

A Six-Year Longitudinal Study of Consumption of Pornographic Materials in Chinese Adolescents in Hong Kong



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ABSTRACT

Study Objective: Using longitudinal data collected over 6 years, consumption of pornographic materials in adolescents in Hong Kong and the related demographic and psychosocial correlates were examined in this study.

Design, Setting, Participants, Interventions, and Main Outcome Measures: A longitudinal research design with 6 waves of data was used to examine consumption of pornographic materials in high school students. A total of 3291 high school students from 28 schools responded to the questionnaire at wave 1.

Results: Consumption of online pornography was higher than traditional pornography. There was an increase in consumption of pornographic materials in the high school years. Gender, family functioning, and positive youth development were related to the initial status of pornography consumption. Besides, gender, family intactness and positive youth development predicted rates of change in consumption of pornographic material over time.

Conclusion: The present findings showed that gender, family functioning, and positive youth development are significant predictors for pornography consumption in Chinese adolescents.

Key Words: Chinese adolescent, Pornography consumption, Longitudinal study, Risk factors, Protective factors

Introduction

The prevalence of consumption of pornographic materials was studied in the past few decades.¹ Past studies examined the influence of sexually explicit materials on the development of adolescents with a focus on traditional media pornography, such as magazines,^{2,3} television,^{4,5} and movies.⁶ Available evidence showed that exposure to sexual content on television was associated with adolescent expectation about sex,⁷ perceptions of peer sexual behavior,⁸ and permissive sexual attitudes.¹

Researchers pointed out that more attention should be paid to the Internet.^{9,10} With the growing availability of inexpensive wireless broadband Internet service, the popularity of online pornography has grown tremendously. Compared with traditional pornography, children can access this online material more easily^{11,12} and anonymously at almost no cost.¹³ Nowadays, adolescents can access sexually explicit online materials through their personal computers, tablets, or even smartphones. Thus, they have a less embarrassing way to seek information about taboo topics and sexual identity when they have few other traditional sources of information.^{7,14,15} As pointed out by Brown and L'Engle,¹⁴ "appetite for (pornography) has been a primary driver for the success of the Internet" (pp 131). The Internet is also

considered a key "sexuality educator" among adolescents.^{1,7} Research findings showed that adolescents were likely to discuss and share such online sexual materials with their peers who were also consuming them.¹⁶ This is particularly important when individual interest in sex and romantic relationships are salient during adolescence.

Despite the proliferation of adolescent consumption of pornographic materials, several limitations are found in the literature. First, previous studies focused primarily on demographic correlates (such as gender and age) of consumption of pornography. Regarding gender, male individuals consumed more pornographic materials than their female counterparts in the United States,^{14,17} Czech Republic,¹⁸ Dutch country,¹⁹ Hong Kong,^{20–23} and Taiwanese²⁴ contexts. Furthermore, regardless of gender, older adolescents reported a higher level of pornography consumption than their younger counterparts.^{25,26} Apart from demographic variables, researchers from developmental psychology,¹ communication research,¹⁹ youth research,²⁷ and criminology⁹ suggest the adoption of an ecological approach to understand the concurrent effects of multiple contextual factors (eg, personal, family, and media) on adolescent consumption of pornography.

Some studies have shown that family intactness (eg, divorce and separation) was a significant factor to influence adolescent consumption of pornographic materials and extramarital sex.^{28,29} This is supported in a study by Wingood et al,³⁰ who found a relationship between family intactness and pornography consumption. Besides, socio-economic status was also associated with adolescents'

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exposure to sexually explicit materials. In their study, Brown and L'Engle found that adolescents of low socioeconomic status were more frequent consumers of sexually explicit materials compared with those of high socioeconomic status.¹⁴ However, little is known about whether the relationship between economic disadvantage and consumption of pornographic materials might vary with the medium of consumption. Because of the increasing concern on “Net neutrality” as recently raised by President Obama,³¹ the present study attempted to explore whether consumption of pornographic materials differed in adolescents with different family background and socioeconomic status.

Second, although there are studies on risk factors for adolescent consumption of pornographic materials, few studies have focused on protective factors (eg, positive youth development [PYD] and family functioning qualities). Researchers argued that instead of “fixing” problems, provision of contextual and individual assets would better protect youth from risk and aid them to have a successful transition to adulthood.^{32,33} This supports the idea that adolescent risky behavior would decrease when individual strengths are aligned with contextual assets.³⁴

The negative association between positive youth qualities and problem behavior has been supported in Western³⁵ and Chinese³⁶ contexts. Besides PYD, family is also very important for healthy adolescent development.^{1,19} For example, there has been increasing attention paid to how observed ecological assets in the family and peers influence developmental outcomes during adolescence.³⁷ Although previous studies show the linkages among PYD, family functioning qualities, and adolescent consumption of pornography, the results were mixed.^{20–23} Therefore, in the present study we investigated the effects of these protective factors on adolescent pornography consumption.

Third, few studies have been done to assess the pattern of adolescent pornography consumption and its correlates across time. Previous research on exposure to pornography were mostly cross-sectional in nature^{19,38} or on the basis of a specific age group.⁷ For example, Pardun and colleagues³⁹ found positive associations among exposure to pornographic materials, sexual activity, and intentions to be sexually active among junior high school students. However, the temporal relationships among these variables is not clear. Developmental theories also contended that adolescent behavior is the result of multiple factors that interact with each other.⁹ As pointed out by Zabin et al,⁴⁰ “treating adolescence and youth as a single period not only poses the usual hazards of minimizing individual developmental change but also carries the risk of overgeneralization when behaviors associated with near-in-age cohorts vary considerably amid rapid social change” (pp 10–11). This view was also upheld in the cross-sectional studies conducted in the Western⁴¹ and Chinese⁴² contexts.

The prolonged effects of pornography consumption have been recently explored. Some studies have revealed that early exposure to pornography was associated with subsequent sexual attitudes (eg, permissive sexual norms) and behaviors (eg, oral sex, deviant sexual activity, and sexual intercourse).^{14,43–47} In the study of Brown and L'Engle,¹⁴ exposure to sexually explicit materials was the strongest

predictor of sexual outcomes after controlling for demographic characteristics and other factors. Similar findings were shown in three recent longitudinal studies.^{8,40,48} However, only two time points were assessed.^{40,48} As commented by Ward,¹ “assessments capturing levels at only one point in time may not fully represent the nature and quantity of exposure over the years” (pp 375).

Researchers argued that at least three waves of data would help clarify the causal sequence.¹⁴ Using a 4-wave longitudinal study of early Chinese high school students, Shek and colleagues²³ found that the prevalence of pornography consumption increased steadily across time. Besides, younger viewers (ages 5–12 years) might be more vulnerable to this exposure compared with older viewers^{1,49} because of growing accessibility of the Internet and inescapable involuntary exposure.⁵⁰ It is likely that the influence of different ecological factors on sexual outcomes changes over time¹ and the effects of pornography consumption might also be more pronounced among young adolescents compared with older adolescents.^{19,38} Hence, it is important to ask what individual, family, peer, and social factors are related to trajectories of adolescent consumption of pornographic materials. With reference to this question, we analyzed the relationships between ecological factors and online exposure across six waves of data (grades 7–12) in the present study.

Fourth, very few studies have been conducted in non-Western contexts, where people have conservative attitudes toward sex. On the basis of a national representative survey, approximately 90% of adolescents (ages older than 14) were exposed to pornographic materials in the United States.⁴³ Similar results were found in other Western studies.^{14,26,38,51} However, the prevalence of pornography consumption was lower, and ranged 6%–40% in non-Western contexts, such as Korea,⁵² Taiwan,⁵³ and Hong Kong.^{20–23} On the basis of cross-sectional and longitudinal studies, the authors found that the prevalence of online pornography among early adolescents increased steadily over time from 5% in grade seven to 15% in Grade 10.^{20–23}

Although the level of exposure of pornography consumption found in previous Chinese studies^{20–23} were lower than those found in other countries,^{40,42,54} the rate of exposure increased sharply when they reached young adulthood⁵⁵ (ie, more than 80%). Peter and Valkenburg¹⁹ noted that “within-country differences regarding issues of adolescent sexuality may be bigger than between-country differences” (pp 180). Recent studies showed that the influence of Confucian cultural norms on adolescents' sexual behavior,⁵⁶ gender role attitudes,⁵⁷ and premarital sexual permissiveness,⁵⁸ differed in three Asian cities, including Hanoi, Shanghai, and Taipei.^{57,59}

According to the statistics of Hong Kong Census,⁶⁰ the rates of Internet use among early adolescents (aged 10–14 years) have remarkably increased (ie, 73% in 2000 to 99% in 2009). The rapid growth of Internet usage was also supported by the increasing amount of online hours per week among Chinese adolescents.^{36,61} As use of the Internet becomes more pervasive among adolescents, identifying factors related to pornographic materials in the Internet would help reduce its effect among Hong Kong adolescents

in the future. As such, in the present study we extended the literature by exploring the pattern of pornography consumption and its relationships with different measures of ecological factors among Chinese adolescents. The results of the study will be useful for practitioners to design sex education and pregnancy prevention programs for adolescents.

In this study we examined consumption of pornographic materials in Chinese high school students in Hong Kong and its sociodemographic and psychosocial correlates over the course of adolescent years (grade 7 to 12). Several research questions were addressed in this study:

1. Does the frequency of consumption of pornographic materials via the Internet differ from that via the traditional media? On the basis of previous studies,^{20–23} it was expected that the level of consumption via the Internet would be higher than that via the traditional media (hypothesis 1).
2. Does adolescent consumption of pornographic materials change over time? On the basis of previous studies,^{20–23} it was expected that there would be an increase in adolescent consumption of pornographic materials over time (hypothesis 2).
3. Is gender related to adolescent consumption of pornographic materials? On the basis of previous research, it was predicted that adolescent boys would have greater consumption of pornography than would adolescent girls (hypothesis 3a) and their related growth rates would be faster (hypothesis 3b).
4. Is family intactness related to adolescent consumption of pornography? In consideration of the previous studies,^{20–23} we expected that adolescents who grow up in nonintact families would have a higher level of pornography consumption than those who grow up in intact families would (hypothesis 4a) and their related growth rates would be faster (hypothesis 4b).
5. Is economic disadvantage related to adolescent consumption of pornographic materials? With reference to previous research findings,^{20–23} our prediction was that poor adolescents would have a higher level of consumption than would nonpoor adolescents (hypothesis 5a) and their related growth rates would be faster (hypothesis 5b).
6. Is family functioning related to adolescent consumption of pornographic materials? On the basis of previous research,^{20–23} it was predicted that family functioning would be negatively related to a lower level of

adolescent pornography consumption (hypothesis 6a) and rate of change (hypothesis 6b).

7. Is PYD related to adolescent consumption of pornography? According to the literature,^{20–23} it was expected that PYD attributes would be negatively related to a lower level of adolescent pornography consumption (hypothesis 7a) and rate of change (hypothesis 7b).

Materials and Methods

The data were obtained from a 6-year longitudinal study, in which the influences of individual and family factors on adolescent psychological development during high school (academic year 2009–2015) were assessed. Participants were selected from 28 high schools using a multistage cluster sampling method on the basis of the school list obtained from the Education Bureau of the Government of the Hong Kong Special Administrative Region (<http://www.edb.gov.hk>).

Participants and Procedures

A total of 3291 high school students, with 1719 boys (52%) and 1572 girls (47%), participated in wave 1 of the study (academic year 2009–2010). The average age was 12.6 years (SD = 0.74). Data were collected at a regular interval (approximately 10–12 months) with 47.4% of participants who completed at least 5 measurement waves. Ethical approval, school consent, parental consent, and student consent were obtained before baseline data collection. Because there were student dropouts, student nonattendance on the day of data collection, and new students who joined the project, the number of participants varied across time. The response rates of each measurement wave are shown in Table 1. At all six measurement points, students were compensated with a token gift for completion of the questionnaire.

Instruments

The Chinese Positive Youth Development Scale

Positive youth development was assessed using the trimmed Chinese Positive Youth Development Scale,⁶³ a multidimensional instrument (ie, bonding, resilience, social competence, recognition for positive behavior, emotional competence, cognitive competence, behavioral competence,

Table 1
Demographic Background of Participants Across Six Waves

Demographic Characteristic	Wave 1	%	Wave 2	%	Wave 3	%	Wave 4	%	Wave 5	%	Wave 6	%
Sex												
Male	1719	51.7	1716	47.2	1885	45.9	1875	47.2	1922	52.3	1821	52.2
Female	1572	47.2	1864	51.2	2185	53.2	2086	52.5	1750	47.7	1669	47.8
Economic disadvantage												
Not receiving financial aid	2606	78.3	2932	80.6	3308	80.6	3302	83.1	3111	94.3	2988	94.7
Receiving financial aid	225	6.8	208	5.7	212	5.2	200	5.0	187	5.6	168	5.3
Family intactness												
Intact families	2781	83.6	2985	82.1	3372	82.1	3210	80.8	2956	80.5	2795	80.0
Nonintact families	515	15.5	624	17.2	715	33.72	749	18.9	714	19.5	697	20.0

Variations in the student numbers across time was attributed to several factors, including student dropout, student absence on the day of data collection, and new students joining the study. Because missing data can be reasonably handled by Linear Mixed Model, data of all participants were included in the analyses.⁶²

Table 2
Internal Consistency Coefficients of Scales Across 6 Waves

Variable	Reliability					
	W1	W2	W3	W4	W5	W6
Family functioning	.90	.90	.90	.91	.92	.91
Positive youth development	.93	.96	.96	.96	.96	.96
Exposure to sexual materials (Internet)	.92	.95	.95	.94	.95	.95
Exposure to sexual materials (traditional media)	.86	.92	.93	.93	.94	.95

W, wave.

moral competence, self-determination, self-efficacy, clear and positive identity, beliefs in the future, prosocial involvement, prosocial norms, and spirituality). Participants responded to questions using a 6-point scale from 1 “strongly disagree” to 6 “strongly agree.” The validity of the scale is reported elsewhere.⁶⁴ Cronbach α 's for the scale across waves were satisfactory (greater than 0.90; [Table 2](#)).

The Chinese Family Assessment Instrument

Family functioning was assessed using the trimmed Chinese Family Assessment Instrument,⁶⁵ which encompasses the following aspects: mutuality, communication, and harmony. Participants responded to questions using a 5-point scale from 1 “very similar” to 5 “very dissimilar.” The validity of the scale has been reported elsewhere.⁶⁶ In the present study, Cronbach α 's for the scale across waves were satisfactory (greater than 0.90, see [Table 2](#)).

Consumption of Traditional and Online Pornography

Participants were asked to rate their frequency of consuming pornographic materials with reference to a typical week (six items for online pornography; six items for traditional pornography) using a 6-point Likert scale from 0 “never” to 5 “daily” ([Table 3](#)). Cronbach α 's for the scale across waves were satisfactory (greater than 0.90; [Table 2](#)).

Demographic Variables

Participants were asked to report their gender (0 = male; 1 = female), economic disadvantage (0 = receiving financial

aid; 1 = not receiving financial aid), and family intactness (0 = intact; 1 = nonintact).

Statistical Analyses

For an overall view about the predictors of pornography consumption at wave 6, multiple regression analyses were carried out to examine the effects of gender, family intactness, economic disadvantage, family functioning, and PYD at wave 1 on pornography consumption at wave 6.

Individual growth curve was then used to study whether the changes of both types of pornography consumption vary within individuals over time (level 1) and between individuals' demographic factors (level 2). This approach has been used in previous developmental studies.^{67,68} The growth models were tested separately in two types of media (ie, online and traditional pornography) using the maximum likelihood method.⁶⁹ Dummy variables were created to assess whether demographic factors were predictive of individual differences in growth parameters (eg, initial status and rate of change). In the present study, gender, socioeconomic status, and family intactness were treated as sociodemographic factors. Age was centered (ie, mean, 12.6) and included in the models as a control variable. All analyses were performed using SPSS version 21.0 (IBM Corp, Armonk, NY).

Results

[Table 3](#) shows the prevalence of two types of pornographic materials from wave 1 to wave 6. Consistent with our prediction, online pornography consumption was higher than for traditional pornography, thus giving support to hypothesis 1. The descriptive statistics and internal consistency of all variables across waves are shown in [Tables 2 and 4](#).

Multiple regression analyses showed that all predictors (except economic disadvantage) were significant predictors of consumption of online pornography ($P < .05$). However, only gender and PYD qualities were associated with consumption of traditional pornography. In general,

Table 3
Frequencies of Exposure to Pornographic Materials Across 6 Waves

Source	Wave 1		Wave 2		Wave 3		Wave 4		Wave 5		Wave 6	
	n	%	n	%	n	%	n	%	n	%	n	%
From the internet												
1. Pornographic stories	197	5.9	271	9.3	323	11.7	380	14.7	616	17.3	659	19.4
2. Pornographic pictures	233	7.0	308	10.6	365	13.2	418	16.2	759	21.3	840	24.8
3. Pornographic videos	208	6.3	298	10.3	380	13.8	478	18.5	872	24.4	934	27.6
4. Pictures of sexual intercourse	213	6.4	255	8.8	329	11.9	363	14.0	672	18.8	686	20.2
5. Videos of sexual intercourse	221	6.7	265	9.2	325	11.8	392	15.2	710	19.9	753	22.2
6. Pornographic web sites	160	4.8	213	7.4	290	10.5	359	13.9	642	18.1	669	19.8
From traditional media												
1. Pornographic cinemas	25	0.8	36	1.2	38	1.4	45	1.7	127	3.6	122	3.6
2. Pornographic video	15	0.5	32	1.1	34	1.2	30	1.2	75	2.1	70	2.1
3. Pornographic videos on television	56	1.7	49	1.7	59	2.1	60	2.3	114	3.2	95	2.8
4. Pornographic magazines	42	1.3	51	1.8	53	1.9	51	2.0	104	2.9	86	2.5
5. Pornographic books	45	1.4	79	2.7	77	2.8	84	3.3	138	3.9	132	3.9
6. Pornographic comics	96	2.9	128	4.4	125	4.5	119	4.6	229	6.4	204	6.0

Information about attempted frequency (rating range, 1–5) in exposure to pornographic materials is shown. Items are assessed on a 5-point scale with 1 = never, 2 = less than 1 time a month, 3 = 1–3 times a month; 4 = about 1 time a week, 5 = several times a week. Those who had engaged in the related behavior (ie, “2” to “5”) were counted in the analyses.

Table 4
Descriptive Statistics of Key Variables (Waves 1–6)

Variable	Mean (SD)					
	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6
Family functioning	3.73 (0.81)	3.65 (0.81)	3.65 (0.79)	3.66 (0.77)	3.64 (0.77)	3.66 (0.75)
Positive youth development	4.51 (0.70)	4.43 (0.69)	4.44 (0.65)	4.45 (0.62)	4.44 (0.59)	4.48 (0.60)
Exposure to online pornography	1.09 (0.36)	1.19 (0.64)	1.28 (0.79)	1.35 (0.84)	1.43 (0.93)	1.49 (0.99)
Sex						
Male	1.13 (0.44)	1.25 (0.74)	1.42 (0.95)	1.55 (1.01)	1.74 (1.19)	1.78 (1.17)
Female	1.05 (0.24)	1.08 (0.29)	1.08 (0.31)	1.09 (0.83)	1.10 (0.39)	1.11 (0.42)
Economic disadvantage						
Not receiving financial aid	1.09 (0.35)	1.16 (0.56)	1.26 (0.75)	1.32 (0.79)	1.42 (0.94)	1.46 (0.96)
Receiving financial aid	1.13 (0.46)	1.25 (0.73)	1.25 (0.73)	1.31 (0.69)	1.45 (0.97)	1.37 (0.79)
Family structure						
Intact families	1.08 (0.32)	1.15 (0.54)	1.23 (0.71)	1.30 (0.77)	1.39 (0.90)	1.42 (0.90)
Nonintact families	1.14 (0.53)	1.23 (0.69)	1.32 (0.81)	1.42 (0.87)	1.52 (1.07)	1.55 (1.05)
Exposure to traditional pornography	1.02 (0.17)	1.06 (0.38)	1.06 (0.40)	1.06 (0.37)	1.08 (0.45)	1.08 (0.47)
Sex						
Male	1.03 (0.21)	1.06 (0.39)	1.08 (0.47)	1.07 (0.39)	1.09 (0.46)	1.12 (0.57)
Female	1.01 (0.11)	1.03 (0.16)	1.02 (0.13)	1.03 (0.23)	1.03 (0.18)	1.02 (0.18)
Economic disadvantage						
No financial aid	1.02 (0.15)	1.04 (0.27)	1.05 (0.38)	1.05 (0.31)	1.07 (0.45)	1.07 (0.45)
Receiving financial aid	1.04 (0.26)	1.07 (0.47)	1.03 (0.11)	1.03 (0.13)	1.06 (0.24)	1.03 (0.12)
Family intactness						
Intact families	1.02 (0.11)	1.04 (0.29)	1.05 (0.34)	1.05 (0.33)	1.07 (0.42)	1.06 (0.40)
Nonintact families	1.05 (0.35)	1.05 (0.34)	1.07 (0.39)	1.05 (0.31)	1.12 (0.59)	1.09 (0.50)

male gender, growing up in a nonintact family, weaker perceived family functioning, and lower PYD qualities were associated with higher consumption of pornographic materials (Table 5). These findings generally provided support for hypotheses 3a, 4a, 6a, and 7a.

Following the suggestions of Singer and Willett,⁶² we tested the following models: unconditional model, unconditional linear growth model, and conditional growth models with different predictors. The levels (initial statuses) of online and traditional pornography consumption were 1.33 and 1.07, respectively (see model 1 and model 4 in Table 6). To test the changes of both types of pornography consumption, time was tested in model 2 and model 5 (Table 6). The positive sign of time indicated that the levels of pornographic consumption increased over time, regardless of types of pornography consumption (internet: $\beta = 0.09$, $P < .01$; traditional: $\beta = 0.01$, $P < .01$). These findings provided support for hypothesis 2.

Table 5
Hierarchical Multiple Regression Analyses on Consumption of Pornographic Materials at Wave 6

Variable	Exposure to Sexual Materials (Online)		Exposure to Sexual Materials (Traditional Media)	
	β	R^2	β	R^2
Predictors				
Step 1		0.17		0.03
Sex*	0.70 [†]		0.10 [†]	
Economic disadvantage [‡]	-0.14		-0.06	
Family intactness [§]	0.13		0.06	
Family functioning	-0.12 [†]		-0.02	
Positive youth development	-0.08		-0.06 [†]	
Step 2		0.20		0.03
Initial status	0.56 [†]		0.07	

* Female = 0, male = 1.

† $P < .01$.

‡ Receiving financial aid = 1, not receiving financial aid = 0.

§ Nonintact = 1, intact = 0.

|| $P < .05$.

Demographic, family, and personal variables (ie, gender, age, family intactness, economic disadvantage, and PYD) were included in model 3 and model 6 to test whether these effects were significant in predicting changes of individual growth parameters. Gender, family intactness, and PYD showed significant effects on individual differences in trajectories for both types of pornography consumption, indicating that male adolescents who grew up in nonintact families reported a lower level of PYD and faster rates of consumption of online pornography. These findings provided support for hypotheses 3b, 4b, and 7b. In general, these two models explained the trajectories of both types of pornography consumption better as supported by the lower values of fit indices (Bayesian information criterion and Akaike's information criterion; Table 7).

To test the interaction effects of all background variables on levels of pornography consumption, three sets of interaction effects were tested (gender by family intactness; gender by economic disadvantage; family intactness by economic disadvantage). Only the gender by family intactness interaction effect was significant ($P < .01$), which indicates that boys reported higher levels of pornography consumption than did their girl counterparts, regardless of family intactness (Table 8).

To test the interaction effects of all demographic variables by time on the levels of pornography consumption, three sets of interaction effects (gender by time, family intactness by time, and economic disadvantage by time) were assessed in the post hoc analysis. More significant gender differences were found in online pornography consumption (ie, all six waves; Table 9) than in traditional pornography consumption (ie, four waves; Table 10). Male adolescents reported a higher level of pornography consumption than did female adolescents across waves. A significant effect of family intactness was only found in online pornography consumption at wave 6 (Table 9) and in traditional pornography consumption at wave 5 (Table 10),

Table 6
Results of Individual Growth Line of Adolescent Consumption of Pornographic Materials for all Models

Variable	Parameter	Exposure to Online Pornography						Exposure to Traditional Pornography					
		Model 1		Model 2		Model 3		Model 4		Model 5		Model 6*	
		Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Fixed effects													
Intercept	β_{0j}												
Initial status	γ_{00}	1.327433 [†]	.009	1.113494 [†]	.007	1.411233 [†]	.061561	1.066533	.003523	1.033933 [†]	.004230	1.131728 [†]	.028748
Age	γ_{01}					.054852 [†]	.012886					.012938 [†]	.013762
Sex [§]	γ_{02}					.032166 [†]	.008950					.004958	.004164
Economic disadvantage	γ_{03}					.015220	.018667					-.00810	.008714
Family intactness [¶]	γ_{04}					-.18861	.013801					.011864	.006440
Family functioning	γ_{05}					-.044267**	.013289					-.022820**	.006188
PYD ^{††}	γ_{06}					-.035514 [†]	.015291					-.007410	.007147
Linear slope													
Initial status	γ_{10}			.088 [†]	.005	.193059 [†]	.031222			.013002 [†]	.001771	.022281**	.013762
Age	γ_{11}					-.013629 [†]	.006556					-.003780	.002891
Sex [§]	γ_{12}					.071150 [†]	.0044113					.009171 [†]	.001944
Economic disadvantage	γ_{13}					-.014901	.009511					-.008149**	.003039
Family intactness [¶]	γ_{14}					-.014376 [†]	.006900					-.008149**	.003039
Family functioning	γ_{15}					-.006734	.006581					-0.00003	.002899
PYD ^{††}	γ_{16}					-.019012 [†]	.007739					-.002381	.003405
Random effects													
Level 1 (within)													
Residual	r_{ij}	.367727 [†]	.004	.278208 [†]	.003	.215680 [†]	.003488	.123678 [†]	.001439	.114596 [†]	.001403	.0059349 [†]	.000927
Level 2 (between)													
Intercept	u_{0j}	.292099 [†]	.008	.092181 [†]	.006	.046788 [†]	.004596	.030691	.001570	.001033		.003123 [†]	.000608
Time	u_{1j}			.030134 [†]	.001	.021626 [†]	.001048			.004464 [†]	.000218	.0000110	.000392

PYD, positive youth development; SE, standard error

Models 1 and 4 = unconditional mean model; models 2 and 5 = unconditional growth model; models 3 and 6 = conditional model.

* First-order autoregressive covariance structure was used.

† $P < .001$.‡ $P < .05$.

§ Female = -1, Male = 1.

|| Receiving financial aid = 1, not receiving financial aid = -1.

¶ Nonintact = -1, intact = 1.

** $P < .01$.

†† Variance components structure was used for covariance structure for all models.

which indicates that adolescents from nonintact families reported higher levels of both types of pornographic materials than did their counterparts from intact families. Last, economic disadvantage differences were only found in online pornography consumption at wave 6 (Table 9), which suggests that adolescents from lower socioeconomic families reported a higher level of consumption of online pornography than did their counterparts from high socioeconomic families (ie, support for hypothesis 5a). The trajectories of pornography consumption according to gender and family intactness are shown in Figures 1–3.

Discussion

In the present study we attempted to understand consumption of pornographic materials among high school

students in Hong Kong. We extend the existing literature in several ways. First, in the present study we examined the effects of personal (age, gender, PYD) and family (family intactness and economic disadvantage) factors on adolescent consumption of pornography. Second, because of the paucity of non-Western research on this topic, Chinese adolescents were used in the study. Third, a large sample drawn using a stratified cluster sampling method was used to generate a representative picture. Fourth, validated instruments were used to explore the pattern of pornography consumption over time. Fifth, multiple regression analyses were used to assess the levels of consumption of pornographic materials at grade 12. Finally, on the basis of six waves of data, initial status and rate of change in adolescent consumption of pornographic materials were examined via individual growth curve modeling.

Table 7
Fit Statistics for All Models According to Type of Pornography Consumption

Fit Statistic	Exposure to Online Pornography			Exposure to Traditional Pornography		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6*
Deviance	46,713.025	43,344.255	18,249.126	19,621.463	18,819.754	2740.763
AIC	46,719.025	43,354.255	18,283.126	19,627.463	18,829.754	2774.763
BIC	46,742.954	43,394.138	18,407.073	19,651.394	18,869.639	2898.674
df	3	5	17	3	5	17

AIC, Akaike's information criterion; BIC, Bayesian information criterion

Models 1 and 4 = unconditional mean model; models 2 and 5 = unconditional growth model; models 3 and 6 = conditional model. Variance components structure was used for covariance structure for all models.

* First-order autoregressive covariance structure was used.

Table 8
LMM Post Hoc Analysis on the Basis of Consumption of Pornographic Materials According to Sex, Economic Disadvantage, and Family Intactness at Wave 6

	Exposure to Online Pornography				Exposure to Traditional Pornography			
	Intact		Nonintact		Intact		Nonintact	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE
CSSA								
Yes	1.236	.044	1.265	.041	1.016	.017	1.030	.016
No	1.275	.011	1.304	.030	1.045	.004	1.059	.012
Sex								
Female	1.059*	.025	1.088*	.031	1.005*	.010	1.019*	.012
Male	1.453*	.026	1.481*	.031	1.057*	.010	1.071*	.012

CSSA, Comprehensive Social Security Assistance; LMM, Linear Mixed Model; SE, standard error

* Means sharing the same superscript symbol indicate significant post hoc differences; $P < .05$.

In line with the previous findings,^{20–23} the consumption rate of online pornography was higher than for traditional pornography, providing evidence to support hypothesis 1. This can be explained by the features of the Internet.^{13,70} First, the Internet is readily accessible 24 hours a day. It does not depend on the operation hours of the vendors such as cinemas and bookshops, which usually have restriction to sell pornography to people younger than the age of 18. Thus, this type of material can be easily accessed via the Internet (ie, accessibility). Second, adolescents can consume online pornography at little or no cost (ie, affordability). Finally, consumption via the Internet is anonymous and nobody knows the act committed. As a result, such behavior will not threaten the “positive” identity of the viewer. These findings have two implications. First, parents should be educated about how to guide their children to use the Internet. Second, adolescents should be educated about the negative consequences of consumption of pornography, especially via the Internet.

Consistent with previous research in the Western^{1,14} and Chinese,^{21–23} contexts,²⁰ the present findings showed that consumption of pornographic materials via the Internet and the traditional media gradually increased over time, thus providing support for hypothesis 2. Such a pattern is in line with the existing developmental literature,^{14,17,71} which indicates the increase in pornography consumption in high school years appears to be universal across cultures, even in the Chinese society in which sex is considered a “taboo” subject.^{20,42} This sheds light on the provision of sex education through different media, including the Internet,

which is an increasingly influential agent of socialization. Teachers and parents should provide guidance and offer adolescents an opportunity to discuss the purpose of pornography consumption and promote sexual literacy (eg, abstinence, healthy sexuality, responsible sexual behavior).

Results of the present study underscored the need to study multiple contextual factors for understanding changes of pornography consumption during adolescence. Primarily, gender was related to consumption of pornographic material in the adolescent years, which gave support for hypotheses 3a and 3b. Male adolescents showed higher consumption behavior than did female adolescents. Perhaps this is related to the conservative attitude toward sex in Chinese societies.^{20,42} In the Chinese culture, it is generally accepted that male individuals are more susceptible to their sexual urges.^{20,53} Because consumption of pornography is not only confined to viewing explicit sexual materials but also endorsement of certain values about sex,^{41,46} the current findings call for the provision of early intervention programs and service among Chinese adolescents. Practitioners should use effective and gender-specific prevention programs to help adolescents, especially male adolescents, to develop correct beliefs about the role of women when they consume pornographic materials.

This study showed that family nonintactness was a risk factor for adolescent consumption of pornography over time (ie, providing support for hypothesis 4b). This finding can possibly be attributed to the fact that relatively looser parental supervision is associated with nonintact families. The present study provided support for the general theoretical proposition that adolescents growing up in nonintact families^{1,46} have more negative developmental outcomes compared with those in intact families. The present findings thus suggest that more attention should be paid to help adolescents in nonintact families deal with issues related to pornography consumption.

Contrary to our expectation, economic disadvantage was not associated with consumption of pornographic materials. One possibility is that lack of financial resources limits the involvement of poor adolescents in pornography consumption—their computers might be of lower capacity (less expensive and/or secondhand computers) and they might not have much reserved money to buy print copies. More studies are warranted to explore the relationship between socioeconomic status and consumption of pornographic materials among adolescents.

Table 9
Post Hoc Analysis on the Basis of Consumption of Online Pornography According to Sex, Economic Disadvantage, and Family Intactness Across Waves

Wave	Sex		Economic Disadvantage		Family Intactness	
	Male	Female	Yes	No	Intact	Nonintact
	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)
1	1.107 (0.03)*	1.035 (0.03)*	1.075 (0.06)	1.067 (0.02)	1.087 (0.03)	1.055 (0.04)
2	1.255 (0.03)*	1.075 (0.03)*	1.179 (0.06)	1.152 (0.02)	1.176 (0.03)	1.154 (0.04)
3	1.428 (0.04)*	1.064 (0.03)*	1.231 (0.06)	1.261 (0.02)	1.243 (0.04)	1.249 (0.04)
4	1.574 (0.04)*	1.087 (0.04)*	1.298 (0.06)	1.363 (0.03)	1.292 (0.04)	1.370 (0.04)
5	1.827 (0.04)*	1.132 (0.04)*	1.493 (0.06)	1.467 (0.03)	1.444 (0.04)	1.515 (0.05)
6	1.779 (0.04)*	1.067 (0.04)*	1.316 (0.06)*	1.530 (0.03)*	1.369 (0.04)†	1.477 (0.05)†

SE, standard error

* $P < .01$.

† $P < .05$.

Table 10

Post Hoc Analysis on the Basis of Consumption of Traditional Media Pornography According to Sex, Economic Disadvantage, and Family Intactness Across Waves

Wave	Sex		Economic Disadvantage		Family	
	Male	Female	Yes	No	Intact	Nonintact
	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)
1	1.017 (0.01)	1.007 (0.01)	1.013 (0.02)	1.011 (0.01)	1.019 (0.01)	1.005 (0.02)
2	1.029 (0.02)	1.008 (0.01)	1.007 (0.03)	1.031 (0.01)	1.026 (0.02)	1.011 (0.02)
3	1.073 (0.02)*	1.004 (0.02)*	1.027 (0.03)	1.050 (0.01)	1.042 (0.02)	1.035 (0.02)
4	1.059 (0.02)*	1.014 (0.02)*	1.023 (0.03)	1.050 (0.01)	1.031 (0.02)	1.042 (0.02)
5	1.119 (0.02)*	1.032 (0.02)*	1.055 (0.03)	1.096 (0.01)	1.035 (0.02)*	1.117 (0.02)*
6	1.098 (0.02)*	1.011 (0.02)*	1.028 (0.03)	1.082 (0.01)	1.039 (0.02)	1.071 (0.02)

SE, standard error

* $P < .01$.

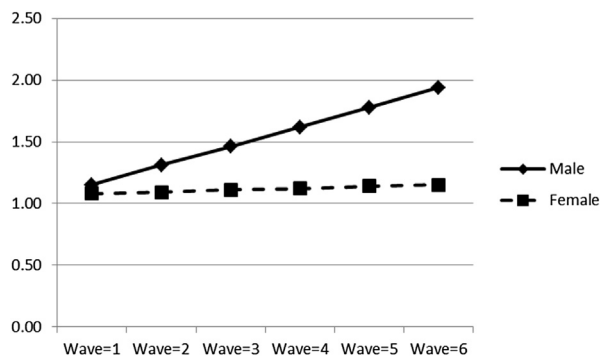
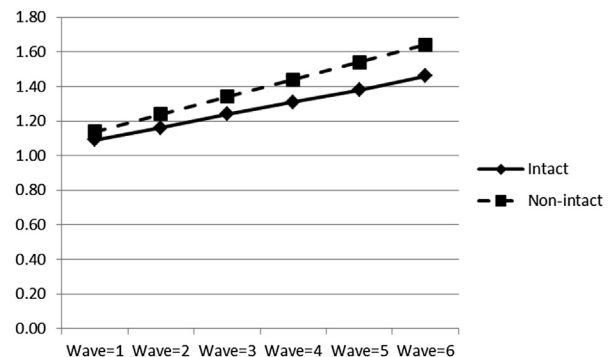
Consistent with previous research,²² family functioning was negatively related to consumption of pornography (ie, providing support for hypothesis 6a). However, family functioning was not related to the growth rates in pornography consumption across time. There are two possible explanations for this unexpected finding. First, as good family relationships and sexual drives of adolescents are relatively independent of each other, the linkage between family functioning and pornography consumption behavior might not be strong. Second, sexual outlet in adolescence is usually a coping mechanism for stress. Hence, even if adolescents communicate well with their parents, they might still rely on using pornography as “psychological drugs” to cope with stress.

Finally, in line with past research,^{20–23} the protective effect of PYD qualities on reducing adolescent pornography consumption was found in the present study (ie, providing support for hypotheses 7a and 7b). This supports the existing literature about the deterrent effect of this inner strength on adolescent risk behaviors.^{33,34} However, two points should be taken into account when interpreting the results. First, the effect size of the significant findings was not strong. Second, some PYD attributes might in fact promote adolescent consumption of pornography. Primarily, those with higher self-confidence might think that they can control their behavior, and hence engage in more pornography consumption. Besides, those with higher social competence might be influenced by their peers, which results in higher consumption behavior. Perhaps future work is needed to explore the relationships between different PYD dimensions and adolescent consumption of pornography.

There are several implications of the present findings. First, it is important to differentiate different types of pornographic materials (ie, online and traditional pornography) for examining such behavior. Second, the present study provides support for the ecological model of adolescent development. The study showed that gender, family intactness, family functioning, and positive youth qualities were significant predictors of pornography consumption. In particular, gender, PYD, and family intactness were closely related to the increased rate of change on online pornography consumption. The results extend the existing knowledge on the dynamic process of consumption of pornographic materials among male individuals, especially those from economically disadvantage and single-parent or divorced families.

Third, there is a need to examine how consumption of pornography influences the development of adolescents over time. There are two contrasting views on the influence of pornography on adolescent development. Those who subscribe to Freudian views suggest that release of sexual tension is beneficial to adolescent development. In contrast, some suggest that pornography consumption leads to guilt and distorted sexual beliefs in adolescents. In Chinese medicine, the general belief is also that control of sexual desire is beneficial to youth development. Clearly, more support is needed for adolescents who are heavy internet users with the increasing likelihood of consuming pornographic materials via the Internet.¹²

Several limitations of the study should be noted. First, peer influence is not included in the present study. Previous studies showed that social bonding is a significant factor

**Figure 1.** Growth trajectories of online pornography consumption according to sex.**Figure 2.** Growth trajectories of online pornography consumption according to family structure.

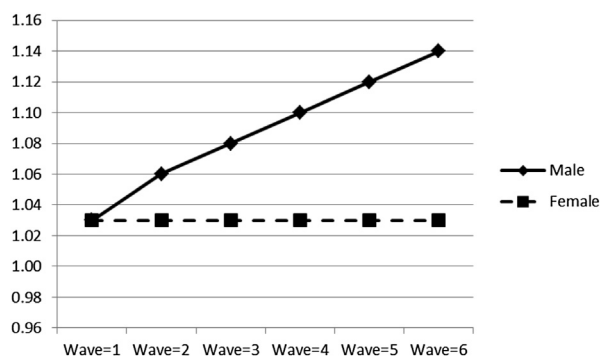


Figure 3. Growth trajectories of traditional pornography consumption according to sex.

for predicting the pornography consumption,¹² sexual behavior,⁷² and drug use⁷³ among adolescents. Thus, future research should include peer influence for studying problematic behaviors among youth. Another limitation of the current study is that we focused on only one problematic behavior. Previous studies in adolescents show that individuals usually engage in more than one problem behavior during adolescence.^{52,73} Thus, the correlates of multiple problematic behaviors should be studied in the future research. Last, in this study we focused on the factors associated with pornography consumption. The consequences of this problematic behavior are not clear. The negative effects (eg, stereotypical sexual attitudes, irresponsible sexual activity) of prolonged and premature exposure to pornography materials have been shown in Western^{74,75} and Chinese⁷⁶ samples. Hence, more research on the outcomes of this behavior is warranted.

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