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Media's Contribution to Sexual Knowledge, Attitudes and Behaviors for Adolescents and Young Adults in Three Asian Cities

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Abstract

Background—Evidence in western countries indicates that the media have associations with adolescents' and young people' sexual behavior that may be as important as family, school and peers. In this new study of Asian adolescents and young adults in the three cities of Hanoi, Shanghai and Taipei, the associations between exposure to sexual content in the media and adolescents' and young adults' sex-related knowledge, attitudes and behaviors are explored in societies with traditional Confucian culture, but at different stages in the process of modernization.

Method—The data are from a questionnaire-based cross-sectional study conducted from 2006 to 2007 where a sample of 17,016 adolescents and young adults aged 15–24 years from Shanghai, Hanoi and Taipei completed face-to-face interviews coupled with computer-assisted self-interviews (CASI) for sensitive questions. For the objectives of this paper, analysis was restricted to the 16,554 unmarried respondents. Exposure to sexual content in the mass media (including the Internet and traditional media), pornographic videos, and a preference for western/Asian movies/videos were the main media influence measures. Sex-related knowledge, premarital sexual permissiveness, and sex-related behaviors were the main outcome measures. The impact of each of four contexts including family, peer, school and media on sex-related knowledge, attitudes and behaviors were assessed using multiple linear regression stratified by gender and city, controlling for age, urban/rural residence, education and economic status. The change in adjusted R^2 from the multiple linear regression analysis was adopted to indicate the contribution of family, peer, school and media variables to respondents' sex-related knowledge, attitudes and behaviors.

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Results—The contextual factors, including family, peer, school and media, explained 30–50% of the variance in sex-related knowledge, 8–22% of the variance in premarital sexual permissiveness and 32–41% of the variance in sex-related behaviors. Media variables explained 13–24% of the variance in sexual knowledge, 3–13% in premarital sexual permissiveness and 3–13% in sex-related behaviors, which was comparable to that of family, peer and school variables. These associations differed by city and gender.

Conclusion—Access to and use of mass media and the messages it presents are influential factors on sex-related knowledge, attitudes and behaviors of unmarried Asian adolescents and young adults, and should be considered in future research and intervention programs attempting to improve reproductive health outcomes.

Keywords

Mass media; Unmarried; Sex-related knowledge; Attitude; Sexual behavior; Asian city; Multi-center study

Introduction

The Asian areas of Taiwan, China-mainland and Vietnam share the same Confucian-based culture but have been open to outside influences socially, culturally and economically for different periods of time and in different ways. Research has shown that the levels of adolescents' and young adults' sexual activities differ in the three areas. In China-mainland, with a more open policy in effect since the late 1970s, surveys have shown measurable increases in sexual intercourse among adolescents and young adults in general; for example, in 1998, 1.8% of middle school students in Shanghai reported ever having had sex, and this percentage had risen to 7.0% in 2005 [1–2]. A report in 2004 on an unmarried migrant population aged 15–24 in one district of Shanghai showed even higher rates of premarital sex: 34.8% of males and 12.7% of females were sexually active [3]. Taiwan, one of the most developed regions in Asia, seems to parallel many developed countries in several social aspects. In the Taiwan Young People Survey in 1994, 7% of adolescents aged 15–19 were sexually experienced [4]. More recently, a 2003 study involving girls in Taiwan vocational high schools showed that 25.5% were sexually experienced [5]. Since 1986, with the effects of economic reform, considerable social change has occurred in Vietnam. A survey conducted in six provinces among adolescents and young adults aged 15–22 in 1999 reported that 10% of male and 5% of female adolescents and young adults had had premarital sex [6]. In the Survey Assessment of Vietnamese Youth (widely known as "SAVY") conducted in late 2003, it was found that 19.8% of 18–25 year old boys in urban areas had had sex, and 13.6% in rural areas, respectively. For girls, the percentages were still quite low, 2.6% and 2.2%, respectively [7].

Recent ecological models of adolescent health risk behaviors posit that behavior is produced by the interactions between people and their environments, e.g., school, peers and family [8–9]. According to social ecology theory, mass media are another important dimension of young people's lives that may take on special significance during adolescence, in particular for sexual risk behaviors [9–10]. With the approach of the information era, no matter whether in the East or the West, access to media gradually becomes prevalent in the daily

life of adolescents and young adults. A recent survey in 2008–2009 found that on average, U.S. 8–18 year-olds spent over seven hours per day using media [11]. In China, a survey on Internet use in 2007 indicated that over 40% of youths aged 18–24 years visited the Internet [12]. In Taiwan, 75% male college students and 25% female college students were committed to Internet use [13]. In Vietnam, a qualitative study showed that young people used the Internet as a medium for expressing sexual identities and desires [14]. Previous research has shown that adolescents consistently cite mass media as important sources of sexual information [15–17]. Moreover, some adolescents may be learning about sex from the media but not be aware of it. However, much of the media that adolescents are exposed to include sexual imagery but rarely portray the consequences of risky sexual encounters or convey healthy sexual messages [9,18–19]. Meghan Smith conducted content analysis on web-based reproductive health information in 2000 and found that 63% of information online can be defined as pornography, and she observed that this may negatively impact youths' premarital sexual attitudes and behaviors [20].

Despite data showing that adolescents and young adults are frequent media users and consumers of numerous unhealthy media messages about sexual behaviors, limited research has included media as an influential factor in models of teens' risk behavior. Increasing evidence in western countries points to the media adolescents use frequently (television, music, movies magazines, and the Internet) as important factors in the initiation of sexual intercourse, showing that there are possible cause-and-effect between media use and earlier sexual intercourse[21], and that these effects are comparable to those of family, peers and school [9]. However, no similar results have been reported in Asian societies thus far.

In this paper, we use the data from the "Three-City Study of Asian Adolescents and Young Adults: Hanoi, Shanghai and Taipei" to explore the role of media in unmarried adolescents' and young adults' sex-related knowledge, attitudes and behaviors. First, we hypothesize that exposure to media is an important context for adolescents' and young adults' sex-related knowledge, attitudes and behaviors in these Asian cities with their heritage of Confucian-based culture, and that this effect is comparable with other contextual influences such as family, peers and school. Thus media influence can explain a part of the variation in respondents' sex-related knowledge, attitudes and behaviors. Secondly, as Taiwan, China-mainland and Vietnam have experienced different social and economic transitions despite sharing similar cultural backgrounds, media development, adolescents' and young adults' exposure to media and the relationship between media exposure and adolescents' and young adults' reproductive health status will be different in the three settings. Thus, we hypothesize that the associations between access to media and adolescents' and young adults' sex-related knowledge, attitudes and behaviors will be different in these three Asian cities.

Method

Sample and procedures

Data for this article come from a 2006 cross-sectional survey of 17,016 male and female, married and unmarried adolescents and young adults, aged 15–24, conducted in urban Hanoi, Shanghai and Taipei and rural areas included in their large metropolitan districts by a team of researchers from the Johns Hopkins Bloomberg School of Public Health, the

Population and Health Research Center in Taiwan's Bureau of Health Promotion (BHP), the Shanghai Institute for Planned Parenthood Research (SIPPR) and the Hanoi Institute for Gender and Women's Studies. In this paper, only the 16,554 unmarried respondents were included in the analysis.

The sampling methodology has been described in detail in "Levels of Change in Adolescents' and Young Adults' Sexual Behavior in Three Asian Cities" [22]. Multi-stage sampling methods were used to insure representativeness within each city. In Hanoi and Shanghai both private residences and group living facilities (GLFs) were sampled. In Taipei students were interviewed in school with a small non-student sub-sample interviewed at their private residences and GLFs. The survey was developed by the research team, translated, back-translated, and pilot tested in each site. Interviewers received extensive training. Most of the interview was conducted face-to-face, except that computer-assisted self interview CASI) was used for sensitive questions. All aspects of this study received approval from the Committee on Human Research Office at the Johns Hopkins University as well as the collaborating local organizations.

Measures

There are 3 groups of measures, i.e., independent variables or media exposure variables, control variables and dependent or outcome variables (these were measured by the scores for responses on sex-related knowledge, premarital sexual permissiveness (PSP) and sex-related behaviors).

Independent or media exposure variables—The media exposure variables include four indicators, namely, a) exposure to sexual content in the traditional media, b) exposure to sexual content on the Internet, c) exposure to pornographic movies/videos and d) origin of preferred movies/videos.

a. **Exposure to sexual content in the traditional media.** There are four kinds of information/knowledge including AIDS/STDs, sex, pregnancy and contraception which were asked about in the questionnaire and defined as sexual content. Five types of media are defined as traditional media – namely radios/TVs/videos, newspapers/magazines, books, bulletins/educational columns, and telephone hotlines. As traditional media in China are unlikely to convey much of sex in its content, we are looking largely at informational traditional media, save for porn. Exposure was assessed by asking respondents whether they had learned of each of the above-mentioned sexual information/knowledge subjects from each of above-mentioned media sources (yes=1, no=0). The responses were summed and yielded a score ranging from 0 (never heard of any sexual content from any traditional media) to 20 (have heard about all 4 kinds of sexual information from all five media types). The score was divided into two groups (zero and above zero) in bivariate analysis and was treated as a continuous variable in the multivariate analysis. Cronbach's alphas for items composing these variables are 0.85 in Hanoi, 0.88 in Shanghai and 0.89 in Taipei.

b. **Exposure to sexual content on the Internet.** Similarly, respondents were asked whether they had learned the four kinds of information listed above from the Internet (yes=1, no=0). The responses varied from 0 (never heard of any information from the Internet) to 4 (have heard about all 4 kinds of sexual information from the Internet). In the analysis, the score was treated in the same way as knowledge from the traditional media. The Cronbach's alphas of items constituting these variables in Hanoi, Shanghai and Taipei are 0.88, 0.90 and 0.86, respectively.

c. **Exposure to pornographic videos.** Respondents were asked whether they had watched any pornographic movies/ DVDs or seen pornographic pictures or videos. Responses were scored zero for "no" and one for "yes".

d. **Origin of preferred movies/videos.** Respondents were asked where most of the movies/videos they like to watch come from. The answers were coded as follows: Asian area=1, western countries=2, no preference=3.

Control variables—A variety of other potential contextual determinants of adolescents' and young adults' sex-related knowledge, attitudes and behaviors including individual, family, peer and school variables were treated as covariates. Table 1 presents the definition and coding of these variables.

Dependent or outcome measures—There are three main outcome measures: a) a sex-related knowledge score, b) a Premarital Sexual Permissiveness (PSP) score, and c) a sex-related behavior score.

a. **Sex-related knowledge score.** A total of 32 questions related to reproductive health knowledge (4 on reproduction, 22 on contraception and 6 on STDs/AIDS) were used to evaluate each respondent's knowledge level. A correct answer was credited with a score of one and incorrect answer with a score of zero. The sum of the scores for the 32 questions was calculated, the maximum being 32; then the score was converted into a new one with a maximum of 100 (the value of the sum was divided by 32 and multiplied by 100). The higher the score, the greater the respondent's sex-related knowledge. The Cronbach's alphas for items composing the knowledge score are 0.71 in Hanoi, 0.84 in Shanghai, and 0.60 in Taipei.

b. **Premarital sexual permissiveness (PSP) score.** The score was obtained by creating male and female Guttman scales based on questions concerning the individual's acceptance of various physical acts (kissing, fondling, or coitus) under various conditions of affection/familiarity (with casual acquaintance, with boyfriend/girlfriend, or with fiancé/fiancée). These questions were modified from the PSP Scale developed by Reiss (1967), which was widely applied in measuring adolescents' and young adults' PSP in western countries, Taiwan, Japan, and Singapore [23–26]. The items for the male and female scales are similar except that the sex referent is female for the female scale and male for the male scale. A one-dimensional measure of PSP was created within each city for each gender using a frequency analysis of the items above. The rankings were based on the percentage

of "acceptable" responses for each act/familiarity combination. Items with similar percentages of "acceptable" responses were combined into a single group. The lower the percentage of "acceptable" responses an item has, the higher its rank, and therefore the more permissive a respondent who finds that behavior acceptable is considered to be. The analysis showed that both the male and female scales in all three cities were similarly ordered – from less to more permissive the rankings are 0) disagree with all premarital sexual contact, 1) agreement with kissing with boyfriend/fiancé (girlfriend/fiancée) or fondling with fiancé (fiancée), 2) fondling with boyfriend (girlfriend), 3) coitus with fiancé (fiancée), 4) coitus with boyfriend (girlfriend), 5) kissing with casual acquaintance, 6) fondling with casual acquaintance, and 7) coitus with casual acquaintance. Through the Guttman scaling method, these items were arranged in an order so that an individual who agreed with a particular item was assumed to also agree with items ranked sequentially lower [27]. All coefficients of reproducibility for the Guttman scaling in the three cities are over 0.96.

c. **Sex-related behavior score.** Respondents' sex-related behavior level was evaluated by five questions on intimacy behaviors (holding hands, hugging, kissing, fondling and sexual intercourse) in the questionnaire. Respondents were asked whether they had participated in each of the five behaviors. A Guttman-type scale was used to construct the sex-related behavior score through ranking the items with the proportion of "yes" within each site. Participants received scores of 1 to 5 for holding hands, hugging, kissing, fondling and sexual intercourse respectively, reflecting the highest level of behavior experienced; adolescents and young adults who reported not having participated in any of these behaviors were scored 0. The coefficients of reproducibility for the scale in three cities are higher than 0.97.

Statistical analysis

The sample was weighted before the analysis and the weights were calculated according to the probability of each respondent being selected from each sample site. Chi-square tests were used to detect differences in the distribution of demographic characteristics (age group, gender, education level, etc.) and exposure to media sexual content between genders within each city. The Mantel-Haenszel test was used to detect differences in exposure to media sexual content among cities after controlling for gender. The Wilcoxon-Mann-Whitney test was adopted to compare respondents' sex-related knowledge score, PSP score and their sex-related behavior score between genders. The Kruskal-Wallis test was used to compare respondents' sex-related knowledge, attitudes and behavior scores among the cities after controlling for gender. Lastly, multiple linear regressions were used to compare the impact of each of the four contexts (family, peer, school and media) on the outcome measures, controlling for individual variables. In the first set of analyses, each set of contextual factors was entered into a model with each outcome variable. Then, all factors of individual, family, peer and school were simultaneously entered into one model and finally media variables were included in the model. The change in adjusted R^2 between the two models (with and without media variables) was used to indicate the contribution of media factors after

controlling for other contextual factors. A Cronbach's alpha coefficient over 0.60 indicates an acceptable internal consistency of items making up the composite variables. A coefficient of reproducibility over 0.90 for a Guttman-type scale is considered an acceptable reproducibility for Guttman scaling. In general, the Cronbach's alpha coefficients for composite variables and the reproducibility coefficients for Guttman Scaling within each site in the paper meet the minimum level of acceptance. Data were analyzed with SAS 9.1. Cases with missing values were excluded from the analysis.

Results

Demographic characteristics of respondents

The sample for this study includes 16,554 adolescents and young adults (6,204 from Hanoi, 6,023 from Shanghai and 4,327 from Taipei). The proportion of Shanghai respondents aged 21–24 (31%) was less than that of Taipei and Hanoi (40%). Significant differences were also observed between the three cities in terms of the background variables of gender, educational level, current student status, economic status, urban/rural residence and whether or not the respondent is engaged ($p<0.05$). These factors were then controlled for in the multivariate analysis. All of the following analyses were stratified by city and gender.

Status of respondents' exposure to sexual content in the media

More than half of respondents in three cities reported having learned about sex from the Internet (45–84%); the highest percentage was in Taipei, the lowest in Hanoi, and the middle in Shanghai. In all three cities more respondents reported having learned about sex from the traditional media (86–99%) than from the Internet. The percentage was higher in Hanoi than that in Taipei and Shanghai. A relatively high proportion of Taipei respondents reported having watched pornographic movies or videos (86%), compared to respondents in Shanghai and Hanoi. The majority of respondents in Hanoi (72%) and Shanghai (66%) preferred Asian movies/videos while more than half of Taipei respondents expressed a preference for western movies/videos. The differences of exposure to sexual content in the media within each of the sources above were statistically significant between cities ($p\leq0.01$). Gender differences were also observed within each site, i.e., more males than females learned about sex from the Internet, more females than males learned about sex from the traditional media, and considerably more males than females watched pornographic videos ($p\leq 0.01$). In Hanoi and Shanghai, significantly more males than females preferred western movies/videos ($p\leq 0.01$) (Table 2).

Respondents' sex-related knowledge, attitudes and behaviors

Table 3 presents the median scores of respondents' sex-related knowledge, attitudes and behaviors by city and gender. The sex-related knowledge and the sex-related behavior scores were the highest in Taipei. Shanghai respondents had the lowest knowledge score. The premarital sexual permissiveness (PSP) score was the highest for Shanghai respondents, followed by those in Taipei and was the lowest for respondents in Hanoi. All of the differences between cities were statistically significant ($p\leq0.01$). There was also evidence of gender differences in each city. In Hanoi, males had higher sex-related knowledge, more permissive attitudes to premarital intimacy behaviors and higher sex-related behavior scores

than did females ($p<0.01$). In Shanghai, males had more open attitudes to premarital sex and were more sexually active than were females ($p<0.01$), but they had a similar knowledge level. In Taipei, females had a higher level of sex-related knowledge and males once again had more liberal attitudes toward sexually intimate behaviors before marriage ($p<0.01$), but they had similar sex-related behavior levels.

Comparison of the effects of media, family, peer and school on outcome variables

Media influences showed a consistent and significant association with respondents' sex-related knowledge, permissive attitudes towards premarital sexual intimacy and behaviors in each site (Table 4).

In Hanoi, the proportions of variance that media variables explained in male and female respondents' sex-related knowledge and permissive attitudes to premarital sexual behaviors are higher than those that family, peer or school variables explained. The variance accounted for by media variables in male and female respondents' sex-related behavior is lower than the variance accounted for by peer variables, but higher than that by family or by school variables. After controlling for other contextual factors, media still added 2–9% of variance to the prediction of male and female respondents' sex-related knowledge, premarital sexual permissiveness, and sex-related behaviors. All contextual factors, including media, explained about 40% of the variance in sexual knowledge, 8% of the variance in sexual permissive attitudes, and 32% of the variance in sex-related behaviors of female and male respondents (Table 4).

In Shanghai, as in Hanoi, media variables explained more variance in male and female respondents' sex-related knowledge and permissive attitudes toward premarital sexual intimacy than did family, peer or school variables, and more variance in male and female respondents' sex-related behaviors than family and school variables after controlling for individual variables. When all other context factors were included in the model, media influences still made a significant contribution, adding 4% to 11% of variance to the prediction of male and female respondents' sex-related knowledge, premarital sexual permissiveness, and sex-related behaviors. All context variables, including media, jointly explained nearly 50% variance in sex-related knowledge, 20% variance in PSP attitudes, and 40% variance in sex-related behaviors of female and male respondents (Table 4).

In Taipei, after controlling for individual variables, media variables explained higher variance than family, peer or school variables in male and female respondents' sex-related knowledge; explained higher variance than school variables in males' and females' PSP and higher variance than family variables in females' PSP. In male and female respondents' sex-related behaviors, while considerably lower than the variance explained by peer variables, the effect is nevertheless higher than those of family and school variables. After controlling for other context factors, media variables contribute 1.4–8% variance in male and female respondents' sex-related knowledge, PSP, and sex-related behaviors. All of the variables, including individual, family, peer, school and media variables jointly explained over 30% of the variance in sex-related knowledge, nearly 15% variance in PSP and 40% in sex-related behaviors of female and male respondents in Taipei.

Tables 5 to 7 present the associations between media exposure variables and sex-related knowledge, attitudes and behaviors after adjusting for the effects from other context variables by city and gender. The results show that media variables are significant contributors across the dependent variables. Irrespective of whether they are male or female, adolescents and young adults in each city who learned something about sex from the traditional media have higher knowledge levels and lower sex-related behavior levels. Regarding learning about sex from the Internet, Shanghai respondents and Taipei male respondents who learned about sex from the Internet are also more knowledgeable about sex-related subjects; Shanghai and Hanoi respondents who learned about sex from the Internet had higher levels of sex-related behaviors. Shanghai respondents as well as Hanoi and Taipei males who learned about sex from the Internet reported more permissive attitudes to premarital sexual intimacy; however, learning about sex from traditional media had no significant effect on PSP. Having watched pornographic videos was significantly associated with higher sex-related knowledge, greater premarital sexual permissiveness and a higher level of sex-related behaviors across cities and genders. As to a preference for movies/videos of a specific origin, adolescents and young adults in the three cities who preferred western videos were more likely to have a higher sex-related knowledge level. Shanghai respondents and Hanoi female respondents who preferred western movies/videos were more likely to have more permissive attitudes towards sexual intimacy before marriage, and Shanghai and Hanoi female respondents and Taipei male respondents who preferred western movies/videos reported a higher level of sex-related behaviors. In summary, there are differences in the associations between access to media and adolescents' and young adults' reproductive health outcomes between the three cities and between genders.

Discussion

The findings of this study show that using media to access sex-related information is prevalent among adolescents and young adults in these three cities. Nearly all respondents report having learned about sex from traditional media, and majority of respondents learned about sex from the Internet. The survey results are consistent with other studies conducted among Asian adolescents and young adults, which indicate that the various forms of media have been an important source of information for Asian adolescents and young adults in learning about sex [16–17].

The results of this study show that media exposure is significantly correlated to adolescents' and young adults' sex-related knowledge, attitudes and behaviors. Even after considering influences from other important socialization sources such as family, peer and school, media impacts on the knowledge, attitudes and behaviors of adolescents and young adults are significant. These findings are similar to those of research conducted in western countries [9]. Moreover, our study shows that the effects of media are also comparable to other environmental factors. For sex-related knowledge, the impact of media variables is higher than that of family, peer and school variables. For sex-related attitudes, the impact of media variables is similar to that of peer variables and higher than that of school variables. In terms of sex-related behaviors, the impact of media variables is only lower than that of peer effects, but higher than the impact of family and school.

The various types of media present a great deal of sexual information in a compelling and easily accessible format. For adolescents and young adults with a heightened romantic and sexual interest during their sexual development, the various forms of media provide a relatively safe and minimally embarrassing way to learn about sex, especially in the Asian region, where talking about sex with adolescents and young adults is still a source of discomfort to educators and parents. Thus, media may serve as a kind of sexual "super peer" for adolescents and young adults seeking information about sexuality [15, 28–29]. However, much of the sexual content in the media describes attractive sexual behavior but rarely depicts the negative consequences of that behavior, which may make adolescents and young adults become more permissive regarding sex and encourage experimentation and imitation [9]. Our research shows that learning about sex from the Internet, watching pornographic videos/movies, and preferring western movies/videos are associated with more permissive attitudes to premarital sexual intimacy and a higher level of sex-related behaviors, findings consistent with previous research [30–32]. However, in contrast to previous findings [21,33], the study demonstrates that learning about sex from the traditional media (including radio/TV/videos, newspaper/magazines, books, bulletin/educational column and telephone hotlines) was associated with respondents' lower level of sex-related behaviors. One possible reason is that traditional forms of media are more easily supervised and monitored compared to the Internet; e.g., in China, most of the traditional media types are controlled by the government. Thus, traditional media are more likely to transmit scientific and "healthy" sexual information to adolescents and young adults. Because this study did not collect detailed information on adolescents' and young adults' exposure to the specific sexual content of the various forms of media, more research is needed to explore the differences in the sexual content that Asian adolescents and young adults receive from the traditional media as opposed to the Internet.

National, regional and gender differences have been observed on many aspects in this study. In terms of media exposure, more Taipei respondents learned about sex from the Internet and watched pornographic videos than did those in Hanoi and Shanghai. Additionally, more Taipei respondents preferred western movies/videos while those in Hanoi and Shanghai preferred Asian movies/videos. More males than females learned about sex from the Internet and watched pornographic movies/videos. Respondents in Taipei also had the highest sex-related knowledge and the highest level of sexual activity. Across all three cities, male and female respondents had similar sex-related knowledge levels but male respondents had more permissive attitudes to premarital sexual intimacy and in Hanoi and Shanghai a higher level of sexual behaviors. Concerning the influence of contextual factors on respondents' sex-related attitudes, among Hanoi and Shanghai respondents, media factors explained more variance than did the other contextual factors (peer, school and family); among Taipei male respondents, family factors explained more variance than the other factors, and for Taipei female respondents, peer factors explained more variance than the other factors. The results of gender differences in this study are consistent with previous research [34].

Taipei is situated in one of the most developed areas of Asia, where rapid media development and broad contact with the outside world provide adolescents and young adults with greater opportunity to be exposed to all kinds of information in the media. This may contribute to the high levels of sexual knowledge and sex-related behaviors found in

adolescents and young adults in Taipei compared to their counterparts in the other two cities. The more conservative nature of the societies of Hanoi and Shanghai may result in reduced communication between adolescents and young adults and their parents, peers or teachers concerning sexual topics and media consequently becomes a more important source of sexual information. This could explain the high impact of media on PSP attitudes in Hanoi and Shanghai but not on those in Taipei. Regarding the diversity of associations between different contextual factors and outcome variables, more research is needed to identify and explore the underlying causes. The specific sexual content of the media is one area in need of much more investigation.

This study is limited in several ways. First, the data presented here are cross-sectional and thus the direction of causal influence is unclear. The process may even be a bi-directional one. For example, sexually active adolescents and young adults may be more likely to seek pornographic videos and western movies to fit their preferred lifestyle, or conversely, exposure to pornographic videos and western movies may make young people more predisposed to engage in sex. In terms of the latter, longitudinal studies have found that increased exposure to sexual content on television predicts earlier initiation of sexual intercourse among adolescents and young people [21]. Second, the measurement of media exposure is not precise: for example the frequency of access to sexual content in the mass media is not included in the questionnaire, which limits the depth of the analysis in this paper. Finally, we failed to explore the possible differences in the sexual content of the media between cities that the adolescent respondents received because the questionnaire was not designed for this purpose.

Despite these limitations, several policy/research implications can be identified from our findings. First, media play as important a role in adolescents' and young adults' sex-related knowledge, attitudes and behaviors as do other contextual factors. Considering the reach of media is broader than that of other environmental variables, media influences on adolescents' and young adults' sexual development should be a concern of researchers and health practitioners. Regional and gender differences of these influences should also be considered. Second, using the mass media to provide sexual and reproductive health education for adolescents and young people should be encouraged since the media have proven to be a popular source of sexual information for adolescents and young adults. Third, many adolescents and young adults, irrespective of gender, learn about sex from the Internet and watch pornography, and these have been found in this study to be associated with more permissive sexual attitudes and higher levels of sexual behavior. Therefore, it is necessary to help adolescents and young people learn how to evaluate what they get from the media by the introduction of successful communication programs between teachers and students, and between parents and children. Finally, the preference for western movies/videos is associated with adolescents' and young adults' greater cognizance of sexual attitudes and behaviors, which implies the necessity of preventing adolescents and young adults from passively absorbing imported sexual information on the one hand, and, on the other, of being encouraged to use constructively the potential benefits of introducing popular western movies/videos with accurate sexual information.

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Table 1

Contextual and control variables

Variable	Description of variable/question/statement	Range & value
Individual		
Age	Age of respondent	15–24
Gender	Gender of respondent	0=female,1=male
Educational level	Student: current educational level	1=high school or lower
	Non-student: highest educational level	2=college/vocational school(Hanoi)
		3=university or above
Student	Do you currently go to school?	0=no, 1=yes
Economic status	Quintile of the sum of 14 items of assets in current dwelling	Quintile within each site
Residence	Urban or rural area	0=rural, 1=urban
Engagement	Are you currently engaged?	0=no, 1=yes
Family		
Live with parents	Whether live with biological parent most of the time?	1=live with neither 2=live with father 3=live with mother 4=live with both
Family support score at 13 or 14 years old	Item 1–2: discussed with father/mother problems; Item 3–4: he/she was interested in you and how you were doing; Item 5–6: he/she believed that you would be successful; Item 7–8: he/she expected you to do your best; Item 9–10: he/she showed you that he loved you (Cronbach's alpha: Hanoi: 0.80; Shanghai: 0.86; Taipei: 0.80)	Item 1–2: 1=not at all, 2=a little, 3=some, 4=a lot Item 3–10: 1=never, 2=sometimes, 3=often, 4=always Sum range: 10–40
Perceived parental upset view of sex	My parents would be very upset if I had sexual intercourse before marriage	1=disagree, 2=no opinion, 3=agree
Learned sexual content from parents	Learned from parents AIDS/STDs, sex, pregnancy and contraception information respectively (Cronbach's alpha: Hanoi: 0.74; Shanghai: 0.78; Taipei: 0.77)	For each of the four items, 0=no, 1=yes Sum range: 0–4
Would seek help from parents if necessary	Would you talk to parents if you felt like killing yourself, were being physically abused or threatened, thought you might have a sexually transmitted disease or needed contraception (respectively)? (Cronbach's alpha: Hanoi:0.71; Shanghai:0.67; Taipei: 0.60)	For each of the four question, 0=no, 1=yes Sum range: 0–4
Peers		
Time spent with peers weekly	Hours spent in hanging around with friends in a normal week	1=0 hour, 2=1–6hours, 3=≥7 hours
Perceived peers' sexual behavior	Perceived most of close friends have had sexual intercourse	0=no, 1=yes
Perceived peer pressure on sexual behavior	Whether do you need to have premarital sex to fit in with your friends?	0=no, 1=yes
Learned sexual contents from peers	Item 1–4: Learned from friends AIDS/STDs, sex, pregnancy and contraception information respectively Item 5–8: Learned from boy(girl) friends AIDS/STDs, sex, pregnancy and contraception information respectively Item 9–12: Learned from young relatives AIDS/STDs, sex, pregnancy and contraception information respectively (Cronbach's alpha: Hanoi: 0.82; Shanghai: 0.85, Taipei: 0.86)	For each item, 0=no, 1=yes Sum range: 0–12
Would seek help from peers if necessary	Item 1–4: Would you talk to friends if you felt like killing yourself, were being physically abused or threatened, thought you might have a sexually transmitted disease or needed contraception (respectively) ? Item 5–8: Would you talk to boy(girl) friends if you felt like killing yourself, were being physically abused or threatened, thought you might have a sexually trans mitted disease or needed contraception (respectively)?	For each items, 0=no, 1=yes Sum range: 0–8

Variable	Description of variable/question/statement	Range & value
	(Cronbach's alpha: Hanoi: 0.55;Shanghai: 0.71; Taipei: 0.68)	
School		
School support score	Item1: Students are encouraged to ask questions and speak out in school; Item2: Teachers treat every student fairly; Item3: Teachers generally set high expectations of students; Item4: Teachers provide students with support and encouragement. (Cronbach's alpha: Hanoi: 0.59; Shanghai: 0.70; Taipei: 0.51)	1=disagree, 2=neither, 3=agree Sum range: 4–12
Grades	Grades received as a student	1=poor, 2=average, 3=good
Learned sexual content from school	Learned from schools AIDS/STDs, sex, pregnancy and contraception information respectively (Cronbach's alpha: Hanoi: 0.82; Shanghai: 0.83; Taipei: 0.78)	0=no, 1=yes Sum range: 0–4
Would seek help from teachers if necessary	Would you talk to teachers if you felt like killing yourself, were being physically abused or threatened, thought you might have a sexually transmitted disease or needed contraception (respectively)? (Cronbach's alpha: Hanoi: 0.47; Shanghai: 0.67; Taipei: 0.68)	0=no, 1=yes Sum range: 0–4

Table 2

Respondents' exposure to sexual content in the media by city and gender(%)

Media variables	Hanoi			Shanghai			Taipei		
	Male (n=3,095)	Female (n=3,109)	Total (n=6,204)	Male (2,983)	Female (n=3,040)	Total (n=6,023)	Male (n=2,168)	Female (n=2,159)	Total (n=4,3270)
Learned about sex from the Internet	57.0#	45.3	51.4*	63.7#	48.3	56.0	84.4#	80.7	82.6
Learned about sex from traditional media	97.9#	98.7	98.3*	85.7#	88.2	86.9	94.3#	97.2	95.7
Watched porn	43.3#	6.8	26.0*	56.7#	22.2	39.6	94.1#	77.1	85.8
Origin of preferred movies/videos									
Asian	67.9#	76.9	72.2*	61.5#	70.2	65.8	20.5	21.5	21.0
Western	19.1	11.7	15.6	20.8	13.6	17.3	56.6	55.8	56.2
No preference	13.0	11.4	12.2	17.7	16.2	16.9	22.9	22.7	22.8

$p \leq 0.01$, Chi-square test between genders.

* $p \leq 0.01$, Cochran-Mantel-Haenszel test among sites.

Chi-square subdivision method was used for multiple comparison on proportions between Hanoi and Shanghai, Shanghai and Taipei, Hanoi and Taipei, and all $p \leq 0.01$.

Table 3

Median score of respondents' sex-related knowledge, attitude and behaviors by city and gender

Reproductive health status	Hanoi			Shanghai			Taipei		
	Male (n=3,095)	Female (n=3,109)	Total (n=6,204)	Male (2,983)	Female (n=3,040)	Total (n=6,023)	Male (n=2,168)	Female (n=2,159)	Total (n=4,327)
Sex-related knowledge score (0–100)	56.3#	53.1	56.3*a	43.8	43.8	43.8b	59.4#	65.6	62.5c
Premarital sexual permissiveness score (0–7)	4.0#	3.0	3.0*a	5.0#	4.0	5.0b	5.0#	4.0	4.0b
Sex-related behavior score (0–5)	2.0#	1.0	1.0*a	2.0#	1.0	1.0b	3.0	3.0	3.0c

# $p<0.01$, Wilcoxon-Mann-Whitney test between genders.

* $p<0.01$, Kruskal-Wallis test among sites. SNK test for multiple comparison across sites, values with the same letter are not significantly different.

Table 4

Percent variance in sex-related knowledge, attitudes and behaviors explained by each context, after controlling for individual variables(%)

Sites	Independent variables(R^2)					Variables without media	All Change	Change in R^2
	Individual	Family	Peer	School	Media			
Sex-related knowledge score								
Hanoi								
Male	18.4	1.1	9.7	5.1	16.2	31.2	39.9	8.7
Female	19.6	1.1	6.7	5.2	12.9	30.3	36.7	6.4
Shanghai								
Male	18.2	5.4	17.2	2.0	23.9	38.6	49.5	10.9
Female	20.9	1.9	14.5	3.9	17.4	38.8	46.9	8.1
Taipei								
Male	16.9	2.7	3.9	4.9	13.8	26.3	34.1	7.8
Female	11.7	0.8	6.8	4.0	12.9	23.2	30.3	7.1
Premarital sexual permissiveness score								
Hanoi								
Male	1.7	3.3	2.5	1.1	4.4	7.2	9.2	2.0
Female	2.7	1.2	2.1	0.5	2.8	6.1	7.8	1.7
Shanghai								
Male	5.4	3.3	7.4	0.5	13.2	14.9	21.8	6.9
Female	4.9	0.9	8.4	1.9	8.7	14.6	18.5	3.9
Taipei								
Male	3.9	6.1	4.0	1.1	3.1	13.1	14.9	1.8
Female	2.0	3.5	6.8	0.6	5.3	11.6	13.9	2.3
Sex-related behavior score								
Hanoi								
Male	20.3	1.5	8.6	0.5	4.6	30.0	31.6	1.6
Female	23.1	0.5	7.2	0.2	4.4	30.7	32.7	2.0
Shanghai								
Male	18.2	3.5	15.3	0.8	12.8	34.6	39.5	4.9
Female	16.9	1.3	17.9	1.0	11.3	35.6	39.5	4.0

Sites	Independent variables(R^2)					Variables without media	All Change	Change in R^2
	Individual	Family	Peer	School	Media			
Taipei								
Male	16.6	2.8	17.1	0.9	3.3	36.8	39.1	2.3
Female	12.2	3.7	23.8	1.8	4.8	39.2	40.6	1.4

Table 5

Variables regressed on knowledge score by city and gender: standardized β

Variable	Hanoi		Shanghai		Taipei	
	Male (n=2,619)	**Female (n=2,556)**	**Male (n=2,916)**	**Female (n=2,987)**	**Male (n=2,073)**	**Female (n=2,040)**
Individual						
Age	0.12*	0.21*	0.10*	0.15*	0.12*	0.00
Educational level (ref: HS or lower)	0.15*	0.13*	0.11*	0.07*	0.09*	0.20*
Student or not (ref: non-student)	−0.06*	0.01	0.08*	0.06*	0.11*	0.05*
Economic status (ref: bottom quintile)	−0.01	−0.03	0.02	0.05*	0.04*	0.05*
Urban/rural type (ref: rural)	0.02	−0.02	−0.01	−0.02	0.09*	0.04*
Engagement or not (ref: no)	0.01	0.01	0.01	0.05*	0.00	0.03
Media exposure						
Learned about sex – traditional media	0.29*	0.25*	0.24*	0.20*	0.21*	0.22*
Learned about sex – the Internet	0.01	0.01	0.08*	0.06*	0.08*	0.03
Watched porn (ref. no)	0.12*	0.11*	0.17*	0.11*	0.11*	0.11*
Preferred movies/videos (ref. Asian)						
Western	0.05*	0.05*	0.05*	0.09*	0.10*	0.10*
No preference	0.01	0.03*	0.03*	0.05*	0.07*	0.04
Family						
Whether lived with parents (ref: live with neither)						
Live with father	0.01	0.02	−0.04*	−0.00	−0.05*	−0.02
Live with mother	0.00	−0.06*	0.04*	−0.00	−0.02	0.03
Live with both	0.01	−0.05	−0.01	−0.03	0.02	−0.01
Perceived family support	−0.03*	−0.02	0.12*	0.10*	0.06*	0.08*
Perceived parental upset view of sex (ref: disagree)						
No opinion	−0.04	0.05	−0.07*	−0.02	−0.11*	−0.03
Agree	0.00	0.08*	−0.06*	0.00	−0.07*	0.00

Variable	Hanoi		Shanghai		Taipei	
	Male (n=2,619)	**Female (n=2,556)**	**Male (n=2,916)**	**Female (n=2,987)**	**Male (n=2,073)**	**Female (n=2,040)**
Learned about sex from parents	0.03*	0.02	−0.01	0.02	0.01	−0.05*
Would seek parental help when necessary	0.02	−0.01	−0.06*	−0.07*	−0.06*	−0.09*
Peer						
Time spent with peers weekly (ref: 0 hour)						
1 to 6 hours	0.04	0.01	−0.02	−0.01	−0.04	−0.05
More than 6 hours	0.06*	0.01	−0.03	−0.03	−0.05	−0.04
Perceived peers' sexual behavior (ref: no)	0.07*	0.06*	0.12*	0.08*	0.08*	0.09*
Perceive peers' pressure on sexual behavior (ref: no)	0.02	0.05*	0.02	0.01	−0.02	0.02
Learned about sex from peers	0.12*	0.10*	0.14*	0.19*	−0.01	0.06*
Would seek peers' help when necessary	0.11*	0.04*	0.09*	0.10*	−0.03	0.04*
School						
Perceived school support	0.02	−0.02	−0.03*	−0.07*	0.05*	0.02
Received good grades as a student	0.00	0.04*	0.04*	0.06*	0.03	0.05*
Learned about sex from teachers	0.10*	0.14*	0.05*	0.12*	0.16*	0.20*
Would seek teacher's help when necessary	0.02	0.01	−0.01	−0.01	0.02	−0.02

* $p \leq 0.05$. Variables without indicating reference are treated as continuous variables.

Table 6

Variables regressed on premarital sexual permissiveness score by city and gender: standardized β

Variable	Hanoi		Shanghai		Taipei	
	Male (n=2,619)	**Female (n=2,556)**	**Male (n=2,916)**	**Female (n=2,987)**	**Male (n=2,072)**	**Female (n=2,040)**
Individual						
Age	−0.01	0.01	0.02	0.01	0.01	0.01
Educational level (ref: HS or lower)	−0.05	0.01	0.04	0.01	0.07*	0.01
Student or not (ref: non-student)	0.01	0.03	−0.00	0.11*	0.01	−0.01
Economic status (ref: the bottom quintile)	0.04	0.07*	0.01	0.02	0.05*	0.01
Urban/rural type (ref: rural)	0.03	0.04*	−0.05*	0.03	0.07*	0.05*
Engagement or not (ref: no)	0.04	0.03	−0.03	0.01	−0.01	0.01
Media exposure						
Learned about sex from traditional media	−0.03	0.01	0.04	0.04	0.02	0.05
Learned about sex from the Internet	0.08*	0.01	0.11*	0.10*	0.09*	0.00
Watched porn (ref. no)	0.12*	0.14*	0.23*	0.15*	0.10*	0.15*
Preferred movies/videos (ref. Asian)						
Western	0.03	0.04*	0.05*	0.05*	−0.01	0.02
No preference	−0.01	0.00	0.01	0.02	−0.06*	−0.03
Family						
Whether lived with parents (ref: live with neither)						
Live with father	−0.02	−0.01	−0.01	−0.01	0.01	−0.01
Live with mother	−0.08	−0.14*	0.03	−0.00	0.00	−0.04
Live with both	−0.07	−0.11*	0.00	−0.04	−0.03	−0.05*
Perceived family support	−0.03	−0.04	0.03	0.03	−0.01	−0.02
Perceived parental upset view of sex(ref: disagree)						
No opinion	−0.07*	0.04	−0.10*	−0.00	−0.13*	−0.14*
Agree	−0.15*	−0.02	−0.12*	−0.05	−0.23*	−0.25*
Learned about sex from parents	−0.01	−0.00	0.01	−0.01	−0.04	0.09*

Variable	Hanoi		Shanghai		Taipei	
	Male (n=2,619)	**Female (n=2,556)**	**Male (n=2,916)**	**Female (n=2,987)**	**Male (n=2,072)**	**Female (n=2,040)**
Would seek parental help when necessary	−0.08*	0.01	−0.06*	−0.04	−0.10*	−0.04
Peer						
Time spent with peers weekly(ref: 0 hrs)						
1 to 6 hours	−0.04	0.05	0.03	0.06*	0.01	−0.03
More than 6 hours	−0.01	0.04	0.08*	0.02	0.05	−0.03
Perceived peers' sexual behavior(ref: no)	0.07*	0.04*	0.05*	0.03	0.06*	0.14*
Perceived peers' pressure on sexual behavior (ref: no)	−0.02	0.05*	0.03	0.03	0.05*	−0.01
Learned about sex from peers	0.07*	0.04	0.09*	0.13*	0.08*	0.10*
Would seek peers' help when necessary	0.03	0.04*	0.02	0.12*	−0.03	0.04
School						
Perceived school support	−0.05*	−0.02	−0.01	−0.06*	0.01	−0.02
Received grades as a student	−0.03	0.00	0.01	0.03	−0.04	−0.02
Learned about sex from teachers	−0.02	0.06*	−0.01	0.07*	0.02	−0.03
Would seek teacher's help when necessary	−0.01	−0.04	−0.02	−0.01	−0.04	0.02

* $p \leq 0.05$. Variables without indicating reference are treated as continuous variables.

Table 7

Variables regressed on sex-related behavior score by city and gender: standardized β

Variable	Hanoi		Shanghai		Taipei	
	Male (n=2619)	Female (n=2556)	Male (n=2916)	Female (n=2987)	Male (n=2073)	Female (n=2040)
Individual						
Age	0.29*	0.36*	0.21*	0.21*	0.26*	0.29*
Educational level (ref: HS or lower)	−0.02	0.01	−0.07*	−0.04*	−0.02	−0.11*
Student or not (ref: non-student)	−0.04	0.00	−0.07*	−0.01	−0.06*	0.02
Economic status (ref: bottom quintile)	0.06*	0.08*	0.08*	0.02	0.03	0.04*
Urban/rural type (ref: rural)	−0.03	0.01	0.01	0.03	−0.02	0.01
Engagement or not (ref: no)	0.02	0.02	0.03	0.08*	−0.01	−0.02
Media exposure						
Learned about sex from traditional media	−0.04	−0.06*	−0.01	−0.05*	−0.09*	−0.10*
Learned about sex from the Internet	0.04*	0.04*	0.05*	0.07*	−0.05	−0.02
Watched porn (ref. no)	0.15*	0.14*	0.23*	0.20*	0.09*	0.11*
Preferred movies/videos (ref. Asian)						
Western	0.00	0.04*	0.01	0.05*	0.11*	−0.02
No preference	−0.01	−0.02	−0.04*	0.00	0.07*	−0.00
Family						
Whether lived with parents (ref: live with neither)						
Live with father	−0.03	0.03	−0.01	−0.01	0.03	0.01
Live with mother	−0.01	−0.01	−0.00	−0.01	−0.02	−0.01
Live with both	−0.02	−0.02	−0.04*	−0.01	−0.04	−0.04*
Perceived family support	0.05*	0.01	0.03	0.00	0.04	0.02
Perceived parental upset view of sex(ref: disagree)						
No opinion	−0.06	−0.04	−0.04*	−0.03	−0.03	−0.01
Agree	−0.07*	−0.04	−0.08*	−0.06*	−0.06*	−0.04
Learned about sex from parents	0.03	−0.04*	−0.01	−0.02	−0.05*	−0.11*

Variable	Hanoi		Shanghai		Taipei	
	Male (n=2619)	Female (n=2556)	Male (n=2916)	Female (n=2987)	Male (n=2073)	Female (n=2040)
Would seek parental help when necessary	−0.06*	−0.04*	−0.03	−0.06*	−0.04*	−0.10*
Peer						
Time spent with peers weekly(ref: 0 hr)						
1 to 6 hours	0.04	0.09*	0.08*	0.06*	0.07*	0.04
More than 6 hours	0.11*	0.11*	0.14*	0.11*	0.10*	0.05*
Perceived peers' sexual behavior(ref: no)	0.17*	0.13*	0.14*	0.09*	0.24*	0.22*
Perceived peers' pressure on sexual behavior (ref: no)	0.04*	0.02	0.02	0.04*	0.04*	0.05*
Learned about sex from peers	0.10*	0.14*	0.18*	0.25*	0.26*	0.29*
Would seek peers' help when necessary	0.03	0.07*	0.03*	0.10*	0.04*	0.04*
School						
Perceived school support	0.05*	−0.00	−0.01	−0.02	0.00	−0.04*
Received grades as a student	0.01	0.01	0.00	0.02	−0.02	−0.01
Learned about sex from teachers	0.04*	0.03	−0.03	−0.04*	−0.11*	−0.04
Would seek teachers' help when necessary	−0.03	−0.03	−0.02	−0.03	0.01	−0.01

* $p \leq 0.05$. Variables without indicating reference are treated as continuous variables.