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Closing the Gender Gap? A Cohort Comparison of Adolescent Responses to and Attitudes Toward Pornography, 2004 vs. 2021

M. Donevan ^{a,b}, M. Bladh ^c, Å. Landberg ^a, L. S. Jonsson ^a, G. Priebe ^d, I. Dennhag ^b, and C. G. Svedin ^a

^aDepartment of Social Sciences, Marie Cederschiöld University; ^bDepartment of Clinical Sciences, Child and Adolescent Psychiatry, Umeå University;

^cDepartment of Biomedical and Clinical Sciences, Linköping University; ^dDepartment of Social and Psychological Studies, Karlstad University

ABSTRACT

Pornography has become increasingly prevalent and normalized within society, raising questions about how today's adolescents might differ in their responses to and attitudes toward pornography compared to earlier generations. This study begins to fill this gap by comparing cross-sectional data from two cohorts of high school students in Sweden in 2004 ($n = 4,266$, mean age = 18.15, $SD = 0.74$, 53.9% girls) and 2020–21 ($n = 3,256$, mean age = 18.20, $SD = 0.61$, 55.4% girls). Gender-stratified bivariate analyses and logistic regression models were performed to examine the impact of survey year on outcomes. Results reveal an increase in frequent pornography use among both genders and a narrowing of the gender gap in responses and attitudes by 2020–21. Boys reported decreased arousal responses, fewer positive emotional responses, and were less inclined to imitate the behaviors seen in pornography. Girls were less averse to and upset by the pornography they encountered. Both genders became more tolerant of pornography, yet more critical of its purported benefits. Notable gender differences remain, especially with girls being more likely to recognize pornography as degrading and exploitative. These findings underscore the need for educational strategies that foster critical understandings of pornography and its societal impact.

Introduction

The nature and reach of pornography have undergone significant transformations in recent decades, evolving from images in magazines to videos shown in movie theaters, on home videos, television, computers, and now personal handheld devices such as smartphones and tablets (Price et al., 2016). Each technological shift has rendered pornography more accessible, affordable, and discreet to use than ever before (Price et al., 2016; Wright, 2014). The nature of pornography use has also evolved from paid content in the early 2000s to the present-day prevalence of “tube sites” enabling free access to “all possible content within one interface” (Paasonen, 2019, p. 559). Today, the widespread adoption of personal handheld devices ensures that adolescents have nearly ubiquitous and often unmonitored access to free, online pornography (Noll et al., 2022; Paasonen, 2019). Adolescent exposure to pornography has thus been described as practically “inevitable” (Wright, 2014).

Changes in pornography's nature and access have also coincided with a broader societal shift. Pornography has become increasingly normalized, as pornographic imagery and references are now readily seen in mainstream media and popular culture (Paasonen, 2019; Tyler & Quek, 2016). This growing societal acceptance is further exemplified by the rise in platforms like OnlyFans, where influencers and celebrities are among the many individuals actively selling pornographic content (Sanchez, 2022). Social media platforms like

Snapchat and Instagram have also evolved into spaces where pornography is viewed and exchanged, including self-produced content (Martellozzo et al., 2020; Van Ouytsel et al., 2019). Pornography is now deeply embedded in the daily experiences of adolescents, even if they are not directly exposed to it.

The unprecedented role of pornography in the lives of young people has spurred a growing body of research and societal awareness about its potential effects. Despite this, research examining how these significant technological and societal shifts have shaped current adolescents' responses to and attitudes toward pornography, compared to earlier generations, is surprisingly limited. It is also unclear whether these societal developments have impacted boys and girls differently. Addressing these gaps, this study provides a timely cohort comparison of girls' and boys' responses to and attitudes toward pornography between 2004 and 2020–21.

Defining and Understanding the Impact of Pornography

To contextualize adolescent responses and attitudes, it is important to establish a common understanding of pornography. Pornography is commonly defined as third-party produced or user-generated images or videos typically depicting sexual activities – such as oral, vaginal, and anal penetration – in an unconcealed way, intended to sexually arouse the viewer (adapted from Peter & Valkenburg, 2011, 2016). While this

definition offers a useful starting point, it does not account for the often violent and gendered nature of pornography.

Content analyses over the past decades have consistently found that sexual violence is both prevalent and normalized in mainstream pornography (Bridges et al., 2010; Carrotte et al., 2020; Fritz et al., 2020; Purcell, 2012; Shor, 2019; Vera-Gray et al., 2021). The violence is also clearly gendered: women are almost always the targets of male aggression and portrayed as deriving pleasure from dominance and pain (Bridges et al., 2010; Carrotte et al., 2020; Fritz et al., 2020; Menaker & Franklin, 2018; Shor, 2019). Beyond the widespread themes of degradation and violence against women, the lack of condom use shown in pornography (Carrotte et al., 2020) risks normalizing unprotected sexual activities.

Adolescence marks a critical period of sexual development, when young people form, internalize, and apply sexual scripts, which are socially constructed guidelines dictating how individuals should behave in sexual situations (Simon & Gagnon, 1986). According to Wright's (2011) Sexual Script Acquisition, Activation, or Application (3AM) model on sexual socialization, pornography's themes and content can directly influence these scripts, shaping how adolescents understand and navigate consent, violence, and intimacy within their sexual relationships. Supporting this, previous studies have found a link between pornography use and the adoption of attitudes and behaviors consistent with the recurring themes in pornography (Wright, 2014). These include harmful gender stereotypes (Brown & L'Engle, 2009; Klein et al., 2020; Peter & Valkenburg, 2007, 2009), permissive sexual attitudes (Brown & L'Engle, 2009; Doornwaard et al., 2015; Tokunaga et al., 2019), risky sexual behaviors (Donevan & Mattebo, 2017; Lin et al., 2020; Mattebo et al., 2014, 2016; Svedin et al., 2011), and sexual violence perpetration (Huntington et al., 2020; Kjellgren et al., 2010; Rostad et al., 2016; Stanley et al., 2016; Svedin et al., 2011; Wright et al., 2016; Ybarra & Thompson, 2018; Ybarra et al., 2011). Given these significant influences, it is crucial to understand how adolescents perceive pornography and react to its content.

Adolescent Responses to and Attitudes Toward Pornography

Existing research highlights the complex and at times contradictory ways adolescents respond to and make sense of the pornography they encounter (Häggström-Nordin et al., 2006; Johansson & Hammarén, 2007; Löfgren-Mårtenson & Månsson, 2010; Noll et al., 2022; Peterson et al., 2022; Vertongen et al., 2022). Pornography can be experienced as sexually arousing and exciting, but it can also be upsetting and repulsive (Davis et al., 2020; Häggström-Nordin et al., 2009; Häggström-Nordin et al., 2006; Löfgren-Mårtenson & Månsson, 2010; Mattebo et al., 2012; Peterson et al., 2022; Rothman et al., 2015; Stanley et al., 2016). Many see it as a "how-to manual" for learning about sexual behaviors, bodily anatomy, roles, and expectations within sexual relationships, especially in the absence of adequate sexual education (Arrington-Sanders et al., 2015; Litsou et al., 2020; Löfgren-Mårtenson & Månsson, 2010; Mattebo et al., 2012; Peterson et al., 2022; Rothman et al., 2015). However, some recognize it

as a problematic source of information that can lead to harmful expectations about sex (Doornwaard et al., 2017; Häggström-Nordin et al., 2006; Horvath et al., 2013; Litsou et al., 2020; Löfgren-Mårtenson & Månsson, 2010; Mattebo et al., 2012; Vertongen et al., 2022).

Research confirms that adolescents can feel compelled to replicate the behaviors observed in pornography within their own intimate relationships (Arrington-Sanders et al., 2015; Davis et al., 2020; Litsou et al., 2020; Löfgren-Mårtenson & Månsson, 2010; Mattebo et al., 2012; Rothman et al., 2015; Ševčíková & Daneback, 2014; Svedin et al., 2011). Girls in particular report feeling pressure to enact certain unwanted behaviors inspired by pornography and attribute boys' sexual aggression to the violence seen in pornography (Davis et al., 2020; Doornwaard et al., 2017; Häggström-Nordin et al., 2006; Lavoie et al., 2000; Mattebo et al., 2012; Stanley et al., 2016). For instance, an online survey among 491 young women and girls aged 15–29 in Australia revealed that many felt compelled to adopt the behaviors seen in pornography, linking their experiences of unenjoyable, painful, and violent sexual interactions directly to pornography's influence on themselves and their partners (Davis et al., 2020).

Research has also explored adolescents' overall attitudes toward pornography, noting that these can be distinct from their personal experiences (Peterson et al., 2022) and self-reported use (Noll et al., 2022). Previous studies indicate a general acceptance of pornography among adolescents (Carroll et al., 2008; Mattebo et al., 2014). For example, in an earlier school survey of 877 Swedish adolescents, most boys and girls thought that using pornography is "natural" and an integral part of adolescent life (Mattebo et al., 2014). Understanding adolescents' attitudes toward pornography is important, especially considering the link between these attitudes and views supporting violence against women (Hald et al., 2010; Noll et al., 2022). A recent U.S. study found that emerging adults who held positive or neutral views of pornography were more likely to endorse rape myths that place blame on female rape victims and exculpate male perpetrators (Noll et al., 2022). However, Noll et al. (2022) noted that the association between pornography use and rape myth acceptance was primarily driven by male participants, suggesting that gender plays a crucial role in these attitudes.

Gender Differences in Responses and Attitudes

Previous research has identified significant differences in how boys and girls respond to and perceive pornography. Boys tend to describe pornography as arousing and exciting and are more likely to be inspired by or imitate the sexual behaviors seen in pornography. In contrast, girls more often find pornography "disgusting" and a "turn off" (Johansson & Hammarén, 2007; Löfgren-Mårtenson & Månsson, 2010; Mattebo et al., 2014; Rothman et al., 2015; Wallmyr & Welin, 2006). Boys also tend to hold more positive, permissive attitudes, whereas girls are more likely to characterize pornography as misogynistic, "made for men," and normalizing sexual violence (Doornwaard et al., 2017; Löfgren-Mårtenson & Månsson, 2010; Mattebo et al., 2014; Pirrone et al., 2022).

These gender differences can partly be attributed to varying levels of pornography use, where higher frequency of pornography use corresponds to more positive and permissive reactions to and perceptions of pornography (Mattebo et al., 2012; Noll et al., 2022; Svedin et al., 2011). Studies among youth spanning the ages of 15–25 have found that almost all adolescent boys have used pornography, whereas the proportion of adolescent girls varies between 39–76% depending on study setting (Böthe et al., 2020; Donevan & Mattebo, 2017; Flesia et al., 2020; Mattebo et al., 2013, 2014, 2016; Milas et al., 2020; Romito & Beltrami, 2011; Svedin et al., 2011, 2022; Weber et al., 2012; Wright & Štulhofer, 2019). Additionally, in research looking specifically at the frequency of pornography use, 10–24% of adolescent boys report using pornography daily (Böthe et al., 2020; Donevan & Mattebo, 2017; Donevan et al., 2021; Flesia et al., 2020; Mattebo et al., 2013, 2014; Svedin et al., 2011), compared to a very small percentage of adolescent girls (0.3–1.8%; Böthe et al., 2020; Donevan et al., 2021; Mattebo et al., 2013, 2014).

Beyond the frequency of pornography use, the gendered content of mainstream pornography is a crucial factor in explaining gender differences. Portrayals of violence against women and themes of male dominance can evoke different responses in boys and girls. Boys may react with arousal, whereas girls might feel repelled, perceiving such content as degrading and exploitative.

Additionally, societal norms and gender roles, which deem it more acceptable for boys and less acceptable for girls to use pornography, could further explain these gender differences (Löfgren-Mårtenson & Månsson, 2010; Mattebo et al., 2014). Boys may experience social pressure to use pornography and perceive it positively, while girls might face judgment for similar behaviors, leading to divergent attitudes and responses.

Gaining insights into adolescent responses to and attitudes toward pornography, particularly from a gendered perspective, is essential for designing educational interventions and informing professional interactions tailored to girls' and boys' realities and needs. This knowledge can help guide parents, educators, and other professionals in countering any misconceptions and addressing harmful attitudes and behaviors stemming from pornography.

Study Aims and Hypotheses

Despite the substantial technological and cultural shifts in recent decades, surprisingly little research has considered how current adolescents might differ in their responses to and attitudes toward pornography compared to earlier generations, and how gender differences might have changed. Using two repeated, nationally representative cross-sectional studies from Sweden in 2020–21 and 2004, this study begins to bridge this gap. Our analysis was stratified by gender, given the consistent evidence that gender affects the way adolescents respond to and perceive pornography (Johansson & Hammarén, 2007; Löfgren-Mårtenson & Månsson, 2010; Mattebo et al., 2014; Peter & Valkenburg, 2016; Rothman et al., 2015; Wallmyr & Welin, 2006).

The overall purpose of the study was threefold. The initial aim was to assess cohort differences in the frequency of

pornography use, a known influence on responses to and attitudes toward pornography (Mattebo et al., 2012; Noll et al., 2022; Svedin et al., 2011). The second aim was to determine whether adolescent girls' and boys' responses to pornography have changed between 2004 and 2020–21, across four response categories: arousal, emotional, cognitive, and behavioral. Lastly, we aimed to compare attitudes toward pornography, focusing on regulation and availability, content, and societal impacts.

For frequency of pornography use, we hypothesized that while gender differences would persist, the widespread use of smartphones and greater societal acceptance of pornography would lead to more frequent pornography use among both genders. Should this hypothesis prove correct, we would expect both girls and boys to become less sensitive to the pornography they encounter and more tolerant in their views (Dawson et al., 2020; Doornwaard et al., 2017; Häggström-Nordin et al., 2006; Löfgren-Mårtenson & Månsson, 2010; Mattebo et al., 2012; Peterson et al., 2022; Rothman et al., 2015; Vertongen et al., 2022). However, other dynamics such as increased societal awareness and improvements in sexual education – a recognized protective factor against the pornographic sexual script (Wright, 2014) – could have the opposite effect. For example, a recent study among emerging adults in the U.S. found that greater knowledge about pornography fostered more critical attitudes toward it (Noll et al., 2022). Given the dynamic nature of societal and technological changes, it remains uncertain how these factors have impacted girls' and boys' responses and attitudes today compared to the 2004 cohort. Hence, instead of proposing specific hypotheses concerning responses and attitudes, we adopt an open-ended, exploratory approach.

Method

Participants

Four nationally representative surveys focusing on sexual behaviors, sexual abuse, and sexual exploitation were carried out among Swedish third-year high school students in 2004, 2009, 2014 and 2020–2021. The current study analyzed the data collected in 2004 and 2020–2021 (Svedin & Priebe, 2004; Svedin et al., 2021), both containing identical items about responses to and attitudes toward pornography. Although there were slight changes to the sampling methods (detailed below), both surveys comprised a nationally representative cohort of third-year Swedish high school seniors. According to data provided by Statistics Sweden (2006), and the Swedish National Agency for Education (2021), approximately 90% of all 18-year-old adolescents were enrolled in Swedish high schools in both 2004 and 2020–2021.

The 2004 Study

The sample consisted of Swedish high school seniors (3rd year students). The guidelines of the Baltic Sea Regional Study on Adolescent Sexuality (Mossige et al., 2007) were followed when selecting Stockholm (capital), Malmö (large port), as well as Luleå, Haparanda, and Falköping (smaller cities) for data collection. All students from surrounding towns and rural areas who

commuted to the schools were included in the sample. All 3rd year high school students in these cities were included in the initial group. At the time of the implementation of the study in 2003, a total of 10,751 high school seniors were registered at the selected schools, where 17 different national educational programs were offered. By applying a sampling procedure designed to ensure proportional representation of all programs and classes, 5,623 (52.3%) students from 54 schools were selected. After obtaining the principal's permission, the questionnaires were administered during an hour of class time under the supervision of a research team member. Out of the selected students, 4,377 participated. Thirty-eight questionnaires were excluded due to incorrect completion. The final number of participants was 4,339 (2,015 boys and 2,324 girls), with a response rate of 77.2%. Seventy-three adolescents did not answer the index question *have you ever used pornography*, resulting in a final sample of 4,266 adolescents (1,967 boys and 2,299 girls) with a mean age of 18.15 years ($SD = 0.74$).

The 2020–21 Study

The schools were selected based on information from the national school register and stratified to represent a normal population of third-year Swedish high school students. The selection of schools was stratified based on study program and size of school, resulting in nine distinct strata. The overall participation closely matched the expected distribution across these strata, although two specific strata – large schools offering vocational or individual programs (strata 6 and 9) – exhibited slightly lower participation rates (strata 6 was 1.7% and strata 9 was 0.6% of the total sample, instead of the expected 5.4% and 2.2%, respectively). This discrepancy can largely be attributed to Workplace Learning, a program component where students spend part of the semester away from school for practical learning experience.

Principals at selected schools were informed about the study by e-mail and then contacted by phone. The school was excluded if no contact was established after three attempts. If a principal agreed to participate, a date was set for administering an online questionnaire filled in during one hour of class time in the presence of field workers. Students received written information and gave informed consent by answering the questionnaire. A total of 210 schools with 7,752 students were selected and, of these, 110 schools with 3,286 students completed the questionnaire. Four sets of responses that were assessed as being fake were excluded, resulting in responses from 3,282 students and yielding an overall response rate of 42.3%. Due to the COVID-19 pandemic, data collection was interrupted and extended, with the collection method changing to an online version that was possible to access from other locations than the classroom. This resulted in three periods of data collection in 2020 and 2021: two in classrooms – in the spring of 2020 ($n = 1,195$) and the autumn of 2020 ($n = 737$) – and one from home, in the spring of 2021 ($n = 1,350$). The response rates differed between the three periods. During the data collection in classrooms, the response rates were 57.1% and 58.4%, respectively, while the response rate during the period of home studies was 30.7%. In contrast to the 2004 survey, the 2020–21 survey included a “non-binary” response alternative for gender identity. For the sake of comparison over

the survey years, the 26 adolescents in the 2020–21 survey who identified as non-binary were excluded, rendering a final sample of 3,256 adolescents (1,452 boys and 1,804 girls) with a mean age of 18.20 years ($SD = 0.61$).

Measures

The questionnaires administered in the two surveys comprised 110 main questions about participants' sociodemographic background, experiences of abuse, sexual exploitation, risk behaviors, and pornography use. The methodology shifted from a paper and pencil survey in 2004 to a computerized survey in 2020–2021. A set of core questions remained unchanged throughout the survey cycles to enable cohort comparisons. Other questions were altered (deleted or added) to explore new societal trends such as the development and use of the Internet and social media. In the current study, we focused on identical items found in both datasets pertaining to participant sociodemographic characteristics, patterns of pornography use, responses to pornography, and attitudes toward pornography. The identical sets of investigator-derived questions related to pornography were developed by an international team and used in the Baltic Sea Regional study on adolescents' sexuality (Mossige et al., 2007).

In both surveys, participants provided background information (Table 1) on several variables: gender (boy or girl), living arrangement (living with both parents or not), birthplace (born in Sweden or not), study program (theoretical or vocational), father's employment status (employed father or not), mother's employment status (employed mother or not), lifetime cannabis use (ever used cannabis or not), and lifetime pornography use (ever used pornography or not). Those who reported using pornography also indicated the frequency of their use within the last 12 months, categorized as never, 1–2 times a year, some time each month, some time each week, or more or less daily. The survey clarified that, “By pornography, we mean images or videos where one or more people engage in sexual acts, either alone or with others.” This definition was followed by a list of various types of pornography that respondents might have encountered, including content featuring individuals performing sexual acts on themselves, sexual activities between two or more individuals, and sexual acts involving elements of violence or force.

The current analysis also incorporated 22 identical single items in both surveys broadly grouped into “Responses” to and “Attitudes” toward pornography. These survey items were further categorized into thematic groupings to enhance clarity and provide a logical structure to facilitate analysis and interpretation. The 12 items encompassing responses were organized into the following thematic categories:

- **Arousal:** Items reflecting physiological arousal responses to pornography
- **Emotional:** Items capturing emotional reactions and feelings associated with pornography use.
- **Cognitive:** Items related to thoughts and beliefs formed as a result of engaging with pornography.
- **Behavioral:** Items detailing actions and behaviors influenced by pornography use.

Table 1. Background data: gender comparisons and cohort differences.

	2004			2020–21			Boy 2004 vs 2020–21 <i>p</i> -value*	Girl 2004 vs 2020–21 <i>p</i> -value*
	Boy <i>n</i> (%)	Girl <i>n</i> (%)	<i>p</i> -value	Boy <i>n</i> (%)	Girl <i>n</i> (%)	<i>p</i> -value		
Living arrangement			.003			.767		
Living with both parents	1262 (63.2)	1356 (58.7)		908 (62.5)	1119 (62.0)		.692	.032
Not living with both parents	735 (36.8)	953 (41.3)		544 (37.5)	685 (38.0)			
Born in Sweden			.693			.058		
Yes	1695 (84.5)	1966 (84.9)		1276 (87.9)	1623 (90.0)		.004	<.001
No	312 (15.5)	350 (15.1)		176 (12.1)	181 (10.0)			
Study program			.038			.082		
Theoretical	1318 (65.4)	1589 (68.4)		1074 (74.0)	1285 (71.2)		<.001	.084
Vocational	697 (34.6)	735 (31.6)		378 (26.0)	519 (28.8)			
Employed father			.149			.180		
Yes	1570 (82.4)	1793 (80.6)		1264 (87.1)	1541 (85.4)		<.001	<.001
No	336 (17.6)	431 (19.4)		188 (12.9)	263 (14.6)			
Employed mother			.221			.647		
Yes	1533 (78.5)	1826 (80.0)		1259 (86.7)	1574 (87.3)		<.001	<.001
No	421 (21.5)	457 (20.0)		193 (13.3)	230 (12.7)			
Ever used cannabis			<.001			<.001		
Yes	521 (26.3)	491 (21.4)		380 (26.2)	309 (17.1)		.946	<.001
No	1462 (73.7)	1809 (78.6)		1072 (73.8)	1495 (82.9)			
Early sexual debut (before the age of 14)			.055			<.001		
Yes	122 (6.1)	113 (4.9)		65 (4.5)	66 (3.7)		<.001	.001
No	1279 (64.5)	1548 (67.6)		837 (57.6)	1156 (64.1)			
No debut yet	583 (29.4)	629 (27.5)		550 (37.9)	582 (32.3)			
Ever used pornography			<.001			<.001		
Yes	1936 (97.9)	1761 (76.5)		1291 (89.8)	1055 (59.3)		<.001	<.001
No	41 (2.1)	541 (23.5)		146 (10.2)	725 (40.7)			
Frequency of pornography use within the last 12 months			<.001			<.001		
1–2 times a year	554 (29.8)	1431 (90.4)		81 (6.3)	450 (42.7)		<.001	<.001
Some time each month	563 (30.3)	117 (7.4)		229 (17.7)	400 (37.9)			
Some time each week	544 (29.2)	31 (2.0)		692 (53.6)	189 (17.7)			
More or less daily	200 (10.7)	4 (0.3)		289 (22.4)	18 (1.7)			

*Pearson's Chi-square statistics, or, when cell counts were below five, Fisher's Exact test.

The 10 items regarding attitudes were organized into three thematic categories:

- **Regulation and Availability:** Items addressing opinions on the regulation and accessibility of pornography.
- **Content:** Items concerning views on the nature and type of pornographic content.
- **Societal Impacts:** Items reflecting beliefs about the broader social and cultural effects of pornography.

The analysis also included three additional items introduced in the 2020–21 survey that aligned thematically with the existing categories. The two relating to behavioral responses were: “difficult to avoid using pornography,” and “difficult to stop using pornography once I’ve started.” The additional attitudes item pertaining to societal impacts was: “I think those who participate in pornography are exploited.” All items provided participants with yes-no binary response alternatives.

Procedure

At the start of the initial survey in 2004, following the selection of participating schools, the directors of the school systems in each participating community were asked to grant permission to present the research project to high school principals. Subsequently, during each survey cycle, the principals received an information letter about the survey

followed by a phone call from the research team. Once permission had been granted by the school principal, oral and written information about the research was provided to students, allowing them to give informed consent before filling out the questionnaires. According to the Ethical Review Act (2003) in Sweden, parental consent is not required for respondents over the age of 15. All participating students received written information about the location and availability of counseling services, should they feel the need to speak with someone after having completed the survey. No remuneration was provided. The two surveys were approved by The Human Research Ethics Committee, Medical Faculty, Lund University (2003, Dnr 938-02) and the Swedish Ethical Review Authority (2019-05013-31, 2020-03611, 2020-06556).

Data Analysis

Categorical data are presented as numbers (*n*) and percentages (%) and continuous data are presented as means and standard deviations (*SD*). Bivariate analyses were first performed using Pearson's Chi-square unless the expected cell count was below five, in which case the Fisher's exact test was used. Since the outcomes are dichotomous, single and multiple logistic regression models were then performed to assess how the year of survey impacted the outcome variables. Each item related to responses to (shown in Table 2) and attitudes toward

Table 2. Responses to pornography: gender comparisons and cohort differences.

Item*	2004		2020-2021		Gender differences		
	Boy 1798–1861 n (%)	Girl 1608–1683 n (%)	Boy 1289 n (%)	Girl 1055 n (%)	2004 % <i>p</i> -value**	2020–21 % <i>p</i> -value**	Across cohorts % <i>p</i> -value**
Arousal response							
Turned me on	1250 (67.2)	509 (30.5)	767 (59.5)	439 (41.6)	36.7 < 0.001	17.9 < 0.001	–18.8 < 0.001
Agree							
Turned me off	273 (15.1)	832 (50.4)	162 (12.6)	308 (29.2)	–35.3 < 0.001	–16.6 < 0.001	–18.7 < 0.001
Agree							
Emotional response							
Made me feel excited	752 (40.5)	432 (35.8)	427 (33.1)	299 (28.3)	14.7 < 0.001	4.8 0.013	–9.9 < 0.001
Agree							
Made me feel disgusted	325 (17.5)	918 (54.7)	188 (14.6)	318 (30.1)	–37.2 < 0.001	–15.5 < 0.001	–21.7 < 0.001
Agree							
Made me feel depressed	130 (7.0)	385 (23.1)	120 (9.3)	110 (10.4)	–16.1 < 0.001	–1.1 0.366	–15.0 < 0.001
Agree							
Made me feel upset	127 (6.9)	518 (30.9)	51 (4.0)	114 (10.8)	–24.0 < 0.001	–6.8 < 0.001	–17.2 < 0.001
Agree							
Made me feel indifferent	215 (12.0)	306 (19.0)	112 (8.7)	104 (9.9)	–7.0 < 0.001	–1.2 0.330	–5.8 < 0.001
Agree							
Cognitive response							
Interesting to learn what you can do	873 (47.1)	472 (28.0)	396 (30.7)	301 (28.5)	19.1 < 0.001	2.2 0.248	–16.9 < 0.001
Agree							
Made me want to try what I saw	828 (44.6)	304 (18.2)	383 (29.7)	271 (25.7)	26.4 < 0.001	4.0 0.031	–22.4 < 0.001
Agree							
Taught me things I did not know about other people's appearance	533 (28.8)	243 (14.5)	353 (27.4)	247 (23.4)	14.3 < 0.001	4.0 0.028	–10.3 < 0.001
Agree							
Behavioral response							
I have tried sexual activities I've seen in pornography	578 (31.2)	270 (16.1)	285 (22.1)	231 (21.9)	15.1 < 0.001	0.2 0.910	–14.9 < 0.001
Agree							
I believe the pornography I've used has had no influence on me	539 (29.2)	700 (41.7)	343 (26.6)	372 (35.3)	–12.5 < 0.001	–8.7 < 0.001	–3.8 < 0.001
Agree							

*All items were dichotomized and only the agree category is reported in the table.

**Pearson's Chi-square statistics, or, when cell counts were below five, Fisher's Exact test.

pornography (shown in Table 4) were defined as outcome variables and modeled separately.

In addition to gender and survey year, the multiple logistic regression models included adjustments for relevant background factors present in both surveys and which showed significant differences between the two surveys, as shown in Table 1. The selection of these control variables was motivated by the recognition that adolescents' responses to and attitudes toward pornography are affected by a range of factors, including demographic (e.g., gender, socioeconomic status), cultural (e.g., cultural identity, societal norms), and personal characteristics (e.g., frequency of pornography use, sensation-seeking behavior). To control for potential socioeconomic and cultural influences on outcome variables, and thus ensure comparability between cohorts, we controlled for living arrangement, born in Sweden, study program, and parental employment (father and mother).

Furthermore, to account for any confounding variables, we included controls for frequency of pornography use, cannabis use, and early sexual debut. Frequency of pornography use is a recognized factor influencing responses and attitudes toward pornography (Mattebo et al., 2012; Noll et al., 2022; Svedin et al., 2011). Cannabis use serves as a proxy for sensation-seeking tendencies, which is a predictor of pornography use (Peter & Valkenburg, 2016), and could increase the appeal of pornography. Early sexual debut is associated with the likelihood of having used pornography (Kastbom et al., 2015) and

might alter one's sensitivity to pornography. By adjusting for these variables, we aimed to isolate changes in responses and attitudes over the survey years that are independent of these cohort-specific factors.

Single and multiple logistic regression models estimated unadjusted odds ratios (uOR) and adjusted odds ratios (aOR), with corresponding 95% confidence intervals (CI) to investigate the joint effect of gender and year on outcome variables. The adjusted analysis incorporated the control variables outlined above. Data were also stratified by year and gender to examine potential gender-specific shifts within and across the years 2004 and 2020–2021. Prior to the multivariable analysis, we assessed the assumption regarding independence of the included variables and confirmed the absence of extreme values. All analyses were performed using IBM SPSS, version 28 (IBM Inc., Armonk, NY, USA), and statistical significance was defined as $p < .05$ (two-sided).

Results

Background Variables

Table 1 presents the background variables that were available in both surveys and the changes that occurred between the two cohorts. The most notable differences were the higher proportion of adolescents born in Sweden, the higher share of parents who were employed, and the lower share of adolescents who

had an early sexual debut (before the age of 14) in the 2020–21 cohort.

Regarding pornography use, a greater proportion of boys compared to girls reported having ever used pornography in both cohorts. However, a significant decline in lifetime usage was observed for both genders by 2020–21. For boys, the proportion fell from 97.9% to 89.8% ($p < .001$), and for girls, from 76.5% to 59.1% ($p < .001$). Among those who reported using pornography within the last year, there was a significant increase in the frequency of use for both genders. Weekly and daily usage among boys increased from 39.9% in 2004 to 76.0% in 2020–21 ($p < .001$), while for girls it rose from 2.3% to 19.4% ($p < .001$). It is worth noting that during the 2020–21 data collection period, the onset of the COVID-19 pandemic did not coincide with any statistically significant fluctuations in the frequency of pornography use across the three collection periods in 2020–21, as described above ($p = .371$).

Responses to Pornography

Bivariate Analyses

There were clear gender differences in how girls and boys described their responses to pornography. These gender differences were statistically significant for all items in 2004, and this pattern persisted for eight of the twelve items in the 2020–21 cohort. Across cohorts, girls were more likely to report being turned off by pornography and experiencing negative emotional responses such as “made me feel disgusted.” In contrast, boys more often described their experience of pornography as arousing and exciting, and that they learned from pornography and imitated the observed behaviors they had seen. For the new items added to the 2020–21 survey (not shown in Table 2), more boys (15.0%) than girls (5.1%) thought that it was “difficult to avoid using pornography” (uOR 0.31 [95% CI 0.22–0.42]; $p < .001$), and more boys (15.1%) compared to girls (4.2%) agreed to the statement “difficult to stop using pornography once I’ve started” (uOR 0.24 [95% CI 0.17–0.34]; $p < .001$).

Despite the persistent gender gap across cohorts, there was a convergence in boys’ and girls’ responses by 2020–21 (all responses $p < .001$), as shown in Table 2. For many items, the gender convergence was largely driven by changes in boys’ responses. For example, the closing gap between boys and girls who agreed to the item “interesting to learn what you can do” was solely due to the reduction in the share of boys from 47.1% in 2004 to 30.7% in 2020–21 (uOR 0.50 [95% CI 0.43–0.58]; $p < .001$). Similarly, while the proportion of girls who had tried the sexual acts seen in pornography increased slightly across survey years, the proportion of boys fell to practically identical proportions as girls, from 31.2% in 2004 to 22.1% in 2020–21 (uOR 0.63 [95% CI 0.53–0.74]; $p < .001$). By 2020–21, fewer boys also felt that pornography turned them on, was exciting, and made them want to try what they observed.

Conversely, for some items, shifts in the girls’ responses played a larger role in the reduced gender gap, such as the item “made me depressed,” falling from 23.1% in 2004 to 10.4% in 2020–21 (uOR 0.39 [95% CI 0.31–0.49]; $p < .001$). Changes in

girls’ responses largely accounted for the convergence for the item “made me upset:” while 30.9% of girls compared to 6.9% of boys reported feeling upset after using pornography in 2004, this gap narrowed to 10.8% for girls and 4.0% for boys in 2020–21.

Multiple Analyses

The multivariate analyses, accounting for background variables (living arrangement, born in Sweden, study program, parental employment, ever used cannabis, early sexual debut, and frequency of pornography use), generally corroborated the patterns identified in the bivariate analyses (Table 3). Most differences across cohorts of girls and boys, and gender differences per survey year, retained statistical significance after adjusting for controls. Some examples of when the multivariate results diverged from the bivariate analyses were the change in direction for the item “turned me on” when comparing girls across cohorts (2004 and 2020–21), and the change in direction for the item “made me excited” when comparing gender differences in each survey year. Overall, however, the multivariate analyses confirmed the persistent gender disparities, yet a convergence in responses in the 2020–21 cohort compared to the earlier cohort.

Attitudes Toward Pornography

Bivariate Analyses

Throughout the survey years, girls consistently held more critical and restrictive attitudes about pornography compared to boys, who typically reported more positive and tolerant views, shown in Table 4. Girls were significantly more inclined to support legal prohibitions and restrictions on pornography’s availability. They were less likely to consider pornography inspiring, and entertaining, and more likely to think that pornography degrades both women and men. Additionally, girls were less likely to perceive pornography as a beneficial stimulus for people’s sex lives, and more frequently associated the sexualization of children in media with an increased risk of child sexual abuse. In the 2020–21 survey, the new attitude item “I think those who participate in pornography are exploited” also revealed a gender disparity, with 48.8% of girls compared to 19.8% of boys agreeing with the statement (uOR 3.86 [95% CI 3.29–4.52]; $p < .001$).

Analogous to adolescent responses, these gender differences were much less pronounced by 2020–21. Both girls and boys adopted a more permissive stance regarding the regulation and availability of pornography by 2020–21. For instance, the proportion of girls who believed that the availability of pornography should be restricted fell from 63.5% in 2004 to 56.6% in 2020–21 (uOR 0.75 [95% CI 0.66–0.85]; $p < .001$), and for boys from 45.1% to 32.3% (uOR 0.58 [95% CI 0.50–0.67]; $p < .001$). Meanwhile, the endorsement of pornography’s availability increased for both genders, from 7.4% to 13.6% for girls (uOR 1.97 [95% CI 1.60–2.40]; $p < .001$) and from 32.9% to 41.6% for boys (uOR 1.46 [95% CI 1.26–1.68]; $p < .001$).

A convergence in attitudes related to pornography’s content was also observed for three of the four items. This pattern was primarily due to the decline in boys regarding pornography as entertaining and inspiring by 2020–21. The share of boys who thought that pornography

Table 3. OR and logistic regression results for responses to pornography.

Item*	Boy 2004 vs 2020–2021	Girl 2004 vs 2020–2021	Boy vs Girl 2004	Boy vs Girl 2020–21
Arousal response				
Turned me on	0.72 (0.62–0.83) ^{u2}	1.62 (1.38–1.90) ^{u2}	0.22 (0.19–0.25) ^{u1}	0.48 (0.41–0.57) ^{u1}
Agree	0.35 (0.29–0.42) ^{a2}	0.55 (0.44–0.69) ^{a2}	0.62 (0.51–0.74) ^{a1}	1.23 (0.99–1.53) ^{a1}
Turned me off	0.81 (0.66–1.00) ^{u2}	0.40 (0.34–0.48) ^{u2}	5.72 (4.87–6.72) ^{u1}	2.86 (2.32–3.54) ^{u1}
Agree	1.02 (0.80–1.28) ^{a2}	0.76 (0.62–0.92) ^{a2}	2.99 (2.43–3.67) ^{a1}	2.06 (1.58–2.69) ^{a1}
Emotional response				
Made me feel excited	0.73 (0.63–0.84) ^{u2}	1.14 (0.96–1.35) ^b	0.51 (0.44–0.59) ^{u1}	0.80 (0.67–0.95) ^{u1}
Agree	0.53 (0.45–0.62) ^{a2}	0.53 (0.42–0.67) ^{a2}	1.22 (1.00–1.50) ^{a1}	1.46 (1.16–1.83) ^{a1}
Made me feel disgusted	0.80 (0.66–0.98) ^{u2}	0.36 (0.30–0.42) ^{u2}	5.69 (4.88–6.64) ^{u1}	2.53 (2.06–3.10) ^a
Agree	1.09 (0.88–1.36) ^{a2}	0.60 (0.49–0.72) ^{a2}	2.92 (2.40–3.55) ^{a1}	1.88 (1.46–2.44) ^{a1}
Made me feel depressed	1.36 (1.05–1.76) ^{u2}	0.39 (0.31–0.49) ^{u2}	3.96 (3.20–4.89) ^{u1}	1.13 (0.86–1.49) ^{u1}
Agree	1.50 (1.12–2.02) ^{a2}	0.57 (0.44–0.74) ^{a2}	2.42 (1.83–3.20) ^{a1}	1.24 (0.87–1.75) ^{a1}
Made me feel upset	0.56 (0.40–0.78) ^{u2}	0.27 (0.22–0.34) ^{u2}	6.08 (4.94–7.49) ^{u1}	2.94 (2.09–4.14) ^{u1}
Agree	0.78 (0.54–1.14) ^{a2}	0.38 (0.30–0.50) ^{a2}	2.92 (2.25–3.80) ^{a1}	3.13 (2.05–4.79) ^{a1}
Made me feel indifferent	0.70 (0.55–0.89) ^{u2}	0.46 (0.37–0.59) ^{u2}	1.73 (1.43–2.09) ^{u1}	1.15 (0.87–1.52) ^{u1}
Agree	0.72 (0.55–0.93) ^{a2}	0.55 (0.42–0.73) ^{a2}	1.18 (0.92–1.52) ^{a1}	1.42 (0.99–2.04) ^{a1}
Cognitive response				
Interesting to learn what you can do	0.50 (0.43–0.58) ^{u2}	1.02 (0.86–1.22) ^{u2}	0.44 (0.38–0.50) ^{u1}	0.90 (0.75–1.08) ^{u1}
Agree	0.36 (0.30–0.42) ^{a2}	0.58 (0.47–0.73) ^{a2}	0.80 (0.66–0.97) ^{a1}	1.74 (1.37–2.19) ^{a1}
Made me want to try what I saw	0.52 (0.45–0.61) ^{u2}	1.56 (1.29–1.88) ^{u2}	0.28 (0.24–0.32) ^{u1}	0.82 (0.68–0.98) ^{u1}
Agree	0.36 (0.30–0.43) ^{a2}	0.82 (0.65–1.05) ^{a2}	0.57 (0.46–0.70) ^{a1}	1.53 (1.21–1.94) ^{a1}
Taught me things I did not know about other people's appearance	0.93 (0.80–1.09) ^{u2}	1.80 (1.48–2.19) ^b	0.42 (0.36–0.50) ^{u1}	0.81 (0.67–0.98) ^a
Agree	0.71 (0.60–0.85) ^{a2}	1.36 (1.06–1.73) ^{a2}	0.65 (0.52–0.82) ^{a1}	1.55 (1.21–1.97) ^{a1}
Behavioral response				
I have tried sexual activities I've seen in pornography	0.63 (0.53–0.74) ^{u2}	1.46 (1.20–1.78) ^{u2}	0.42 (0.36–0.50) ^{u1}	0.99 (0.81–1.20) ^{u1}
Agree	0.49 (0.40–0.59) ^{a2}	0.80 (0.62–1.03) ^{a2}	0.79 (0.63–1.00) ^{a1}	1.48 (1.15–1.92) ^{a1}
I believe the pornography I've used has had no influence on me	0.88 (0.75–1.03) ^{u2}	0.76 (0.65–0.90) ^{u2}	1.74 (1.51–2.00) ^{u1}	1.50 (1.26–1.80) ^{u1}
Agree	1.05 (0.88–1.25) ^{a2}	1.13 (0.93–1.37) ^{a2}	1.07 (0.89–1.29) ^{a1}	1.10 (0.88–1.37) ^{a1}

*All items were dichotomized and only the agree category is reported in the table.

^bUnadjusted OR (95% CI) and ^{a1} adjusted logistic regression OR (95% CI), stratified by year comparing boys and girls (boys=reference category).

^cUnadjusted OR (95% CI) and ^{a2} adjusted logistic regression OR (95% CI), stratified by gender/sex, comparing 2004 and 2020/2021 (2004=reference category).

was entertaining fell from 40.6% to 29.9% (uOR 0.27 [95% CI 0.23–0.33]; $p < .001$), whereas for girls there was no significant change. The number of boys who found pornography inspiring fell from 30.3% to 15.4% (uOR 0.42 [95% CI 0.35–0.50]; $p < .001$), and for girls from 10.3% to 6.0% (uOR 0.55 [95% CI 0.44–0.70]; $p < .001$).

Some gender convergence was also observed in attitudes related to societal impacts. For example, the belief that “pornography can stimulate people’s sex lives,” though still prevalent, fell for both genders by 2020–21. For girls, agreement decreased from 47.7% to 39.0% (uOR 0.70 [95% CI 0.62–0.80]; $p < .001$), and for boys, from 68.5% to 50.2% (uOR 0.46 [95% CI 0.40–0.53]; $p < .001$).

There were some exceptions to the gender convergence in attitudes when comparing the 2020–21 cohort with the 2004 cohort. For instance, a smaller percentage of boys in 2020–21 (23.7%) believed that pornography degrades women, a decrease from the earlier cohort (27.8%; uOR 0.81 [95% CI 0.69–0.95]; $p < .001$). In contrast, girls’ views remained relatively stable (62.0% in 2004 to 59.2% in 2020–21). Fewer girls in the 2020–21 cohort thought that pornography degrades men (18.5%) compared to girls in the 2004 cohort (29.1%; uOR 0.55 [95% CI 0.48–0.64]; $p < .001$). No difference across cohorts was found among boys. Additionally, there was no statistically significant shift in the percentage of boys who believed that “pornography is one of the best sources for young people to learn about sex” between the two cohorts (19.9% to 19.1%), whereas the proportion of girls endorsing this view slightly increased (from 3.5% to 5.7%; uOR 1.67 [95% CI 1.24–2.26]; $p < .001$).

Multiple Analyses

In the multivariate analyses, all differences between girls and boys in 2004 and most in 2020–21 retained their statistical significance (Table 5). Most differences between cohorts remained significant for both genders. However, after adjustments were introduced, there was no statistically significant difference between the cohorts of boys agreeing with the items “pornography should be easily available” and “pornography degrades women.” Meanwhile, girls in the later cohort (2021–21) were more likely to agree that pornography degrades women (aOR 1.17 [95% CI 1.01–1.36]; $p = .040$), while fewer agreed that pornography is entertaining (aOR 0.42 [95% CI 0.32–0.55]; $p < .001$). Some gender differences observed in the bivariate analyses, such as the belief that pornography degrades men, were also no longer statistically significant post-adjustment in 2020–21. Overall, however, the multiple analyses support the bivariate findings that with few exceptions, boys’ and girls’ attitudes have converged between 2004 and 2020–21.

Discussion

This study is among the first attempts to compare adolescent responses to and attitudes toward pornography across genders and eras, amidst significant technological and cultural shifts. By analyzing cross-sectional data from two cohorts of high school students in 2004 and 2020–21, we aimed to first assess changes in girls’ and boys’ frequency of pornography use, before exploring how their responses to and attitudes toward pornography may have shifted. Overall, the findings reveal that

Table 4. Attitudes toward pornography: gender comparisons and cohort differences.

Item*	2004		2020–2021		Gender differences		
	Boy 1923–1959 n (%)	Girl 2256–2281 n (%)	Boy 1432 n (%)	Girl 1776 n (%)	2004 % <i>p</i> -value**	2020–2021 % <i>p</i> -value**	2020–2021 Across cohorts
Regulation and availability							
Pornography should be easily available	644 (32.9)	169 (7.4)	596 (41.6)	242 (13.6)	25.5 < 0.001	28.0 < 0.001	+2.5 < 0.001
Agree							
Pornography should be prohibited by law	202 (10.3)	807 (35.5)	140 (9.8)	514 (28.9)	–25.5 < 0.001	–19.1 < 0.001	–6.1 < 0.001
Agree							
The availability of pornography should be restricted	883 (45.1)	1445 (63.5)	463 (32.3)	1005 (56.6)	–18.4 < 0.001	–24.3 < 0.001	+6.9 < 0.001
Agree							
Content							
Pornography is entertaining	793 (40.6)	271 (11.9)	428 (29.9)	186 (10.5)	28.7 < 0.001	19.4 < 0.001	–9.3 < 0.001
Agree							
Pornography is inspiring	592 (30.3)	234 (10.3)	220 (15.4)	106 (6.0)	20.0 < 0.001	9.4 < 0.001	–10.6 < 0.001
Agree							
Pornography degrades women	542 (27.8)	1349 (59.2)	340 (23.7)	1101 (62.0)	–31.4 < 0.001	–38.3 < 0.001	+6.9 < 0.001
Agree							
Pornography degrades men	227 (11.7)	663 (29.1)	155 (9.8)	329 (18.5)	–17.4 < 0.001	–7.7 < 0.001	–9.7 < 0.001
Agree							
Societal impacts							
Pornography can stimulate people's sex lives	1240 (68.5)	1083 (47.7)	719 (50.2)	692 (39.0)	20.8 < 0.001	11.2 < 0.001	–9.6 < 0.001
Agree							
When children are portrayed as sexually attractive, sexual abuse of children will be more common	1083 (56.3)	1607 (71.2)	600 (41.9)	1159 (65.3)	–14.9 < 0.001	–23.4 < 0.001	+8.5 < 0.001
Agree							
Pornography is one of the best sources of information for young people to learn about sex	384 (19.9)	79 (3.5)	273 (19.1)	101 (5.7)	16.3 < 0.001	13.4 < 0.001	–2.9 < 0.001
Agree							

*All items were dichotomized and only the agree category is reported in the table.

**Pearson's Chi-square statistics, or, when cell counts were below five, Fisher's Exact test.

while gender differences persist, there is a notable convergence in boys' and girls' responses and attitudes across cohorts.

Initially, we assessed changes in the frequency of pornography use among adolescents, a known factor affecting the way adolescents respond to and perceive pornography. While the overall percentage of adolescents who reported ever using pornography declined between 2004 and 2020–21 (from 98% to 90% for boys, and from 76.5% to 59.3% for girls), among those who used pornography, there was a substantial increase in the frequency of use for both genders. The proportion of boys reporting daily or weekly pornography use surged from 40% in 2004 to 76% in 2020–21, and among girls, it rose from 2% to 19%. These frequency results corroborate prior observations for boys but mark a significant shift for girls, as previous research incorporating the surveys from 2004, 2009 and 2014 found no significant rise in the share of girls using pornography frequently (Donevan et al., 2021; Svedin et al., 2022). Pirrone et al. (2022), who also identified a subset of girls actively using pornography, argued that this likely reflects a reduction in social barriers to girls consuming pornography. It seems that ubiquitous access to online pornography, combined with pornography's increased normalization in society, has indeed reduced previous barriers to pornography use.

The higher usage frequencies among those who reported using pornography could also denote a rise in compulsive or so-called "problematic pornography use" (PPU). Our data from the 2020–21 survey indicate that although boys who used pornography were more prone to difficulties avoiding pornography and discontinuing pornography use once they had started, a small subset of girls also shared these

experiences. While not the only possible explanation, the presence of PPU could partly account for the increased frequency of pornography use across cohorts. The proportion of boys and girls who reported difficulties avoiding and discontinuing pornography use (4–15%) closely aligns with earlier research suggesting that PPU affects 5–14% of adolescents who use pornography (Böthe et al., 2021; Donevan & Mattebo, 2017; Doornwaard et al., 2016; Svedin et al., 2011). The rollout of mobile technologies, allowing for uninterrupted access to pornography, has likely contributed to this rise in more frequent and potentially compulsive pornography use. This highlights the need for pediatric and adolescent health care providers to routinely screen children and adolescents for pornography use and associated risks (Hornor, 2020; Jhe et al., 2023; Svedin et al., 2011).

In line with previous research, our study revealed persistent gender differences in responses to pornography, with boys reporting higher arousal responses, positive emotional responses, and cognitive and behavioral responses, such as imitating the behaviors seen in pornography. Despite these gender differences, we observed a narrowing of this gap by 2020–21 across all response categories, primarily due to changes in boys' responses. For example, fewer boys in the 2020–21 cohort found pornography arousing and exciting, suggesting a desensitization effect in these response categories. A longitudinal study among Czech adolescents found that higher levels of pornography use led to desensitization over time (Daneback et al., 2018). The prevalence of pornographic imagery in mainstream media, along with the increase in frequent pornography use among boys, likely contributes to this desensitization. Indeed, in an earlier qualitative study, Swedish male adolescents described being "tired of

Table 5. OR and logistic regression results for attitudes toward pornography.

Item*	Boy 2004 vs 2020–2021	Girl 2004 vs 2020–2021	Boy vs Girl 2004	Boy vs Girl 2020–21
Regulation and availability				
Pornography should be easily available	1.46 (1.26–1.68) ^{u2}	1.97 (1.60–2.42) ^{u2}	0.16 (0.14–0.20) ^{u1}	0.22 (0.19–0.26) ^{u1}
Agree	1.01 (0.86–1.19) ^{a2}	1.54 (1.20–1.98) ^{a2}	0.43 (0.34–0.55) ^{a1}	0.51 (0.41–0.64) ^{a1}
Pornography should be prohibited by law	0.94 (0.75–1.18) ^{u2}	0.74 (0.65–0.84) ^{u2}	4.78 (4.04–5.55) ^{u1}	3.76 (3.07–4.60) ^{u1}
Agree	1.12 (0.85–1.48) ^{a2}	0.76 (0.64–0.88) ^{a2}	2.23 (1.77–2.79) ^{a1}	2.06 (1.61–2.63) ^{a1}
The availability of pornography should be restricted	0.58 (0.50–0.67) ^{u2}	0.75 (0.66–0.85) ^{u2}	2.11 (1.87–2.39) ^{u1}	2.73 (2.36–3.25) ^{u1}
Agree	0.68 (0.58–0.79) ^{a2}	0.88 (0.76–1.02) ^{a2}	2.03 (1.71–2.42) ^{a1}	2.76 (2.30–3.33) ^{a1}
Content				
Pornography is entertaining	0.62 (0.54–0.72) ^{u2}	0.87 (0.71–1.06) ^{u2}	0.20 (0.17–0.23) ^{u1}	0.27 (0.23–0.33) ^{u1}
Agree	0.40 (0.34–0.47) ^{a2}	0.42 (0.32–0.55) ^{a2}	0.67 (0.54–0.84) ^{a1}	0.80 (0.63–1.02) ^{a1}
Pornography is inspiring	0.42 (0.35–0.50) ^{u2}	0.55 (0.44–0.70) ^{u2}	0.26 (0.22–0.31) ^{u1}	0.35 (0.27–0.45) ^{u1}
Agree	0.30 (0.24–0.36) ^{a2}	0.33 (0.24–0.44) ^{a2}	0.73 (0.58–0.92) ^{a1}	0.69 (0.51–0.94) ^{a1}
Pornography degrades women	0.81 (0.69–0.95) ^{u2}	1.12 (0.99–1.27) ^{u2}	3.78 (3.32–4.31) ^{u1}	5.24 (4.49–6.12) ^{u1}
Agree	0.94 (0.79–1.12) ^{a2}	1.17 (1.01–1.36) ^{a2}	2.03 (1.70–2.43) ^{a1}	3.95 (3.26–4.48) ^{a1}
Pornography degrades men	0.92 (0.74–1.14) ^{u2}	0.55 (0.48–0.64) ^{u2}	3.12 (2.64–3.68) ^{u1}	1.87 (1.53–2.30) ^{u1}
Agree	1.02 (0.79–1.32) ^{a2}	0.55 (0.46–0.65) ^{a2}	1.56 (1.24–1.95) ^{a1}	1.10 (0.85–1.43) ^{a1}
Societal impacts				
Pornography can stimulate people's sex lives	0.46 (0.40–0.53) ^{u2}	0.70 (0.62–0.80) ^{u2}	0.42 (0.37–0.47) ^{u1}	0.63 (0.55–0.73) ^{u1}
Agree	0.33 (0.28–0.39) ^{a2}	0.56 (0.48–0.66) ^{a2}	0.81 (0.68–0.97) ^{a1}	1.26 (1.05–1.53) ^{a1}
When children are portrayed as sexually attractive, sexual abuse of children will be more common	0.56 (0.49–0.64) ^{u2}	0.76 (0.66–0.87) ^{u2}	1.92 (1.69–2.18) ^{u1}	2.60 (2.26–3.01) ^{u1}
Agree	0.54 (0.46–0.63) ^{a2}	0.75 (0.64–0.88) ^{a2}	2.03 (1.70–2.43) ^{a1}	3.03 (2.51–3.65) ^{a1}
Pornography is one of the best sources of information for young people to learn about sex	0.95 (0.80–1.13) ^{u2}	1.67 (1.24–2.26) ^{u2}	0.15 (0.11–0.19) ^{u1}	0.26 (0.20–0.33) ^{u1}
Agree	0.75 (0.62–0.92) ^{a2}	1.59 (1.10–2.30) ^{a2}	0.33 (0.24–0.46) ^{a1}	0.45 (0.33–0.60) ^{a1}

*All items were dichotomized and only the agree category is reported in the table.

^bUnadjusted OR (95% CI) and ^{a1} adjusted logistic regression OR (95% CI), stratified by year comparing boys and girls (boys = reference category).

^cUnadjusted OR (95% CI) and ^{a2} adjusted logistic regression OR (95% CI), stratified by gender/sex comparing 2004 and 2020/2021 (2004 = reference category).

pornography” after extensive exposure from an early age (Löfgren-Mårtenson & Månsson, 2010).

Boys from the later cohort were also less likely to report cognitive and behavioral responses, such as applying the behaviors depicted in pornography within their own sexual relationships. Perhaps, thanks to an increase in discussions about pornography and its potential effects, both in the media and in educational contexts, boys perceive less informative value and think more critically about the pornography they encounter. In a 2021 poll among Swedish boys aged 15–18, one-third held an overall negative view of pornography, critical of its extreme content, potential for addiction, themes of degradation, and negative repercussions on sexual satisfaction (Hertzman & Grundqvist, 2021). As more boys frequently use pornography and experience some of its implications (e.g., difficulty avoiding or disengaging from it once they start watching), they may become more cognizant of its broader implications for their personal relationships and sexual health.

Still, the gender convergence was also partly due to girls' responses becoming more closely aligned with boys. Girls for instance, accounted for the convergence in emotional responses, becoming less repulsed, turned off, and upset by the content they encountered. These shifts likely stem from the higher proportion of girls using pornography frequently, as previous research has found that regardless of gender, regular pornography users are more likely to endorse pornography than less frequent users (Mattebo et al., 2014; Noll et al., 2022). Yet, our multiple logistic regression analyses, controlling for frequency of pornography use, indicate that the increase in girls reporting arousal and the reduction in negative emotional responses cannot be solely attributed to frequency of use, suggesting the influence of other factors.

Girls' responses could reflect changing social norms about pornography's acceptability, where pornography use was previously considered only socially acceptable for men and boys (Davis et al., 2020; Löfgren-Mårtenson & Månsson, 2010). Girls' responses may have also shifted due to the mainstreaming of pornographic imagery in popular culture and the rise in platforms like OnlyFans, where mostly young women – including influencers and celebrities – sell pornographic content (Sanchez, 2022; Tyler & Quek, 2016). The pornography industry has also played a role in framing self-produced pornography as a form of women's liberation and using language that disguises the nature of the sexualized content (Donevan, 2021). The 3AM model emphasizes how identification with figures in sexual media enhances mediated sexual socialization – the process by which adolescents adopt the sexual norms and values of their culture (Wright, 2014). When adolescent girls share similar aspirational goals (e.g., affluence) to influencers, celebrities, and other young women with accounts on OnlyFans, this can impact the way they interpret and internalize their experiences with pornography.

Our findings reveal that girls' and boys' attitudes also converged across cohorts. By 2020–21, they were more tolerant of pornography's presence and availability in society, diverging from an earlier U.S. study which suggested that recent cohorts of young men are more inclined to support legal restrictions of pornography (Price et al., 2016). However, this increased tolerance did not translate to a greater endorsement of pornography's content and purported benefits. As adolescents expressed less support for restrictions or legal prohibitions of pornography, they were also less likely to endorse it as a source of inspiration, entertainment, or stimulation in sexual relationships. This suggests a dissonance between acceptance and approval, and that a shift toward perceiving pornography as

“normal” does not necessarily translate to an endorsement of its influence. This sentiment was echoed in a New Zealand qualitative study with adolescent boys, where participants deemed pornography as “normal” primarily because of its ubiquity and the assumption that “everyone uses it” (Vertongen et al., 2022). Yet, they resisted embracing it as their personal “normal” due to its violent, degrading content (Vertongen et al., 2022).

While the attitudes of adolescent boys and girls generally converged between 2004 and 2020–21, gender disparities are still evident. It seems that the content of pornography, tailored to a primarily male audience (“made for men by men”), continues to impact the perceptions among girls and boys differently. The largest gender gap in attitudes are views related to gender inequality and exploitation within the pornography industry. We found that two-thirds of girls in both the 2004 and 2020–21 surveys agreed that pornography degrades women – a finding that aligns with earlier research (e.g., Wallmyr & Welin, 2006). In comparison, the proportion of boys acknowledging this degradation decreased from 28% in 2004 to 24% in 2020–21. These patterns suggest that girls more readily recognize misogynistic and abusive themes in pornography than boys. It appears that although boys may be growing less positive about pornography’s impact on themselves and other consumers, they remain less attuned to the degradation of women in pornography, and the exploitation prevalent in the pornography industry. Noll et al. (2022) pointed out that this lack of critical engagement with pornography is concerning given its correlation with increased rape myth acceptance. Thankfully, increased knowledge about pornography has been shown to reduce such effects, highlighting the need to integrate such knowledge into sexuality education (Crabbe & Flood, 2021; Noll et al., 2022; Vandenbosch & van Oosten, 2017).

The influence of peers, particularly among boys, could reinforce beliefs that overlook exploitation in the pornography industry. For example, if boys feel guilt or revulsion to some of the content they’ve encountered, hearing their peers position pornography as humorous and “harmless fun” (Vertongen et al., 2022) might suppress or negate any such moral dilemmas. Mainstream media also perpetuates the notion that the sexual objectification of women by men is both normative and desirable (Noll et al., 2022). Frequent pornography use among boys may further contribute to this desensitization. Regular exposure to content that normalizes violence and exploitation can obscure an individual’s ability to recognize and acknowledge these behaviors as harmful. Earlier research has identified an association between pornography use and harmful myths about women in the sex trade (Menaker & Franklin, 2018). Frequent exposure to pornography can foster objectifying and victim-blaming beliefs about those depicted in pornography, such as the notion that “girls who have sex a lot may as well get paid for it” (Menaker & Franklin, 2018). The critical need to challenge such misconceptions is underscored by recent criminal investigations into the abuse, pimping, and human trafficking of vulnerable women within the pornography industry (e.g., French Senate, 2022). After receiving school-based pornography education in New Zealand, adolescent boys exhibited a heightened awareness of the exploitation prevalent in the pornography industry, leading some to reduce or discontinue

their use of pornography (Vertongen et al., 2022). This highlights the importance of educational interventions that incorporate not only knowledge about the impact of pornography on users but also the harm experienced by individuals featured in its content.

Overall, our study points to gendered differences in responses to and attitudes toward pornography among present-day adolescents compared to adolescents from the early 2000s. Social norms theory provides a useful lens for making sense of the observed differences, suggesting that individual behaviors and attitudes are largely influenced by perceptions of peer actions and societal acceptability (Echeverría et al., 2015; Grigoropoulos, 2023). The increasing pervasiveness and normalization of pornography are likely reshaping young people’s perceptions of its societal acceptance, particularly among their peers, thus influencing their personal views and responses. This is evidenced by the recent poll among boys aged 13–25 in Sweden, which found that while most boys (69%) believed that their peers held an overall positive view of pornography, only a minority (17%) reported that they themselves did (Hertzman & Grundqvist, 2021). This again highlights the critical role of education in addressing and correcting such misconceptions. Educators are encouraged to delve into topics such as the incentives the pornography industry has to normalize its content, the gender-specific expectations surrounding pornography use, and the reasons why some adolescents choose not to engage with it, despite its widespread prevalence.

Our findings reflect a broader trend of gender convergence across various life domains (Minello et al., 2020). To contextualize our findings, the evolution of smoking patterns provides a useful analogy: what began as a predominantly male behavior became increasingly prevalent among women, partly due to the tobacco industry’s marketing efforts framing smoking as a symbol of women’s liberation (Sohlberg, 2014). As awareness of smoking’s health risks grew, smoking rates peaked and then declined for both genders – first among men and later among women. The combined effect of heightened awareness of the dangers of smoking through educational measures, alongside policies such as prohibitions on smoking in public venues, led to a shift in social norms and behaviors (Echeverría et al., 2015; Sohlberg, 2014). Analogous to smoking, increasing awareness and knowledge about pornography could alter adolescents’ attitudes and behaviors over time. Sweden’s newly updated *Sexuality, Consent and Relationship* curriculum emphasizes a critical analysis of pornography as an essential component (Swedish National Agency for Education, 2022). Improvements in sexuality and relationship education can support adolescents in critically examining and resisting the themes and content presented in the pornographic script and reduce their reliance on pornography for sexual information. Perhaps, as Sweden advances educational and policy measures to minimize the negative impacts of pornography on users and those portrayed in its content, we may witness similar changes in societal norms and behaviors.

This study’s strength lies in the use of two distinct cross-sectional surveys, conducted in 2004 and 2020–21, which

sampled representative cohorts of third-year high school students. By using identical survey items, we were able to compare adolescents' responses to and attitudes toward pornography across these two cohorts. This approach provided a unique opportunity to observe changes in these variables across a period marked by significant technological shifts from shared computers to personal handheld digital devices and a pervasive normalization of pornography.

Our study was not without limitations. First, we only assessed two repeated surveys, limiting what we can conclude about how adolescents' pornography use, responses, and attitudes are evolving over time. Although the school-based survey was also administered in 2009 and 2014, some of the key questions about pornography were removed in these survey cycles, and then re-added in the 2020–21 survey. The inclusion of at least one additional data set would have allowed us to trace changes more precisely in cohorts over the two decades of interest.

A further limitation is that the binary yes-no response alternatives for our single-item measures may not fully capture more nuanced experiences and views that adolescents might have (e.g., Vertongen et al., 2022). It is also important to acknowledge the limitations of single-item measures, which may affect reliability compared to composite scales. The single items used in this study were not originally intended as composite scales; however, they were grouped under the broad categories of responses and attitudes to facilitate understanding and interpretation. A low Cronbach's alpha confirmed that assessing these items individually was more appropriate than using a composite scale. Future research could, for instance, utilize the Attitudes toward Pornography Scale (Whatley & Brock, 2019) and further develop a scale specifically pertaining to responses for assessing how such attitudes and responses are evolving over time.

Additionally, perceptions of what constitutes pornography may have changed over time, potentially introducing measurement error. It is not clear whether recent generations of adolescents would define the sexually explicit images seen on social media applications or platforms like OnlyFans as pornography. The broad definition of pornography provided to study participants may at least partially mitigate this concern by encompassing a wide range of sexually explicit content, ensuring that different interpretations of what constitutes pornography are captured within our data. On the other hand, the broad definition could also lead to the inclusion of sexual content that falls outside of the intended definition of pornography, such as scenes from mainstream TV-shows or movies. However, given that the study participants were around 18 years old, this concern may be less pronounced than it would be with younger teens or children, who may have less experience and discernment in distinguishing between pornography and other sexual content. To capture more precise data, future studies should consider both the medium (e.g., websites, social media platforms, magazines, etc.) and the specific sources through which pornography is accessed. Additionally, research should explore how adolescents themselves define pornography, as this could further illuminate how definitions may vary across time, age, and cultural contexts.

A further caveat is that our analysis was confined to variables that were available in both surveys. This limitation meant that we were unable to explore the responses and attitudes of adolescents with non-binary gender identities, as the option "non-binary" had not yet been introduced in the 2004 survey. It also constrained the scope of background factors we could adjust for in our multiple logistic regression analysis. For instance, the surveys did not gather data on religiosity, a variable that has been found to predict pornography use (Grubbs et al., 2018; Kohut & Štulhofer, 2018) and influence sexual attitudes, including views on pornography (Grigoropoulos, 2023). However, given Sweden's highly secularized context, the two cohorts would likely share greater similarities with adolescents in the Netherlands where religiosity did not predict pornography use (Vandenbosch, 2015). Furthermore, Grigoropoulos' (2023) findings suggest that social norms may have a greater influence on attitudes toward pornography compared to religiosity, indicating that the omission of religiosity likely does not significantly undermine the study's validity.

The COVID-19 pandemic also presented a significant challenge by interrupting and altering the data collection process during the 2020–21 survey. The change in response rates once the survey transitioned to a home-based setting is likely due to students not being allocated a specific time for completing the survey at home. If certain adolescents were more inclined to participate in the home-based survey, this could threaten the validity of comparisons between the two cohorts. However, the consistent pattern we found in the frequency of pornography use throughout the 2020–21 data collection period – spanning both pre-pandemic and pandemic phases – offers some assurance that such bias did not significantly impact our study. This stability in frequency rates was also observed in a recent Canadian study (Böthe et al., 2022).

Finally, although our findings suggest that societal shifts have impacted adolescent responses to and attitudes toward pornography, our analysis did not elucidate the specific factors driving these changes. While not within the scope of this paper, future research should aim to disentangle the influence of gender, frequency of pornography use, knowledge about pornography, social norms, and other potential mechanisms of change.

In conclusion, gender differences in adolescents' responses to and attitudes toward pornography persist, with girls generally expressing aversion and holding a more critical stance than boys. Despite these differences, the responses and attitudes of girls and boys are more similar now compared to an earlier cohort from 2004. Our findings underscore the importance of educational measures that enhance young people's critical engagement with pornography, addressing its impact on users, those depicted within its content, and society at large.

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ORCID

M. Donevan  <http://orcid.org/0000-0003-3761-6186>
 M. Bladh  <http://orcid.org/0000-0002-6681-8601>
 Å. Landberg  <http://orcid.org/0000-0003-3352-8250>
 L. S. Jonsson  <http://orcid.org/0000-0002-8110-2855>
 G. Priebe  <http://orcid.org/0000-0001-8386-8881>
 I. Dennhag  <http://orcid.org/0000-0001-7336-1657>
 C. G. Svedin  <http://orcid.org/0000-0003-1790-2732>

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