

The relationship between Online Porn Consumption and Perceived
Sexual Skills and the moderating role of Perceived Realism of
Online Porn

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Abstract

The Internet has grown tremendously, and with that, the availability of sexually explicit material has changed dramatically. Many adolescents are exposed to porn. This longitudinal study examined the (bidirectional) relationship between porn use and adolescents' perceived sexual skills, as well as the role of perceived realism of online porn in this relationship. For this study, data were used from 'Project STARS', a longitudinal study with four moments of data collection from 2011 till 2013. The sample consisted of 116 adolescents (51.7% girls), aged 13 to 18 years ($M = 15.92$, $SD = 1.28$). Results showed that two out of five participants reported watching porn on a regular basis, boys more often than girls. When adolescents don't watch porn and perceive online porn as realistic, they rate their sexual skills lower. In addition, girls who regularly watch porn rate their sexual skills as better than girls who don't watch porn, whereas boys rate their sexual skills as worse than boys who don't watch porn. Since perceived realism and gender were found to be important, the advice is to develop informative online tools, so, particularly girls, can learn and thus increase their perceived sexual skills.

Key words: porn use; sexual skills; perceived realism; gender; upward social comparison; social learning.

Abstract (Nederlands)

Het Internet breidt steeds verder uit, en daarmee is de beschikbaarheid van seksueel expliciet materiaal drastisch veranderd. Veel adolescenten komen in aanraking met porno. Deze longitudinale studie heeft de (bidirectionele) relatie tussen pornogebruik en iemands ervaren seksuele vaardigheden, en de invloed van ervaren realisme van online porno op deze relatie. Voor deze studie is een dataset gebruikt van 'Project STARS', een longitudinale studie met vier meetmomenten van 2011 tot 2013. De steekproef bevatte 116 adolescenten (51.7% meisje), van 13 tot 18 jaar ($M = 15.92$, $SD = 1.28$). Twee op de vijf participanten gaven aan regelmatig porno te kijken. Als adolescenten geen porno kijken en online porno als realistisch zien, beoordelen zij hun seksuele vaardigheden minder goed. Daarnaast werd gevonden dat meisjes die regelmatig porno kijken hun seksuele vaardigheden als beter beoordelen dan meisjes die geen porno kijken, terwijl jongens daarentegen hun seksuele vaardigheden als slechter beoordelen. Aangezien ervaren realisme en geslacht belangrijk bleken is het advies om online materialen te ontwikkelen, zodat, vooral meisjes, hiervan kunnen leren en zo hun ervaren seksuele vaardigheden kunnen vergroten.

Sleutelwoorden: pornogebruik, seksuele vaardigheden, ervaren realisme; geslacht; opwaartse sociale vergelijking; sociaal leren.

Introduction

Internet has created a communication and information network unlike anything previously seen (Carnes et al., 2007). Whatever we want, we can have it via the Internet. With the growth of the Internet, the availability of sexually explicit material has changed dramatically (Cooper, 2001). Many adolescents are exposed to porn. Peter & Valkenburg (2006b) found that for Dutch adolescents, 71% percent of males and 40% of females had been exposed to online porn in the previous 6 months. Functions of watching porn range from enhancing masturbation to consumption during sex, to exploring new sexual techniques (Solano et al., 2018). Given the fact that porn is used as a way to explore new sexual techniques, perceived sexual skills have been linked to pornography use. Perceived sexual skills are defined as “how one views themselves as being able to be involved in sexual practices with successful processes and outcomes” (Hirst, 2008). When it comes to the effect of porn consumption on perceived sexual skills, the literature shows contradictory results, and much is still unclear. Moreover, it can be assumed that perceived realism of pornography plays a role in this relationship. The present study, therefore, examines the association between porn consumption and sexual skills, as well as the moderating role of perceived realism in this association.

Perceived sexual skills

It's possible that there is an effect of porn consumption on sexual skills. It can be assumed that this effect is positive, when people turn to porn for educational purposes and to learn new skills. However, it can also be assumed that this effect is negative, when people compare themselves to porn actors and think they can never perform the way they do. Porn typically shows actors who engage in a variety of sexual acts and who demonstrate to have the sexual skills to perform these acts (Löfgren-Mårtenson & Månsson, 2010; Vandenbosch et al., 2018). Pornography has become a primary source of sexual education (Sun et al., 2016); 20% up to even 76.5% of adolescents use the Internet for sex education (Simon & Daneback, 2013). In a systematic review by Litsou and colleagues (2020), pornography was found to be a source of information to learn ‘how to have sex’, and about sexual performance, positions and roles. When adolescents want to learn about sex, talking about it with teachers, parents or friends is often perceived as embarrassing and shameful (Simon & Daneback, 2013; Smith, 2013). Thus, adolescents often prefer to turn to the Internet, which is a more private and anonymous place to learn and increase their sense of sexual competence (Simon & Daneback, 2013; Sun et al., 2016). This mechanism relates to Bandura's social learning theory (Bandura, 1986), which focuses on learning that occurs within a social context: people learn from one another, by means

of observational learning and imitation (Häggström-Nordin et al., 2009). The first hypothesis, therefore, states that: *‘Porn consumption increases perceived sexual skills’* (the *‘Social Learning Hypothesis’*). However, watching porn can also decrease a sense of sexual competence. When people watch porn, they might see porn actors that are capable of sexual skills they themselves don’t possess. This could lead to perceiving your own sexual skills as worse. The decrease of perceived sexual skills could be explained by the social comparison theory by Festinger (1954). This theory states that people have an innate drive to evaluate their own abilities and attributes in comparison to others. Social comparison processes can affect self-perceptions; individuals compare themselves to others to measure their own abilities and successes. There are two general types of social comparison: downward (i.e., the target is inferior) and upward (i.e., the target is superior). Porn actors are universalistic targets (i.e., a distant target such as celebrities/models), and comparisons to these targets most likely will be upward (Morrison et al., 2007). Upward comparison to porn actors has previously been associated with body- and sexual dissatisfaction (Doornwaard et al., 2014). Moreover, porn was found to lead to feelings of doubt and insecurity about one’s own sexual skills, and to anxiety-causing beliefs about how to perform sexually for both men and women (Goldsmith et al., 2017; Hare et al., 2014; Löfgren-Mårtenson & Månsson, 2010). People may get distorted ideas about how to perform sexually from watching porn, which thus decreases their own perceived sexual skills due to upward social comparison processes. This relates to the second hypothesis: *‘Porn consumption decreases perceived sexual skills’* (the *‘Upward Social Comparison Hypothesis’*). The goal of the present study is to test the two aforementioned opposing hypotheses to see which of the two mechanisms is (most) involved.

It could be the case that the relationship is bidirectional, where next to the idea that porn consumption can decrease perceived sexual skills, the reversed relationship can also exist (i.e., *‘perceived sexual skills decreases porn consumption’*). It’s important to distinguish these two opposite causal relationships. When individuals get their partner to orgasm or successfully perform different sexual positions, they find proof for their sexual competences (Arrington-Sanders et al., 2015). When adolescents’ self-confidence increases, there’s a decrease in porn consumption (Löfgren-Mårtenson & Månsson, 2010). This relates to the third hypothesis: *‘Perceived sexual skills decrease porn consumption’*.

Perceived realism of online porn

A factor that comes to mind when talking about sex on the Internet is people’s perceived realism of online porn. Pornography, while depicting people actually engaging in sexual acts, often

portrays an unrealistic image of sexuality as it's practiced in real-life (Paul, 2005). Young people may or may not be aware of this. Previous studies showed that exposure to SEIM may also increase the extent to which adolescents see SEIM as valuable and realistic, and that as adolescents consume more SEIM, their perceived realism increases (Peter & Valkenburg, 2006a; Peter & Valkenburg 2010). This is in line with Doornwaard and colleagues (2015), who found that adolescents who consumed SEIM occasionally, as opposed to not/infrequently, perceived sexualized Internet content as more realistic and instructive. This relates to the fourth hypothesis: *'Porn consumption increases perceived realism of online porn'*.

In addition, perceived realism of online porn can buffer or intensify the effects of porn (Hald & Malamuth, 2008; Hare et al., 2014; Simon & Daneback, 2013). Especially in research among adolescents perceived realism is an important factor, since adolescents may easily accept SEIM as a representation of the real world because they lack sexual experience, socio-emotional maturity and critical thinking skills (Peter & Valkenburg, 2010). Perceived realism can be expected to increase both the potential positive and negative effect of porn consumption on perceived sexual skills. When it comes to the positive effect, there's an association between the extent to which one thinks porn is realistic and the self-perceived positive effects of porn use (Kvalem et al., 2014). Furthermore, those who believe that porn is more realistic perceive more positive effects on the self (Hald & Malamuth, 2008). When it comes to the negative effect it can be imagined that when people are aware that pornography isn't a representation of reality, they might not experience lower perceived sexual skills when comparing themselves to the high 'standards' in porn. So, the more one thinks that porn is realistic, the more negative they perceive their own sexual skills as a result of comparing themselves with a 'realistic other'. The fifth hypothesis therefore is: *'Perceived realism of online porn strengthens the potential positive and negative effect of porn consumption on perceived sexual skills'*.

Research model

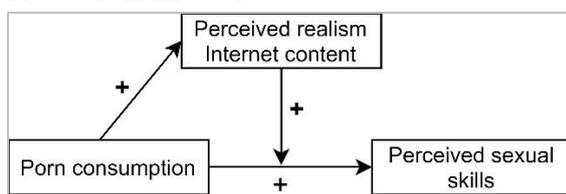


Figure 1. Hypotheses 1, 4 and 5, including the 'social learning hypothesis'.

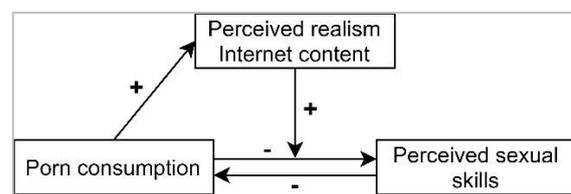


Figure 2. Hypotheses 2 to 5, including the 'upward social comparison hypothesis'.

Method

Design and procedure

The current study used data collected in a longitudinal research project called Project STARS (Studies on Trajectories of Adolescent Relationships and Sexuality). This study was on adolescent romantic and sexual development and related factors. Project STARS consisted of four measurement waves with a six-month interval (Fall 2011 (T1), Spring 2012 (T2), Fall 2012 (T3) and Spring 2013 (T4)). The current study used data from the last two measurement waves (T3 and T4). Participants were recruited via Dutch primary- and secondary schools. As of T3, all participants were in secondary school. Participants and their parents were given the opportunity to refuse participation via passive informed consent, and participants were informed that they could end participation at any time. Questionnaires were completed at school, during school times. Researchers and trained research assistants were present to supervise the data collection. Participants received book gift certificates for completing the questionnaire that increased in value after completing more waves.

Sample

The dataset consisted of 1297 participants (53.3% boys, 46.7% girls). For this sample, first participants were selected that participated in both the 3rd and 4th wave (N=957). Then the sample was narrowed down to those who had engaged in sex at both T3 and T4 (N=116). Of those 116 participants, 56 were boys (48.3%) and 60 were girls (51.7%). At T3, participants were between 13 and 18 years old ($M_{age}=15.92$, $SD=1.28$). The educational level for 52 participants (44.8%) was VMBO and for 64 participants (55.2%) was HAVO or higher. Furthermore, 77 participants (66.4%) reported not being religious, and 36 participants (31.0%) reported being religious.

Measuring instruments

This study consisted of filling in an online self-report questionnaire. The current study only uses items concerning porn use, perceived sexual skills and perceived realism of online porn, as well as the control variables gender (0=boy, 1=girl), age, religion (0=not religious; 1=religious) and educational level (0=VMBO, 1=HAVO/VWO).

Porn use. All participants were asked about their porn use. The question stated: ‘Many teenagers sometimes look at pornography on the Internet. We would like to know how this is for you. How often do you use the Internet to view a porn website (*a website with pictures or movies that show nudity or people having sex*)?’. The response category was a 6-point Likert

scale with the following options: 1 = never, 2 = less than once a year, 3 = less than once a month, 4 = 1 to 3 times a month, 5 = 1 to 2 times a week, 6 = 3 times a week or more. Because this variable was highly skewed, in this study porn use was dichotomized, so participants were more equally distributed among the groups. The response categories 1 to 3 were scored as ‘none or irregular porn use’ and response categories 4 to 6 were scored as ‘regular porn use’.

Perceived realism of online porn. In the current study, perceived realism is measured with one construct of 5 items. Participants had to indicate whether they agree or disagree with the following statements: (1) The Internet gives reliable information on sex and relationships; (2) Sex on the Internet is realistic; (3) Porn websites offer a good representation of sex in real life; (4) Not everyone on the Internet is who he/she says he/she is; (5) I can learn a lot by watching porn on the Internet. These items were rated on a 7-point Likert scale, ranging from 1 (completely disagree) to 6 (completely agree), and 7 (I don’t know). Since none of the participants rated any question with ‘I don’t know’ this answer option was left out in the analyses and the scores were used as a 6-point Likert scale. The recoded item (item 4) didn’t match the others based on face validity and had low item-rest correlations. Besides that, when a factor analysis was conducted, the items loaded on two factors at T4. When the item 4 was deleted, all of the items loaded on one factor. So, this item was excluded. The scale showed satisfactory reliability at T3 ($\alpha = .71$) and T4 ($\alpha = .78$). Responses were scaled by using the mean score of the items combined. Participants with a missing score on 1 of the 4 items were still included. The higher the score on the scale, the higher the level of perceived realism (T3: $M = 2.07$, $SD = .92$; T4: $M = 1.98$, $SD = .92$).

Perceived sexual skills. Participants’ self-perceived sexual skills were measured with 4 items. Participants had to indicate whether they agree or disagree with the following statements: (1) I always know what the boy or girl with whom I have sex likes; (2) I think it is important that the boy or girl with whom I have sex gets aroused by what I do; (3) I pay a lot of attention to what the boy or girl with whom I have sex likes; (4) I find it difficult to please the boy or girl with whom I have sex. These items were rated on a 6-point Likert scale ranging from 1 (completely disagree) to 6 (completely agree). A factor analysis showed that the items loaded on one factor. The scale showed good reliability at T3 ($\alpha = .75$) and T4 ($\alpha = .74$). Responses were scaled by using the mean score of the items combined. Participants with a missing score on 1 of the 4 items were still included. The higher the score on the scale, the higher one’s self-perceived sexual skills (T3: $M = 4.83$, $SD = .73$; T4: $M = 4.94$, $SD = .69$).

Data analysis

These data were made available by the DANS data repository. Neither the original data collectors nor DANS bear any responsibility for the analyses performed with these data, or interpretations presented here.

Statistical analyses were conducted in IBM SPSS Statistics 24. First the correlations between all of the variables (i.e., control-, independent- and dependent variables) were calculated with Pearson correlations for continuous variables and Spearman correlations when at least one variable was nominal. Tests to see if the data met the assumption of collinearity indicated that multicollinearity was not a concern ($VIF < 3.00$). Pairwise deletion was used, which preserves more data and is more accurate than listwise deletion (Tsikriktsis, 2005). Pairwise deletion can be used when less than 10% is missing (perceived realism: 6% missing at T3; 10% missing at T4). To test the first two hypotheses, with sexual skills as dependent variable, a Linear Regression Analysis was conducted. Age and sexual skills were included in step 1 as control variables. Then in step 2 the main effect of porn use was added. To test hypothesis 3, with porn use as the dependent variable, a Logistic Regression Analysis was used. Age and porn use were included in step 1 as control variables. Then the main effect of sexual skills was added in step 2. Hypothesis 4, that states that porn use increases perceived realism of online porn, was tested using Linear Regression Analysis with perceived realism as the dependent variable. In step 1 gender and perceived realism were added, and in step 2 the main effect of porn use was added. To test hypothesis 5, concerning the moderating effect of perceived realism of online porn, an interaction term for the interaction between porn use and perceived realism was computed. This interaction term, together with the main effect of perceived realism, were added as step 3 in the same Linear Regression Analysis used to test hypothesis 1 and 2.

Results

Descriptive analyses

With regard to porn consumption, of the 116 participants, two out of five participants reported watching porn on a regular basis (T3: 39.7%, T4: 38.8%). Chi-square tests were performed to compare porn use between boys and girls, and this difference was found to be significant at T3 ($\chi^2(1) = 50.95$, $N = 116$, $p < .001$) and at T4 ($\chi^2(1) = 54.03$, $N = 116$, $p < .001$). So, boys reported watching porn significantly more often than girls, as can be seen in Table 1.

Table 1.

Chi-square test for porn use by boys and girls at T3 and T4.

	T3		T4	
	Frequency (%)		Frequency (%)	
	Boys	Girls	Boys	Girls
No/irregular porn use	15 (26.8%)	55 (91.7%)	15 (26.8%)	56 (93.3%)
Regular porn use	41 (73.2%)	5 (8.3%)	41 (73.2%)	4 (6.7%)
Total	56 (100%)	60 (100%)	56 (100%)	60 (10%)

With regard to sexual skills, on average participants scored above midpoint (T3: $M = 4.83$, $SD = .73$; T4: $M = 4.94$, $SD = .69$; range: 1.0-6.0). So, on average, participants rate their sexual skills as good. With regard to perceived realism, participants scored below midpoint (T3: $M = 2.07$, $SD = .92$; T4: $M = 1.98$, $SD = .92$; range: 1.0-6.0). So, on average, participants don't perceive porn as realistic. Independent-Samples T Tests to see if gender differences also existed for sexual skills and perceived realism proved to be non-significant.

Correlations

Table 2 shows the correlations between the control-, dependent- and independent variables. For the first three hypotheses, concerning the relationship between perceived sexual skills and porn use, no significant correlations were found. In accordance with the fourth hypothesis, porn consumption was moderately positively correlated with perceived realism, $r(102) = .37$, $p < .001$. This means that higher porn use is related to perceiving porn as more realistic. There were also correlations found between the control variables and the (in)dependent variables. First of all, girls seem to watch less porn than boys and perceive porn as less realistic. In addition, the older participants were, the higher they rated their sexual skills. Furthermore, the higher the educational level, the higher participants rated their sexual skills.

Table 2

Bivariate correlations between the control-, dependent- and independent variables.

	1.	2.	3.	4.	5.	6.	7.
1. Gender	1.00						
2. Age	-.11	1.00					
3. Religion	.05	.07	1.00				
4. Education level	.10	.55**	.25**	1.00			
5. Sexual skills	-.12	.26**	-.06	.27**	1.00		
6. Porn use	-.66**	-.08	-.01	-.05	.05	1.00	
7. Perceived realism	-.25*	-.10	.11	.11	-.08	.37**	1.00

Note. Underscored correlations are Pearson correlations, the others are Spearman correlations.

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Regression analyses

To study the relationship between porn consumption, perceived realism of online porn and sexual skills multiple analyses were conducted. Because there are large gender differences in porn consumption, gender will be taken into account as a control factor. Religion, education level and sexual skills weren't taken into account, since these variables only significantly correlated with one or none of the research variables, and not with both the independent- and the dependent variables.

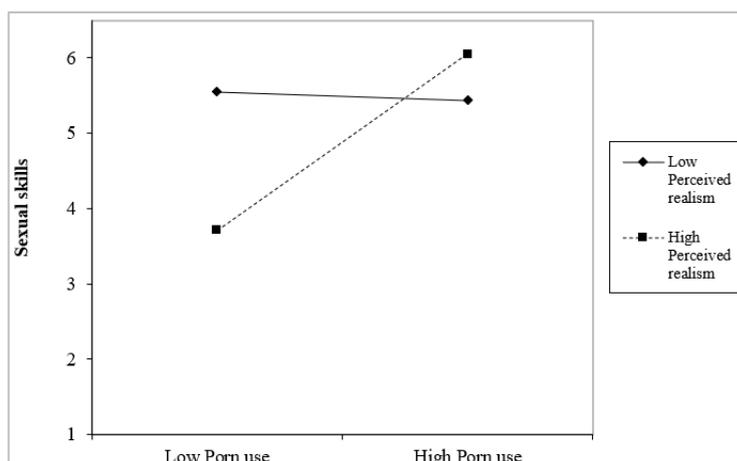
Table 3

Cross-sectional Linear Regression Analysis for the Predictive Role of Porn Use on Sexual Skills, with Perceived realism as moderator.

	Cross-sectional model (T3)				Cross-sectional model (T4)			
	N=116				N=116			
	B	β	<i>p</i>	ΔR^2	B	β	<i>p</i>	ΔR^2
Step 1:				.01				.01
Gender	-.17	-.12	.23		-.11	-.08	.40	
Step 2:				.00				.00
Porn use	-.11	-.08	.57		.01	.01	.96	
Step 3:				.06				.00
Perceived realism	-.31	-.39	.02*		-.03	-.05	.78	
Porn use x realism	.41	.37	.02*		.00	.00	1.00	

Figure 3

Interaction-effect between Porn Use and Perceived Realism of Online Porn in predicting Sexual Skills (cross-sectionally at T3).



A cross-sectional linear regression analysis testing the first two opposing hypotheses, relating to the positive or negative effect of porn consumption on sexual skills, proved to be non-significant. The fifth hypothesis stated that perceived realism of online porn would moderate

the potential positive or negative effect of porn consumption on perceived sexual skills. At T3, the interaction-effect between porn consumption and perceived realism of online porn was significant, $F(4, 99) = 2.08, p < .05$ (see Table 3). As can be seen in Figure 3, the interaction shows that for adolescents with a high perceived realism, those who regularly watch porn perceive their sexual skills as better than those who don't or irregularly watch porn. For adolescents with a low perceived realism of online porn, porn consumption does not seem to impact their perceived sexual skills. So, there seems to be a difference in the self-perceived sexual skills, but only among adolescents with high perceived realism. When exploring the significant interaction effect it was imagined that the main effect of perceived realism on sexual skills could differ for adolescents that don't or irregularly watch porn and those who regularly watch porn. As can be seen in Table 4, at T3 there's a significant effect of perceived realism on sexual skills, but only for those who don't or irregularly watch porn. So, sexual skills significantly differ for those who don't/irregularly watch porn, but not for those who regularly watch porn. When adolescents who don't/irregularly watch porn perceive online porn as realistic, they rate their sexual skills lower.

Table 4

Cross-sectional Linear Regression Analysis for the Predictive Role of Perceived Realism on Sexual Skills, for adolescents with no/irregular porn use and with regular porn use.

	Cross-sectional model (T3)			
	N=116			
	B	β	p	ΔR^2
None/irregular	-.32	-.31	.02*	.10
Regular	.09	.13	.40	.02

Table 5

Longitudinal Linear Regression Analysis for the Predictive Role of Porn Use on Sexual Skills, with Perceived realism as moderator.

	Longitudinal model (T3 → T4)			
	N=116			
	B	β	p	ΔR^2
Step 1:				.37
Sexual skills (T3)	.58	.60	.00**	
Gender	-.01	-.01	.91	
Step 2:				.00
Porn use	-.10	-.07	.53	
Step 3:				.01
Perceived realism	.11	.14	.29	
Porn use x realism	-.08	-.08	.57	

Longitudinally neither the direct effect of porn use on sexual skills, nor the interaction effect between perceived realism and porn were significant (see Table 5).

Table 6
Cross-sectional Binary Logistic Regression Analysis for the Predictive Role of Sexual Skills on Porn Use.

	Cross-sectional model (T3)				Cross-sectional model (T4)			
	N=116				N=116			
	Exp (B)	95% CI Lower	95% CI Upper	R ²	Exp (B)	95% CI Lower	95% CI Upper	R ²
Model 1:				.52				.55
Gender	.03**	.01	.10		.03**	.01	.09	
Model 2:				.52				.55
Gender	.03**	.01	.10		.03**	.01	.09	
Sexual skills	.79	.39	1.62		1.02	.47	2.23	

Table 7
Longitudinal Binary Logistic Regression Analysis for the Predictive Role of Sexual Skills on Porn Use.

	Longitudinal model (T3 → T4)			
	N=116			
	Exp (B)	95% CI Lower	95% CI Upper	R ²
Model 1:				.69
Porn use (T3)	15.26**	4.54	51.31	
Gender	.08**	.02	.31	
Model 2:				.69
Porn use (T3)	15.03**	4.42	51.03	
Gender	.08**	.02	.31	
Sexual skills	.83	.34	2.02	

Binary logistic regressions testing hypothesis 3, which stated that perceived sexual skills decreases porn consumption, yielded no significant relationships (see Tables 6 and 7).

Table 8
Cross-sectional Linear Regression Analysis for the Predictive Role of Porn Use on Perceived Realism of Online Porn.

	Cross-sectional model (T3)				Cross-sectional model (T4)			
	N=116				N=116			
	B	β	<i>p</i>	ΔR^2	B	β	<i>p</i>	ΔR^2
Step 1:				.05				.15
Gender	-.43	-.23	.02*		-.72	-.39	.00**	
Step 2:				.07				.00
Porn use	.66	.35	.01**		.17	.09	.46	

Table 9

Longitudinal Linear Regression Analysis for the Predictive Role of Porn Use on Perceived Realism of Online Porn.

	Longitudinal model (T3 → T4)			
	N=116			
	B	β	<i>p</i>	ΔR^2
Step 1:				.49
Perceived realism (T3)	.60	.60	.00**	
Gender	-.47	-.25	.00**	
Step 2:				.01
Porn use	.31	.17	.10	

The fourth hypothesis stated that porn consumption increases the perceived realism of online porn. Cross-sectionally, at T3, the relationship between porn use and perceived realism of online porn was significant, $F(2, 101) = 7.09, p < .01$ (see Table 8). So, as porn use increases, the perceived realism of online porn also increases. Longitudinally, the effect of porn use on perceived realism is marginally significant, $F(3, 98) = 33.17, p = .10$ (see Table 9). So, an increase in porn consumption leads to higher perceived realism of online porn.

Additional analyses

On the one hand, it can be expected that porn consumption increases perceived sexual skills, because of the ‘*social learning hypothesis*’. On the other hand, it can be expected that porn consumption decreases perceived sexual skills, because of the ‘*upward social comparison hypothesis*’. Further exploring the relationship between porn consumption and sexual skills it was theorized that the effect of porn consumption could be positive for some adolescents and negative for other adolescents. Since gender is a significant predictor for porn use, and there are known gender differences for the effects of porn use, additional analyses were performed using gender as a moderator.

Table 10

Cross-section Linear Regression Analysis for the Predictive Role of Porn Use on Sexual Skills with Gender as moderator.

	Cross-sectional model (T3)				Cross-sectional model (T4)			
	N=116				N=116			
	B	β	<i>p</i>	ΔR^2	B	β	<i>p</i>	ΔR^2
Step 1:				.00				.00
Porn use	.06	.04	.69		.08	.06	.53	
Step 2:				.12				.01
Gender	-.63	-.44	.00**		-.16	-.12	.43	
Porn use x gender	1.41	.40**	.00**		.24	.06	.56	

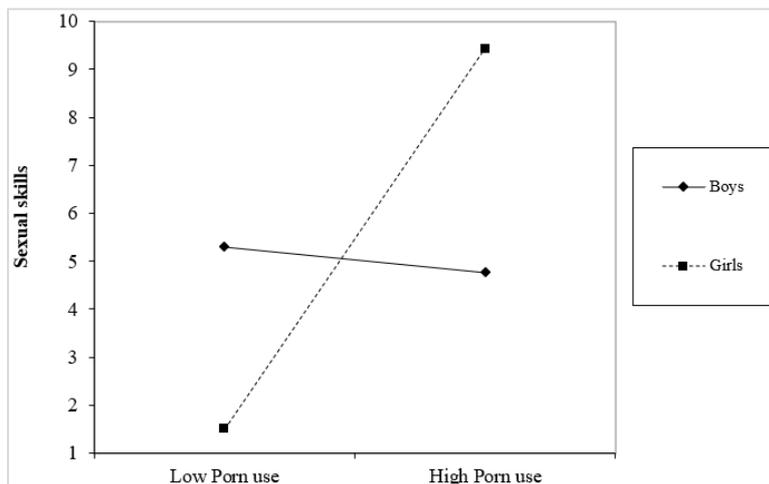
Table 11

Longitudinal Linear Regression Analysis for the Predictive Role of Porn Use on Sexual Skills with Gender as moderator.

	Longitudinal model (T3→ T4)			
	N=116			
	B	β	p	ΔR^2
Step 1:				.37
Sexual skills (T3)	.58	.61	.00**	
Step 2:				.00
Porn use	-.05	-.03	.67	
Step 3:				.00
Gender	-.07	-.05	.68	
Porn use x gender	-.02	-.01	.96	

Figure 4

Interaction-effect between Porn use and Gender in predicting Sexual Skills (cross-sectionally at T3).



Cross-sectionally at T3, gender showed to be a significant moderator on the relationship between porn use and sexual skills, $F(3, 112) = 5.23, p < .01$ (see Table 10). In Figure 4, the interaction between porn use and gender in predicting sexual skills at T3 is visualized. The interaction effect showed a clear positive effect of porn use on sexual skills for girls, with girls rating their sexual skills higher when they regularly watch porn as opposed to not or irregularly. To see if the effect of porn use on sexual skills was significant for boys, an additional regression analysis was performed. The effect for boys is significant, but contrary to the effect for girls it's negative (see Table 12). So, boys rate their sexual skills lower when they regularly watch porn as opposed to not or irregularly. Longitudinally no significant moderation was found (Table 11).

Table 12

Cross-sectional Linear Regression Analysis for the Predictive Role of Porn Use on Sexual Skills, for boys and girls

	Cross-sectional model (T3)			
	N=116			
	B	β	p	ΔR^2
Boys	-.53	-.37	.01*	.13
Girls	.89	.31	.02*	.10

Discussion

The aim of this study was to examine the association between porn consumption and sexual skills, as well as the role of perceived realism of online porn in this relationship. Results showed that for adolescents with a high perceived realism, those who regularly watch porn perceive their sexual skills as better than those who don't or irregularly watch porn. Furthermore, when boys regularly watch porn, they rate their sexual skills lower as opposed to boys who don't or irregularly watch porn, whereas girls rate their sexual skills higher when they regularly watch porn. This study, however, did not generate any insight into the causality of these relationships, as longitudinal analyses did not generate significant results.

The first goal of this study was to examine whether porn consumption decreases or increases one's perceived sexual skills. For neither of the two opposing hypotheses empirical evidence was found. This could be due to the fact that both hypotheses could be true for different groups of adolescents. It might be the case that there are some adolescents for whom the '*social learning hypothesis*' is true, i.e., adolescents learn from porn actors by observational learning, whereas for other adolescents the '*upward social comparison hypothesis*' is true, i.e., watching porn leads to distorted ideas about others' great sexual skills, which may negatively impact one's own perceived sexual skills. On basis of progressive insights, it was assumed that effects of porn use on sexual skills could differ for boys and girls. It was shown that boys rate their sexual skills lower when they regularly watch porn as opposed to not or irregularly, whereas girls rate their sexual skills higher when they regularly watch porn as opposed to not or irregularly. This result is in line with Štulhofer and colleagues (2021) who found that females had significantly higher odds of reporting a positive impact of porn use, while men had higher odds of reporting negative effects. This could imply that the '*social learning hypothesis*' fits girls best, and the '*upward social comparison hypothesis*' fits boys best. The idea that the '*social learning hypothesis*' fits girls is supported by Doornwaard (2015), who found that

particularly girls watch porn to learn, and that girls believe that the visual material teaches them how to perform sexual techniques. The idea that the '*upward social comparison hypothesis*' fits boys best is supported by Morrison and colleagues (2007) who found in an all-male sample that comparing one's own sexual performance to the sexual prowess of porn stars represented a relatively dramatic upward social comparison, and thus was associated with feelings of dissatisfaction of one's sexual skills. Goldsmith and colleagues (2017) found that porn use is a unique predictor of body-related cognitive distractions concerning one's sexual performance, for men only.

Contradictory to previous findings (Löfgren-Mårtenson & Månsson, 2010), this study didn't support hypothesis 3, that stated that higher perceived sexual skills would decrease porn consumption. The study by Löfgren-Mårtenson & Månsson was qualitative of nature, and the authors also suggested that getting older and being in a relationship might explain the relationship between increased sexual skills and decreased porn use. De Alarcón and colleagues (2019) also found that porn use steadily decreases with age. Another factor that could decrease porn consumption is sexual experience, as was found for boys by Doornwaard (2015). So, it could be imagined that there are possible confounders that explain the increase in sexual skills and decrease in porn consumption.

In line with hypothesis 4, the findings indicate that adolescents who regularly watch porn perceive online porn as more realistic. This was also found by Peter & Valkenburg (2010). Cross-sectionally this association was only found at T3 and not T4. The same goes for hypothesis 5, relating to the moderating effect of perceived realism on the potential positive and negative effect of porn consumption on sexual skills as previously found by Simon and Daneback (2013) and Hare and colleagues (2014). The fact that results were only found to be significant at T3 and not at T4, could be due to the effect size that was rather small, which could cause it to be vulnerable to random fluctuations. Another, theoretical, explanation, could be that the participants at T4 were half a year older ($M_{age} = 16.32$). As Štulhofer and colleagues (2021) found, the odds of reporting either a self-perceived positive or negative impact of porn use decreased with an increasing age. In line with the foregoing, age may explain the fact that perceived realism was found to be a moderator at T3, but not at T4. Perceived realism only influenced the relationship between porn use and sexual skills when the perceived realism was high. And, when age increases, perceived realism diminishes (Chock, 2011; Wright & Štulhofer, 2019). Even more so, on average SEIM realism declines from age 16 to 17, and the mean age in this study was 15.92 at T3 and 16.32 at T4.

Strengths and limitations

A strength of this study is that it made use of longitudinal data. Longitudinal research uses rigid statistical testing, and allows for controlling for the previous level of the dependent variable. Moreover, there's been little longitudinal research on the effects of porn use. However, there are also some limitations that should be taken into account. In this study only adolescents who had sex filled out the questions about sexual skills. As a result, the sample of this study was small (N=116). When conducting rigid longitudinal analyses, the chances to find significant results when using such a small sample are limited. The fact that no significant longitudinal effects were found (except for a marginal significant effect of porn use on perceived realism), may have been caused by a lack of statistical power due to the small sample size. Because no longitudinal effects were found, the direction of the found relations cannot be defined. A second limitation is the fact that the variable porn use was dichotomized because the scores weren't normally distributed. Dichotomization results in information loss, reduced power and an increased probability of a Type II error (i.e., the non-rejection of a false null hypothesis, a 'false negative'; Streiner, 2002). A third limitation is that validity may have been lower because the data came from a self-report study. In self-report studies there's a risk of bias. Participants may give socially desirable answers to sensitive topics or don't answer truthfully because they are ashamed. Although anonymity and confidentiality measures are known to reduce this bias, they may not fully eliminate it (Meston et al., 1998). As Doornwaard (2015) mentioned, social desirability bias could explain why very few girls reported watching porn.

Theoretical and practical implications

On basis of the current study, more insight is gained into factors that can intensify or buffer the effects of porn use on the perceived sexual skills of adolescents. It was found for adolescents who perceive online porn as realistic, that those who don't watch porn perceive their sexual skills as worse and those who do watch porn perceive their sexual skills as better. When adolescents are aware that online porn isn't realistic, porn consumption doesn't seem to impact their perceived sexual skills. Furthermore, it was found that when adolescents regularly watch porn, boys rate their sexual skills lower and girls rate their sexual skills higher. In future research it might be desirable to work with a larger sample or with adolescents that are older so more people answered the questions about sexual skills, and longitudinal findings are more likely to be found. Another recommendation is to look at different levels of porn use, instead of porn use as a dichotomous variable. Next to that, porn use was measured with one item. It

could be interesting to look at the effect of different kinds of porn. It can be imagined that 'softcore-porn' could be more related to the '*social learning*' and 'hardcore porn' could be more related to '*upward social comparison*'. In general, boys general prefer hardcore porn, whilst girls prefer watching 'porna' (i.e., softcore porn) (Hald, 2006). The results are promising. As perceived realism was found to be a protective factor for the relationship between porn use and sexual skills, the negative effect can hopefully be minimized if adolescents are taught about porn not representing real life sex. Possible negative effects are feelings of doubt and insecurities about one's ability to perform sexually (Hare et al., 2014). However, there are also indications of positive effects of porn consumption on girls' sexual skills. So, another advice is to develop online tools that are informative (so particularly girls can learn and thus increase their perceived sexual skills) but don't have other negative effects (which also still exist; e.g. greater sexual preoccupancy, less progressive gender role attitudes, sexual dissatisfaction; Peter & Valkenburg, 2010).

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