85 years old, yet, similar to the studies among young adults, increased pornography consumption was associated with considering pornography to be more realistic. Also, studies found that considering pornography to be realistic was associated with perceiving the effects of pornography to be more positive (Koletić et al., 2021; Mulya & Hald, 2014), which is also what we found in our study. However, in a study among Danish adolescents perceived realism was associated with less positive effects of pornography consumption (Hald & Malamuth, 2008). Also, Koletić et al.'s (2021) study found that among Norwegians perceived realism was simultaneously associated with more positive and negative self-perceived effects. These contradictory results indicate the need for more studies exploring perceived pornographic realism and other potential mediators.

Similar to the literature, the associations differed significantly between men and women (Kvalem et al., 2014; Mulya & Hald, 2014). The association between pornography frequency and perceived realism and between perceived realism and the self-perceived effects were slightly stronger for pornography-consuming women, compared to pornography-using men. Put differently, for women, a higher pornography frequency was stronger associated with considering pornography to be more realistic, as well as for indicating that pornography is realistic with improved self-perceived effects, as compared to men. This is in line with Kvalem et al.'s (2014) study, who also found a stronger association for women than men, between said associations. Even though these studies were conducted almost ten years apart, the results were comparable. Furthermore, in our study, women considered pornography to be less realistic than men, contrary to Mulya and Hald's (2014) study. However, the context of their study differed considerably from our study's setting.

In this study, perceived realism of pornography comprised the degree to which people believe pornography is realistic or equal to real-life sex. These are primary elements of the sexual scripting and 3AM theories. These theories sought to clarify the role of acquired

scripts and their influence on and implementation in people's sexual lives (Simon & Gagnon, 1973). Proponents of pornography stated that the consumers of pornography do realize the limits of pornography's realism (Hald & Malamuth, 2008). Nonetheless, the literature, and this study alike, showed a more nuanced reality (Peter & Valkenburg, 2010; Vogels, 2019). In this study, it was found that a higher pornography frequency was associated with considering it to be more educational and realistic. Thinking that pornography is realistic or educational could bring inspiration for one's sexual life (Kohut et al., 2017). Put differently, people might watch pornography for sex education and implement elements into their lives (Maas et al., 2023; Tan et al., 2022). However, not all pornography is realistic, and people that derived sexual knowledge from pornography were more prone to hold incorrect sexual beliefs (Wright et al., 2022) or unrealistic expectations about sex (Kohut et al., 2017). Consequently, in making the distinction between which scripts to take into one's life, and which ones not, porn literacy is essential. In educational programs, it is advisable to discuss pornography in light of the degree of realism.

Perceived pornographic realism also covered the extent it taught people how to behave when having sex and the level of educational value for the consumer. This study's results showed that there was an association between regarding pornography to be realistic and perceiving the impact of pornography on their sexual lives as positive. This displayed that pornography might be an instrument in stimulating people's sexual health. However, people might misjudge the realism of the pornography they watch. Nonetheless, with the right education and information, pornography can be a tool to promote behavior that is beneficial for individual and public health. For example, there is evidence that depictions of condoms in pornography can promote condom use (Schrimshaw et al., 2016), that it expands peoples' sexual functioning (McCormack & Wignall, 2017), and that it improved women's body image (Vogels, 2019). As shown by this study, public and sexual health interventions should reflect the importance of porn literacy and the educational role of pornography in individuals' lives.

Limitations

Concerning the study's design, five main limitations could be identified. First, one of the limitations of a cross-sectional study is that one cannot certainly draw any conclusions on the causal direction. Namely, a higher degree of realism could have been related to higher consumption patterns and more positive self-perceived effects could have been associated with increased pornography frequency. However, the direction proposed in this study's conceptual model was guided by findings from the literature. Second, the response rate

(35.6%) was relatively low. Yet, the participants did not see the questions before agreeing to participate. Consequently, the response rate cannot be attributed to the nature of the questionnaire, and the bias this imposed on this study might be limited. Third, questions on pornography frequency covered one's consumption over the past year, which could be prone to recall bias. However, as the categories for this question were relatively broad, it made it easier for people to identify the answer that was close to their actual consumption pattern. Fourth, the phrasing of the question on the self-perceived effects of one's pornography consumption on having unprotected intercourse was slightly ambiguous. In this case, a higher value referred to a larger interest in having protected intercourse, yet, the phrasing was open for confusion. Nonetheless, the factor analysis suggested that the participants answered this question in the right direction. Additionally, the scale on the self-perceived effects covered a myriad of elements. Even though the internal validity was high, one might argue if this scale was measuring what it should measure, i.e., the self-perceived effects of pornography. Fifth, as I was not involved in the data collection, I had no control or supervision over the quality of the data collected. However, as the questionnaire was designed by experts in the field and the data was collected by a reputable, professional organization, no clear limitations for the study's results have been identified.

The historical and cultural background of Norway created an interesting setting for this study. Even though certain elements in this are specific to Norway, such as certain laws, political influences, or societal norms, the results of this study are likely to apply to settings with a similar social, political, and cultural climate. In a country that has the image of being more open towards sexuality and nudity, it is notable that there were still this many participants that decided against answering the questions related to the self-perceived effects of pornography (Træen et al., 2004). These missing values could have created a bias, as the people that did not answer these questions were most likely not at random. Yet, the robust checks in which we compared the output to two alternative models, with and without the missing values estimated, showed similar results. Among the missing values were more women than men, which skewed the gender balance of the sample towards more men. Due to the high number of missing women, the characteristics of the women that answered these questions might be different from the ones that decided to disregard these questions.

As the outcome was the self-perceived effects of pornography consumption, one could argue, to justify one's behavior, people would exaggerate the positive effects (biased optimism) or become less critical of the potential harms (cognitive dissonance) (Hald et al.,

2015; Miller et al., 2018). These phenomena might have influenced the answers on the self-perceived effects slightly towards the more positive side. Furthermore, as claimed by anti-pornography groups, one would subconsciously downplay the negative effects due to desensitization (Hald & Malamuth, 2008) or cognitive dissonance (Kvalem et al., 2014). Therefore, this study's results should be treated cautiously regarding policy implications.

Conclusion

This study aimed to describe the associations between pornography frequency, perceived pornographic realism, and the self-perceived effects of pornography among adult Norwegian pornography consumers. As laid down by the WHO (n.d.), sexual health encompasses sexual pleasure, well-being, and safety. The items that covered the self-perceived effects were aspects that covered one of the many pillars that constitute sexual health. A higher pornography consumption frequency was associated with more positive self-perceived effects of pornography for both men and women. However, pornography might have elements that should not be implemented directly in people's lives. Consequently, while studying pornography, the degree people evaluate pornography as realistic or educational should be considered. The association between pornography frequency and the self-perceived effects was partially mediated by perceived realism. This study showed that a higher pornography frequency was associated with considering pornography to be more realistic. Furthermore, considering pornography to be more realistic was related to perceiving the effects of pornography as more positive. Generally, the associations were slightly stronger for pornography-consuming women as compared to their male counterparts. These findings showed that pornography can be a tool to promote sexual health, yet, education on porn literacy is imperative. Pornography is increasingly wide-spread available, and more studies are necessary to draw a complete picture of the associations between pornography and sexual health-related topics. The harms and benefits of pornography related to sexual functioning and satisfaction have been explored thoroughly, yet, the self-perceived effects and mediating concepts have been investigated to a lesser extent. This study's results showed that the reality of the associations between pornography consumption and the self-perceived effects is complex, nuanced, and multifaceted.

Implications and Future Studies

The pornography landscape is getting increasingly diverse, with the introduction of different genres, more attention to inclusivity, and the rise in popularity of non-mainstream pornography (Taormino et al., 2013). Therefore, for future research, it might be valuable to

take the different genres into account, for example, focussing on mainstream versus non-mainstream or on LGBTQ+-pornography. Furthermore, the research on pornography has predominantly concentrated on the negative effects that might be associated with pornography consumption. However, slowly, more studies showed the positive, educational – in the expansion of sexual scripts, increased knowledge about one’s preferences and sexuality, or a more positive body image, etc. – value pornography can have on one’s sexual life. Yet, to combat the effects tradition and the negative effect paradigm, more studies on topics outside of these scopes are needed. Also, qualitative studies would be a constructive supplement to the quantitative data, as these provide further insight into the association between pornography and the self-perceived effects on people’s lives. Similarly, there are few longitudinal studies on pornography and self-perceived sexual health. For example, studies that investigate perceived realism and people’s sexual experiences over time or on if the self-perceived effects of pornography and pornography consumption frequency vary over people’s lives.

The self-perceived effects reflect people’s attitudes toward the effects of pornography consumption. Put differently, it is valuable to study how people perceive the effects of their pornography consumption, to take this into account in designing educational programs on pornography and porn literacy. Perceived realism displays the general ideas about the realistic and educational aspects of pornography and the degree of porn literacy. Likewise, this knowledge can be used in the design of interventions and educational programs. More studies on the self-perceived effects of pornography are needed as a base for comprehensive sex education and public health interventions.

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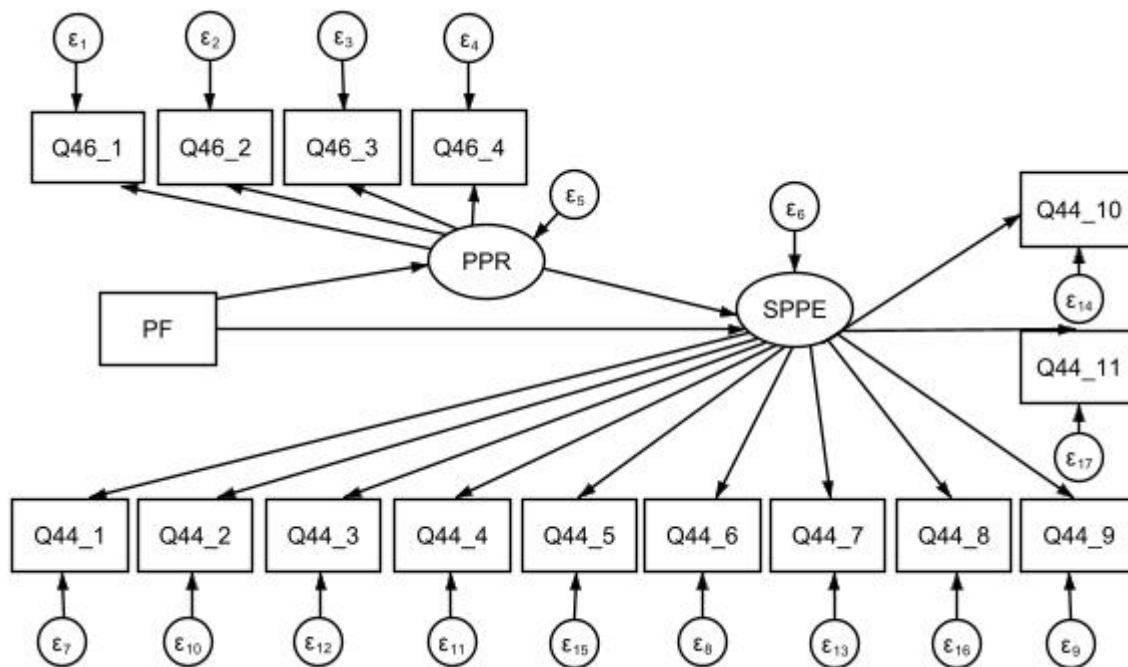
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Appendix A

Figure 5

Structural Equation Model to be Tested



Note. PF: Pornography frequency, PPR: Perceived pornographic realism, SPPE: Self-perceived effects of pornography, ϵ : Estimated errors. Control variables were included but not depicted.