

PLURALISTIC IGNORANCE ABOUT SEX: THE DIRECT AND THE INDIRECT EFFECTS OF MEDIA CONSUMPTION ON COLLEGE STUDENTS' MISPERCEPTION OF SEX-RELATED PEER NORMS

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ABSTRACT

The term *pluralistic ignorance* refers to erroneous beliefs held by a group of individuals about the attitudes or behavior of others. In this study, we examined the degree to which college students in Singapore misconceive their peers' sexual attitudes and behavior. The data for this study came from a web-based survey involving a random sample of 534 college students in Singapore. The results indicate widespread evidence of pluralistic ignorance; that is, students believed that their peers were significantly more sexually active than was actually the case. The data also suggest that the students formed such erroneous impressions of peers on the basis, in part, of the students' media consumption and of the students' own sexual attitudes.

The term *pluralistic ignorance* refers to individuals' erroneous impressions of others' attitudes and behavior (Allport, 1924; O'Gorman, 1986). This phenomenon is not uncommon. Scholars have reported misperception of public opinion on a number of social issues, such as racial segregation (Breed & Ktsanes, 1961; O'Gorman, 1975), political issues (Shamir & Shamir, 1997), voting preferences (Granberg & Brent, 1983; Noelle-Neumann, 1993), and prohibitions against drinking and smoking (Schank, 1932). In recent years, a number of studies have demonstrated the existence of pluralistic ignorance among college students in the area of sex-related issues (Cohen & Shotland, 1996; Lambert, Kahn, & Apple, 2003). Such misconception of sex-related peer norms has received substantial research attention because peer norms appear

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to influence the sexual standards and the sexual behavior of college students (Walsh, Ferrell, & Tolone, 1976; Cvetkovich & Grote, 1980; Billy & Udry, 1985; Whitaker & Miller, 2000).

Scholars have suggested that media is one of the culprits that cause people's misperception of others (Shamir, 1995; Shamir & Shamir, 1997; Gunther & Chia, 2001), but few studies have closely examined the process in which people's media exposure would lead to these people's misperception of others' attitudes and behaviors. As young people including college students have reported that mass media and peers are the two main sources of information about sex (Stodghill, 1998), it appears particularly important to examine how consumption of mass media may contribute to a misperception of peer norms in the context of college students' sexuality. Such an examination can help us understand how media and peer influence would interplay with each other and produce effects on college students' sexual attitudes and behaviors.

We selected Singapore as the locale for our study because college students in Singapore have recently reported their perception of increasing sexual activities on campuses (Luo & Wu, 2004); in contrast, no empirical evidence could affirm the accuracy of that perception. It is interesting that students began perceiving increased sexual activity among peers while the Singapore government began lifting restrictions on certain sexual materials in the mass media. The media in Singapore is known to contain far less—and far less explicit—sexual materials than do either the media in the United States or those of most other developed countries. As it is, the government in Singapore strictly censors the media to ensure that it 'preserves societal and moral standards and promotes positive family values' (Media Development Authority, 2004). However, the strict censorship rules have been loosening up in recent years, and more and more sexual materials have appeared in Singapore's mass media. For example, after being banned for 5 years, the sex-oriented American TV series *Sex and the City* obtained government permission in 2004 to air on Singapore TV ('Sex and the City', 2004). Similarly, the government decided in 2003 to lift a 20-year-ban on *Cosmopolitan*, a women's magazine that often carries sex-oriented images or texts ('Cosmo Allowed', 2003). In addition to the airing or the circulation of foreign sex-related media, Singapore got its first sex-themed talk show on a local television channel in 2005. Many people have seen the series of media expansions as a sign that the city-state is loosening its strict censorship rules ('Singapore to air', 2005).

The purpose of this study is to explore how consumption of the increasing sexual materials in the media may shape misperceptions of sex-related peer norms held by college students in Singapore. The findings of this study, nevertheless, should not be confined to Singapore's context only because the

theoretical explanations that underlie this study are not nation-specific. We expect that an empirical test of those theoretical arguments can advance our knowledge of media influence on people's perception of public opinion. To this end, we attempt to accomplish three objectives in this study. First, we would like to examine the extent to which pluralistic ignorance is related to college students' sexual attitudes and perception in a non-American context. Findings of such a test can demonstrate whether pluralistic ignorance in the area of sex-related issues is a universal phenomenon or is variable across different countries and cultures. Second, we would like to propose a theoretical framework that explains how mass media cause students' distorted perceptions of sex-related peer norms. This framework will include a concurrent test of the direct effect and the indirect effect of media on the formation of pluralistic ignorance. Finally, we would like to examine how the projection effect and the normative influence of peers can enhance the similarity between students' personal sexual attitudes and their perception of peer norms.

LITERATURE REVIEW AND HYPOTHESES

The term *pluralistic ignorance* (Allport, 1924) represents individuals' 'unwarranted and mistaken impressions' of 'how other people feel and think on various matters' (Shamir & Shamir, 1997, p. 227). By its definition, the concept refers to the discrepancy between the real distribution of public opinion and people's perceived distribution of public opinion. It can refer to the extreme case of absolute pluralistic ignorance, in which people misperceive the minority position on an issue to be the majority position, and vice versa; or it can refer also to the scenario of relative pluralistic ignorance (Korte, 1972; Ross, Greene, & House, 1977), in which people simply overestimate or underestimate certain opinions of others. In summary, pluralistic ignorance marks 'a continuum of bias and inaccuracy, and it can be graver or milder' (Shamir & Shamir, 1997, p. 228).

Previous studies have demonstrated the existence of pluralistic ignorance among college students in the area of sex-related issues. The findings show that students tend to overestimate the extent to which their peers' sexual standards are liberal. College students believed that the average other person of their own sex expected sexual intercourse in a relationship to begin much sooner than was actually the case (Cohen & Shotland, 1996). When estimating the level of peers' comfort concerning campus-based sexual behaviors, the perceived comfort rating that college students reported were higher than the actual comfort ratings (Hines, Saris, & Throckmorton-Belzer, 2002). In addition, college students overrated their peers' comfort level with the behavior of 'hooking-up'—when two people agree to engage in sexual behavior

without any commitment for the future (Lambert et al., 2003). As these studies were conducted mostly in the United States, we would like to extend the examination to a non-American context: Singapore. We will first examine the actual distribution of sex-related norms among Singaporean college students by using a random sample. We will then compare the actual distribution of peer norms to students' perceived distribution of peer norms. Our hypothesis is:

H1: The perceived sex-related peer norms, as reported by college students, are more permissive than the actual peer norms.

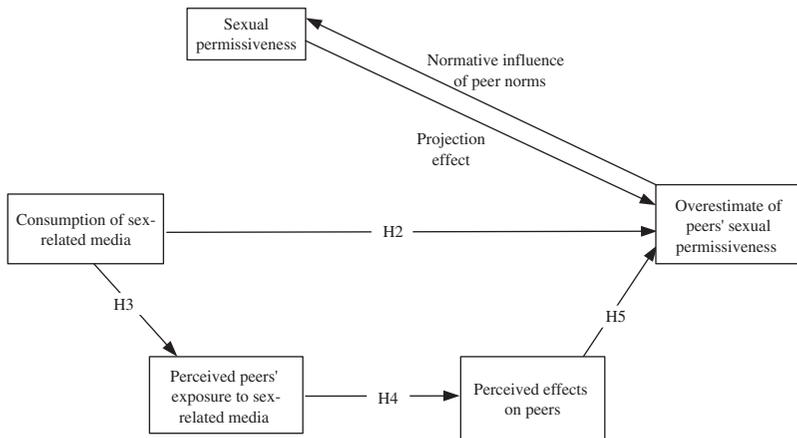
Scholars in the field argue that media portrayals help create college students' misperception of others' comfort with risky behavior like sexual activities (Hines et al., 2002). In general, the media can produce both a direct influence and an indirect influence on people's perception of others. The details are described subsequently.

DIRECT MEDIA EFFECTS

Gerbner and Gross's (1976) cultivation theory provides explanations for the media's direct influence on people's perception of others. In their seminal article, Gerbner and Gross proposed the cultivation effect to describe the influence of television viewing on people's perception of social reality. They argued that television is the primary common source of socialization and everyday information as it transcends barriers of literacy and mobility. Gerbner and Gross (1976) claim that television's programs—whether drama, commercials, news or other programs—bring more or less similar messages into every household. As viewers watch television from day to day, they receive these messages repeatedly and cumulatively. As a result, these viewers, and heavy viewers in particular, start to believe that they live in the narrative world portrayed on TV (Gerbner, Gross, Morgan, Signorielli, & Shanahan, 2002). Recent research has further detailed the possible psychological processes that underlie the cultivation effects (for a review, see Shrum, 2007a). The results suggest that a person's media usage increases the accessibility of relevant information from memory (Shrum, 2007b). When being asked to infer the frequency or probabilities of others' attitudes or behavior in the real world, the person uses the ease of recall as a basis to make the inference (Shrum, 1996; Busselle & Shrum, 2003).

When cultivation theory was first proposed, the focus was on television because television at that time was the main storyteller of US culture—it was the most pervasive cultural institution to provide social patterns and to cultivate those patterns as well (Gerbner et al., 2002). But in recent years, as diversity in different types of media has decreased, print media, movies, and the Internet are part of the same system of storytelling as television and

FIGURE 1 Hypothetical model of media effects on students' misperception of sex-related peer norms



distribute similar cultural values and ideologies (Eastmen & Newton, 1995; Morgan & Shanahan, 1997). Therefore, cultivation effects can consider all types of media. A number of studies in the United States, for instance, have demonstrated that heavy consumption of sex-related media, including television, movies, magazines, and music videos, is positively related to higher estimates of the frequency of sexual practices in the real world (Zillmann & Bryant, 1982; Buerkel-Rothfuss & Strouse, 1993).

As we have described earlier, there has been a significant increase of sexual materials in Singapore's mass media in recent years. It is possible that Singaporean college students' exposure to increasing levels of sex-related media content enhances the accessibility of sexual information from the students' memory. When making inference of peer norms, those who have high levels of consumption of sexual media content are more likely than those who have low levels of media consumption to make the inference in accord with the sexual media content and, as a result, to overestimate peers' sexual permissiveness. Therefore, we propose the following hypothesis (Figure 1):

H2: The amount of college students' consumption of sex-related media will be positively associated with the degree to which the students overestimate peers' sexual permissiveness.

INDIRECT MEDIA EFFECTS

Gunther's study (1998) of 'persuasive press inference' describes an indirect effect of media on people's perception of others' attitudes and behaviors.

The 'persuasive press inference' uses peoples' perceptions of the influence that mass media have on others as a key element with which to explain the possible association between media influence and people's perception of others. It explains the association in relation to three stages: first, people attend to a particular medium and tend to extrapolate general media content from the content of that medium; second, people believe that others are exposed to similar media content and are also influenced by that content. Finally, people base their assessments of others' attitudes and beliefs on this presumed media influence (Gunther, 1998).

The notion of a persuasive press inference is derived from a number of related models of media and public opinion. The first proposition in the persuasive press inference model—extrapolation of media content—comes from research on the law-of-small-numbers bias (Tversky & Kahneman, 1971) and people's tendency to make strong inferences based on small amounts of data (Nisbett & Ross, 1980). Gunther (1998) uses these research findings as the bases to establish that people are likely to think their own sample of media content represents what exists in the overall media. Because people tend to believe that mass media have a broad reach (Parisot, 1988), people would conclude that most others are also exposed to similar media content. Gunther's arguments received empirical support in a number of later studies (Gunther, Christen, Liebhart, & Chia, 2001; Chia, 2006). As sexual content has started to increase in Singapore's media, it is possible that college students ascribe the sexual content to which they are exposed to the overall media. The students may further assume that their peers are exposed to similarly sexual materials in media. Therefore, we propose the following hypothesis (Figure 1).

H₃: The amount of college students' consumption of sex-related media will be positively associated with the amount of exposure that the students believe their peers are having to sex-related media content.

College students' presumed exposure of peers to media content is likely to serve as a reference point from which the students infer possible media influence on peers. The idea that people perceive communication as having some influence on others is derived from the third-person perception (Davison, 1983). The third-person perception refers to the position that people systematically perceive communication as having a greater influence on others than on themselves. A series of third-person-perception studies have found that a person, while conceiving the self as smart enough to resist media effects, usually adopts a relatively naïve schema (e.g., the magic bullet theory) from which the person, according to his or her presumptions about others' exposure to media content, infers media effects on others (McLeod, Eveland, & Nathanson, 1997; Eveland, Nathanson, Detenber, & McLeod, 1999). This suggests that perceived media impact on a 'third-person' group is significantly

and substantially related to perceptions of media exposure for that group (Figure 1):

H4: College students' perception of their peers' exposure to sex-related media will be positively associated with the students' perception of the media's influence on the students' peers.

Finally, according to persuasive press inference, the college students may evaluate their peers' sexual attitudes and behavior according to the college students' own perception of media influence on their peers. People usually assume others as passive, atomized, and with no resistance to media influence (Gunther, 1998) when they infer media influence on others. As a result, people would believe that the influence of media on others constitutes what others think or how they behave. This argument receives empirical support when research shows that individuals' perception of media influence is associated with the individuals' perception of others' attitudes (Gunther et al., 2001) and behavior (Gunther & Storey, 2003). However, according to the third-person-effect hypothesis (Davison, 1983), presumed media influence on others tends to be greater than perceived media influence on the self. This perceptual difference is likely to result from an overestimation of media effects on others, an underestimation of media effects on self, or both (Perloff, 2002). The misperception of media influence on others would lead to a misperception of others' attitudes and behaviors (Gunther & Chia, 2001). In other words, the assumption that others are different from the self would contribute to the pattern of pluralistic ignorance (Merton, 1968). We propose the following hypothesis (Figure 1).

H5: Students' estimates of increasing media influence on peers will be positively associated with the degree to which students overestimate peers' sexual permissiveness.

OPINION AND PERCEPTION

Scholars have long recognized that, in addition to media exposure, an individual's personal opinion influences the individual's perceptions of public opinion. This influence is described as a projection effect, or 'looking-glass effect'; that is, people tend to 'look out onto the world and somehow see their own opinions reflected back' (Fields & Schuman, 1976, p. 437). A variation of this phenomenon is called the false-consensus effect (Ross et al., 1977; Marks & Miller, 1987), in which people tend to 'see their own behavioral choices and judgments as relatively common...while viewing alternative responses as uncommon' (Ross et al., 1977, p. 280). Several studies have found evidence that the projection effect and the false-consensus effect operate in the context of sexual issues involving college students. Sexually experienced adolescents

are likely to estimate their peers' sexual activities as more frequent than the corresponding estimates by sexually inexperienced adolescents (Billy, Landale, Grady, & Zimmerke, 1988; Whitley, 1998). One explanation for the association is that students (i) tend to selectively observe the behavior that corresponds to friends whose sexual behavior patterns are similar to the students' own and (ii) tend to generalize the prevalence of the behavior to other students (Whitley, 1998).

The projection effect and the false-consensus effect suggest that as students project their own sexual attitudes onto their peers, sexually permissive students would believe that most of the peer group shares their liberal views, whereas conservative students would believe that most of the peer group shares their conservative views. As a result, it is more likely that sexually permissive students will overestimate the sexual permissiveness among their peers than it is that students who are sexually conservative will do so. The pattern of pluralistic ignorance in this context results from people's assumption that others share their own attitudes and behaviors (Merton, 1968). This suggestion underlies our projection hypothesis (Figure 1).

However, we should not neglect one rival explanation of the similarity between individuals' sexual attitudes and individuals' misperception of peer norms—an influence of peer norms on students' sexual attitudes (Figure 1). Literature on peer influence has suggested that students' sexual attitudes are sometimes subject to the students' perception of peer norms (Cvetkovich & Grote, 1980; Whitaker & Miller, 2000). It is possible that the students first overestimated peers' sexual attitudes and then aligned their sexual attitudes with the peers' sexual standards. Because the influence of peer norms and the projection effect proffer competing explanations for the correlation between students' sexuality and the degree to which students overestimate peer norms, we need to further clarify whether the correlation results from the projection effect, an influence of peer norms, or both. Answers to this question can provide us with a better understanding of both the predictors of students' misperceptions of peer norms and the influence of peer norms on students' sexual attitudes:

RQ: Does the correlation between perceived peer norms and adolescents' own sexuality result from individuals' projections or from the normative influence of peers?

METHODS

We conducted a web-based survey with a representative sample at a university in Singapore to obtain data for this study. With the consent and assistance of the university administration office, we selected 4,000 undergraduates by using simple random sampling. We sent an invitation to selected students through

the students' school email accounts and we offered an incentive that was worth US\$ 6. The students who were willing to participate in the survey gathered in a stipulated school computer lab at a time that was convenient for them. Upon arrival, participants showed their ID to confirm that they were the selected respondents before they entered the laboratory to randomly choose a computer and to fill out the web-based survey. Prior to the participants' arrival, research assistants had logged all computers in the lab onto the survey website so that the participants would not need to give out their identity to log online. Not once during the survey did we ask respondents to give any information that might reveal their identity. After respondents completed the survey, they directly submitted their responses to an online database. An empty survey would then automatically appear on the screen for the next respondent.

The final sample was composed of 534 college students. The response rate was 13.4 percent according to the American Association for Public Opinion Research formula RR1, the most conservative method of response-rate calculation provided by the organization (AAPOR, 2000). The response rate was low probably for three reasons: One, respondents needed to travel to assigned school computer labs to attend the survey. Two, only one follow-up reminder was sent to the selected students because the university wanted to avoid students' complaints about mail spamming. Three, the respondents did not get the incentive in advance. Dillman (2000) pointed out that it is easier for respondents to decline the request to participate in a survey if they could get an incentive only *after* they completed the questionnaire, as compared to when they get the incentive along with the questionnaire.

We compared the sample to the updated university statistics and found the sample to be largely representative of the university population in terms of age, ethnic groups,¹ and year of study. The respondents were between 20 and 30 years old ($M = 22.47$, $SD = 1.76$). In terms of ethnicity, the majority of the respondents were Chinese (94 percent), while 3 percent were Malay, 3 percent Indian, and 0.4 percent other. Most respondents (68 percent) reported a religious affiliation. Of these, about 49 percent were Christians, 14 percent were Buddhists, 3 percent were Muslims, and 2 percent identified themselves as belonging to other religions. However, in terms of sex, about 56 percent of the respondents were female ($n = 301$). Male students were slightly under-represented.

¹Because the university statistics did not provide information on ethnic groups and religions, we compared our sample to Singapore's 2000 census on resident students. The census shows that, at the time and in terms of ethnicity, 92 percent of university students in Singapore were Chinese, 2.7 percent Malays, 4.3 percent Indians, and 0.7 percent other. Our sample statistics were quite close to these numbers. The census provides no information on university students' religions but shows that Christians form the largest religious group among university graduates. Our sample statistics provide consistent information.

TABLE 1 Actual sex-related norms held by the students and their perception of sex-related peer norms

	<i>Actual norms</i> %	<i>Perceived norms</i> %	<i>SD</i>	<i>One sample t-tests</i> (<i>N</i> =534)
Am comfortable with having sexual intercourse on the first date	9	21	14.5	19.02***
Am comfortable with having sexual intercourse at casual-dating stage	17	32	16.6	20.59***
Am comfortable with having sexual intercourse at serious-dating stage	52	57	21.2	5.02***
Am comfortable with having sexual intercourse at postengagement stage	74	75	21.5	1.42
Had sexual intercourse in the past 6 months	24	45	20.1	23.69***

****p* < .001.

MEASURES

In the survey, we measured both the actual norms attributable to students and students’ perception of peer norms in order to test the presence of pluralistic ignorance. We programed the web-based survey to randomize the order of the questions regarding actual and perceived peer norms to prevent a possible effect of question order.

We first measured students’ *actual norms* by using a four-item scale modified from Reiss’s (1967) Premarital Sexual Permissiveness (PSP) Scale. We asked students to indicate how comfortable they felt about having sexual intercourse at each of four dating stages: (i) the first date, (ii) casual dating, (iii) serious dating, and (iv) postengagement. Responses were given on a 6-point scale where 1 meant ‘very uncomfortable’ and 6 meant ‘very comfortable’. We recoded responses 1 through 3 as uncomfortable and 4 through 6 as comfortable. A frequency analysis showed that most students were uncomfortable with the occurrence of sex before the stage of serious dating (Table 1). Also, we asked students to report their sexual behavior. About 24 percent of respondents admitted that they had engaged in sexual intercourse in the previous 6 months (Table 1).

As to *perceived norms*, students estimated the percentage of students who felt comfortable having sexual intercourse at each of the four dating stages: (i) the first date, (ii) casual dating, (iii) serious dating, and (iv) postengagement. They also estimated the percentage of students who had engaged in sexual intercourse in the previous 6 months. Descriptive statistics for students’ perceptions are listed in Table 1.

We used students’ responses to the four-item PSP scale (the scale we used to measure actual norms earlier) to describe students’ *sexual attitudes*.

We transformed the four items to a five-point Guttman scale² ranging from 0 to 4 where 0 meant that a student felt comfortable having sexual intercourse only after getting married (that is, the respondent was the least permissive) and 4 meant that a student felt comfortable having intercourse on the first date (that is, the respondent was the most permissive). Descriptive statistics showed that most respondents felt comfortable with having intercourse only after they had started seriously dating ($M = 1.52$, $SD = 1.20$).

For *consumption of sex-related media*, we asked the students to report how often they were exposed, in the overall media, to content that included talk about sex, sexual behavior, and sexual relationship. The students gave their responses on a 7-point scale where 1 = 'never' and 7 = 'always'. The descriptive statistics show that the students were often exposed to sexual materials in the media ($M = 4.72$, $SD = 1.41$).

We asked students to report their beliefs concerning the frequency at which *peers were exposed to media content* that included talk about sex, sexual behavior, or sexual relationships. Responses were given on a 7-point scale where 1 meant 'never' and 7 meant 'always'. Students believed that their peers were exposed to a substantial amount of sexual materials in the media ($M = 4.98$, $SD = 1.32$).

As to *perception of media effects on peers*, respondents were asked whether exposure to sexual media content affected other students' attitudes toward (i) premarital sex and (ii) casual sex. Responses were given on a 7-point scale that ranged from 1 = 'no influence' to 7 = 'considerable influence'. Students reported that sex-related media had a fair amount of influence on their peers' attitudes toward premarital sex ($M = 4.22$, $SD = 1.55$) and toward casual sex ($M = 4.27$, $SD = 1.51$).³

Finally, we measured variables that may affect college students' sexuality, such as a person's sex (for a review, see Oliver & Hyde, 1993), religiosity (i.e., the frequency of attendance at religious institutions, $M = 1.52$, $SD = 2.54$; for a review, see Thornton & Camburn, 1989), prior sexual experience (31 percent had already had sexual experiences), age, and ethnicity.

²Responses from one to three for each item were recoded into 0 and responses from four to six were recoded into 1. A high coefficient of reproducibility $C = .99$ (Crocker & Algina, 1986) show that most respondents who answered 1 to an early dating stage would answer 1 to the later dating stages as well. Therefore, the stage a respondent started to answer 1 referred to the dating stage one felt comfortable to start sexual intercourse. The sum of these four items provided a 5-point unidirectional scale ranged from 0 to 4 to measure an individual's acceptance of the progression of intercourse at different dating stages. On this scale, 4 means that one felt comfortable having intercourse on the first date, which is the most permissive attitude; 3 means that one felt comfortable having intercourse after starting casually dating; 2 means that one felt comfortable having intercourse only after seriously dating; 1 means that one felt comfortable having intercourse only after they were engaged; and 0, the least permissive attitude, means that an individual would not feel comfortable having intercourse until getting married.

³We compared the students' perceptions of media effects on peers to the students' perceptions on the self and found significant third-person effects ($t[533] = 6.62$, $p < .001$ for effects on premarital sex; $t[533] = 3.48$, $p < .001$ for effects on casual sex).

We found that males were more sexually permissive [$t(520) = 11.14, p < .001$] and more likely to overestimate sex-related peer norms than were females [$t(532) = 6.17, p < .001$ for norm about sex on first date; $t(532) = 5.99, p < .001$ for norm about sex while casually dating; $t(530) = 6.09, p < .001$ for norm about sex while seriously dating; $t(531) = 4.80, p < .001$ for norm about postengagement sex]. We also found that the frequency of students' attendance at religious institutions was negatively associated with students' own sexual permissiveness [$r(512) = -.24, p < .001$] and with the degree to which students overestimated peer norms about postengagement sex [$r(523) = -.11, p < .05$]. The students' age was positively associated with students' own sexual permissiveness [$r(521) = .32, p < .001$] and with the degree to which students overestimated sex-related peer norms [$r(533) = .26, p < .001$ for norm about sex on first date; $r(533) = .22, p < .001$ for norm about sex while casually dating; $r(531) = .19, p < .001$ for norm about sex while seriously dating; $r(532) = .16, p < .001$ for norm about postengagement sex; $r(531) = .15, p < .01$ for norm about prevalence of sexual intercourse in the past 6 months]. The sexually experienced students were more sexually permissive [$t(520) = 10.89, p < .001$] and more likely to overestimate peer norms than the sexually inexperienced students [$t(532) = 2.23, p < .05$ for norm about sex on first date; $t(530) = 3.50, p < .01$ for norm about sex while seriously dating; $t(531) = 5.13, p < .001$ for norm about postengagement sex; $t(530) = 6.60, p < .001$ for norm about prevalence of sexual intercourse in the past 6 months]. Race, however, had no significant effects on the students' sexual attitudes or on the students' perception of peer norms.

RESULTS

To test whether pluralistic ignorance is related to Singaporean students' sexual attitudes, we performed a series of one-sample *t*-tests. Herein, we examined specifically the discrepancy between the actual and the perceived norms concerning sexual issues. The results show that respondents tended to overestimate the percentage of peers who were comfortable with pre-engagement sexual intercourse (Table 1). They overestimated also the percentage of students who had engaged in sexual intercourse in the previous 6 months. They correctly gauged peer norms only when estimating peers' comfortableness with postengagement sexual intercourse (Table 1). H₁ received support.

H₂ through H₅ suggested a hypothetical model (Figure 1) indicating that a student's use of sex-related media would directly and indirectly influence the degree to which one might overestimate peer norms. In addition, the projection effect and the normative influence of peer norms added to the model a reciprocal relation between students' own sexual attitudes and the degree to which students overestimate peer norms (Figure 1). To simultaneously test all these paths that constituted the hypothetical model,

TABLE 2 Correlation matrix for observed variables in the hypothetical model

	1	2	3	4	5	6	7	8	9
2	.73***								
3	.38**	.60***							
4	.19**	.40**	.72***						
5	.32**	.41**	.46**	.34**					
6	-.08*	-.05	-.03	-.03	-.12**				
7	-.04	-.01	-.03	.01	-.09*	.77***			
8	.01	.03	.09*	.04	.07	.27**	.18**		
9	.18**	.20**	.25**	.21**	.18**	-.09*	-.07	-.03	
10	.04	.05	.08	.07	.12**	.25**	.19**	.75***	.10*

*** $p < .001$; ** $p < .01$; * $p < .05$.

Correlations were computed after we controlled for age, sex, religiosity, and sexual experiences.

Variables (with standard deviations in parentheses):

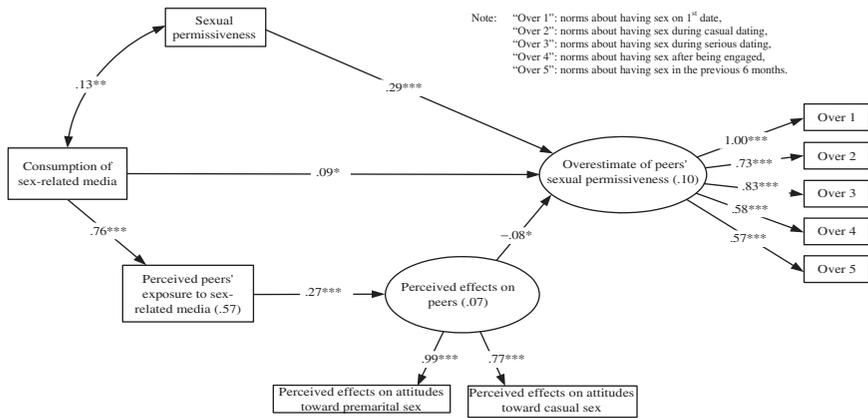
1. Misperception of peer norms about having sexual intercourse on the first date (14.48).
2. Misperception of peer norms about having sexual intercourse when casually dating (16.62).
3. Misperception of peer norms about having sexual intercourse when seriously dating (21.15).
4. Misperception of peer norms about having sexual intercourse after being engaged (21.48).
5. Misperception of peer norms about having had sexual intercourse in the previous 6 months (20.06).
6. Perception of media effects on peers' attitudes toward premarital sex (1.55).
7. Perception of media effects on peers attitudes toward casual sex (1.51).
8. Perception of peers' exposure to sex-related media (1.32).
9. Respondents' sexual attitudes (1.20).
10. Respondents' exposure to sex-related media (1.41).

we planned to perform a structural equation modeling (SEM) analysis using LISREL 8.51 (Jöreskog & Sörbom, 1996). Nevertheless, given the potential obstacles (i.e., the model cannot be identified, Kline, 1998) in analyzing a nonrecursive model that tests a reciprocal relationship, we decided not to test the nonrecursive model and, instead, relied on two separate SEM models. One examined the hypothetical model with the projection effect, and the other examined the hypothetical model with the influence that students' perception of peer norms had on their sexual attitudes. For the analysis, we controlled for students' sex, age, religiosity, and past sexual experience. The ultimate endogenous variable in this equation comprised five items that measured the degree to which students overestimated peer norms. We obtained these five items by subtracting students' answers for each of the five actual-norm items from their answers for each of the corresponding perceived-norm items.⁴

We first performed an SEM analysis (see Table 2 for the correlation matrix) on the hypothetical model with the projection effect. Figure 2 illustrates the results. We found that respondents' media consumption was directly and positively associated with the degree to which the respondents

⁴ Subtracting the actual norms from perceived norms serves the purpose of underscoring the accuracy of estimation. But statistically, the terms we obtained are no different from the perceived-norm items.

FIGURE 2 Structural-equation modeling analysis of media effects on Singaporean students' misperception of sex-related peer norms



Note: The coefficients are standardized (** $p < .001$; * $p < .01$; * $p < .05$). R^2 values are reported in parentheses. In accordance with standard representation, rectangles stand for observed variables and ovals stand for latent variables.

overestimated peers' sexual permissiveness. H2, which concerns a direct effect of media on the pluralistic ignorance attributable to students, received significant but weak support. On the other hand, our test of an indirect effect that media might have on students' misperceptions of peer norms yielded mixed results. Consistent with our hypotheses, the analysis showed that respondents' use of sex-related media was positively associated with their perception of peers' exposure to sex-oriented media content. We also found that students' perception of the amount of peers' exposure to sex-oriented media was positively associated with the students' perception of media influence on peers. H3 and H4 were supported. But to our surprise, respondents' estimates of increasing media influence on peers were weakly but negatively associated with the degree to which students overestimated peers' permissiveness about sex. This result failed to support H5. We also found that respondents who were comfortable with sexual intercourse at earlier dating stages in a relationship were more likely than other respondents to overestimate peers' sexual permissiveness. The projection effect was supported. A comparison of the students' own sexual attitudes and their perceived peer norms (Table 3) further provided support for the assertion that there was false consensus: Sexually permissive students perceived a significantly greater prevalence of sexual activities than did sexually conservative students.

Overall, our analysis provided support for the assertion that media have a significant direct effect (effect size = .09) and an indirect effect (effect size = -.02) on Singaporean students' misperception of peer norms about sexual issues, although both the direct effect and the indirect effect are weak. The indirect effect, however, appears to be negative. We also found that

TABLE 3 A comparison between students' own sexual attitudes and their perception of peers' sexual attitudes

<i>Average estimate of percent of peers who ...</i>	<i>Students who felt comfortable starting intercourse ...</i>					<i>Total</i> (<i>N</i> = 522)
	<i>At first date</i> (<i>n</i> = 44)	<i>When casually dating</i> (<i>n</i> = 45)	<i>When seriously dating</i> (<i>n</i> = 183)	<i>When being engaged</i> (<i>n</i> = 116)	<i>After getting married</i> (<i>n</i> = 134)	
... are comfortable with having sexual intercourse on the first date	34 (18.5)	24 (15.3)	20 (14.0)	19 (12.7)	17 (11.9)	21 (14.5)
... are comfortable with having sexual intercourse at casual-dating stage	44 (20.0)	38 (16.0)	32 (16.7)	30 (14.4)	27 (15.7)	32 (16.6)
... are comfortable with having sexual intercourse at serious-dating stage	71 (19.6)	60 (20.5)	64 (19.3)	53 (18.2)	45 (20.1)	57 (21.2)
... are comfortable with having sexual intercourse at post-engagement stage	80 (22.9)	81 (16.6)	83 (16.5)	77 (18.3)	60 (23.2)	75 (21.5)
... have had sexual intercourse in the past 6 months	55 (22.9)	51 (22.1)	46 (18.6)	41 (19.9)	39 (18.4)	45 (20.1)

Note: Standard deviations are in parentheses.

students' own sexual attitudes may affect the students' perception of peers. The hypothetical model that contains simultaneously the projection effect, the direct media effect, and the indirect media effect accounted for 10 percent of the variance in students' misperception of peer norms. Chi-square statistics were nonsignificant ($\chi^2 = 25.38$, $df = 26$, $p = .50$), and other indices (RMSEA = .00, NFI = .99, NNFI = 1.00, CFI = 1.00, IFI = 1.00, GFI = .99) suggested a good model fit.⁵

To further clarify whether the correlation between perceived peer norms and adolescents' own sexuality results from projection, normative influence, or both, we performed another SEM analysis to examine the influence that students' perception of peer norms had on their sexual attitudes. The results demonstrated that the alternative model fit did not improve ($\chi^2 = 25.83$, $df = 26$, $p = .47$, RMSEA = .00, NFI = .99, NNFI = 1.00, CFI = 1.00, IFI = 1.00, GFI = .99) from the previous analysis of the projection model (Kline, 1998). The path coefficient for the influence of peer norms appeared as significant as it had done for the projection effect ($\beta = .29$, $p < .001$). Rather than challenge the projection effect, this finding validates it and suggests the coexistence of both a projection effect and an influence of peer norms in the context of Singaporean students' sexuality.

DISCUSSION

Our study presents evidence for the existence of sex-related pluralistic ignorance among college students in Singapore. We found that, consistent with American college students (Cohen & Shotland, 1996; Lambert et al., 2003), college students in Singapore tended to overestimate their peers' sexual permissiveness. Most respondents in our study held sexually conservative attitudes but failed to realize that the conservative norm prevailed among their peers; instead, most students in our study believed that their peers were more sexually permissive and more sexually active than was actually the case. Also, our findings suggest that students could sometimes more or less accurately gauge peer norms, but mostly for the norms that were endorsed by social values, like postengagement sex.

Insofar as we controlled for personal sexual attitudes, our findings suggest that Singaporean students' consumption of sex-related media was significantly and directly associated with the degree to which the students overestimated peer norms. Though the association revealed in our analysis is weak,

⁵ In general, a lower and nonsignificant chi-square statistic means a better-fitting model. Desirable fit for the root mean square error of approximation (RMSEA) is $< .05$, which indicates a close fit of the model in relation to degrees of freedom. Goodness-of-fit indices (GFI), which assess the relative amount of variance and covariance jointly accounted for by a model, are considered satisfactory at .90 or better (Maruyama, 1998). The Tucker-Lewis nonnormed fit index (NNFI) is an incremental test that compares the fit to a more restricted baseline model (Hu & Bentler, 1995); again, .90 or better is considered satisfactory.

it indicates that cumulative exposure to sex-related media is likely to lead to a misperception of peer norms. In particular, sexual materials have just started to increase in Singapore's mass media, and the direct effect of media consumption has already appeared significant. It is possible that, over time, the direct effect of media consumption on students' misperception of peer norms will further increase.

The indirect effect of media consumption, on the other hand, is puzzling. We found that the college students in Singapore inferred—from their own media consumption—exposure of peers to sex-related media. The students who perceived higher levels of peer exposure to sex-related media concluded a greater media influence on their peers. These findings support the first two propositions of the persuasive press inference idea (Gunther, 1998). However, the subsequent negative association between perceived peer norms and perceived media influence appears to contradict the last proposition of the persuasive press inference idea. One possible explanation for this unexpected finding is that, except for the small number of foreign sex-related media, most of the locally produced sex-related media in Singapore usually highlight the undesirable consequences of premarital and casual sex because of the government's censorship. College students in Singapore may presume that the influence of sex-related media on their peers decreases the peers' comfortableness with engaging in premarital or casual sex. Accordingly, the students who perceived greater levels of media influence on peers would report a lower estimate of sexual permissiveness among the peers. Future research may test this speculation by clarifying the type of influence that Singaporean students normally expect the media to have on their peers. But more important, our study presents evidence that presumed media influence on others can mediate the effect of sex-related media on college students' perception of peer norms, although the effect is small.

Our study also supports the false-consensus effect and the projection effect. Our findings suggest that, just as in the United States (Whitley, 1998), in Singapore students who held liberal sexual standards were more likely to overestimate the percentage of sexually permissive peers than were students who held conservative sexual standards. This finding is not surprising because previous studies have provided robust support for the projection effect. Other implications of the projection result are probably more interesting. For one, although students tend to base peers' sexual attitudes on their own sexual attitudes, underlying this projection effect is a tendency for respondents to see others as more permissive than the self. This fact is likely to contribute to the overestimation of peer permissiveness. Finally, the projection results affirm the validity of the effects of media influence, since both the direct and the indirect effects of media remain significant even after we controlled for the robust effects of students' own sexual attitudes.

We found that students' perception of peer norms, regardless of whether the perception was biased by media factors or other factors, is also likely to reciprocally contribute to students' sexual attitudes. As for comfort levels regarding sexual intercourse during early dating stages, students who perceived a high level of sexual permissiveness among peers were more comfortable than students who perceived a low level of sexual permissiveness among peers. These findings indicate that, in sexually conservative Singapore society, sexually active students perhaps circumvent a certain kind of marginal status insofar as they tend to overestimate the prevalence of sexual activities among their peers. The sexually active students also use this perception to justify their own active sexual attitudes and behavior. Although our cross-sectional survey data are not sufficient justification for the conclusion that students' perceptions of peer norms causally affect the students' sexual attitudes or the other way around, the significant association revealed by our analyses affirms that a discussion on college students' sexual attitudes always needs to account for students' misperception of peer norms.

There are some limitations in this study. First, although our data come from a random sample, both the low response rate and the sample's underrepresentation of male students may have compromised the generalizability of our findings. Moreover, the norms reported by the students in the survey may not adequately represent the actual norms on campus. It is possible that the students who agreed to participate in our survey happened to be more liberal (Wiederman, 1999) than the average student and that their liberal attitudes skewed the results. It is possible that the actual norms among college students in Singapore are more conservative than the norms that our sample reported. It is mostly likely that, in this case, the less permissive students would also judge their peers—via projection—to be less permissive. The discrepancy between actual norms and perceived norms would differ little from the discrepancy that our study identified. Second, we should sound a note of caution concerning the relationship between the cross-sectional data and causal inferences. Although the media effects and the projection effect on students' misperception of peer norms were supported by theoretical reasoning and by our use of empirical-evidence controls, the causal direction of these associations will require longitudinal designs for more rigorous testing. The SEM analysis did not test directionality in these associations. Finally, the main exogenous variable of our study—namely, exposure to sexually related TV—was measured by a single indicator. Future research would benefit from multiple measures that allow for error estimation and more model elaboration.

Despite these limitations, our findings address some practical concerns. First of all, we found that college students in Singapore mistakenly believe their fellow students on campus to be more sexually permissive than they

actually are. This misperception may give rise to some daunting consequences. For example, a student may pressure his or her date to engage in sexual behaviors because the student misperceives the date's comfort level relative to engaging in sexual activities. Or students may engage in sexual activities or only weakly resist pressure to engage in sexual activities because they misperceive that their low comfort level relative to engaging in these sexual activities is shared by a minority only, campus-wide. Second, our study shows that the erroneous impression held by students is likely a function of students' media consumption and also of their own sexual attitudes. Open discussions among students and their peers concerning pluralistic ignorance, media effect, and false consensus may expose students to more accurate information. Finally, our study establishes links between individual difference, the media, and pluralistic ignorance. It is possible that other factors, such as education, interpersonal communication within family and reference groups, and personal vanities, would also affect the extent to which pluralistic ignorance is related to college students' sexual attitudes and behavior. Future studies may add the influence of socialization and personal conversation in the model to examine those factors.

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BIOGRAPHICAL NOTES

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