

Differences Between Male and Female Indian College Students in Their Knowledge of HIV/AIDS and Preferred Sources of Information

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Abstract

In recent years in India, the rates of HIV prevalence have declined overall, but the epidemic is still growing in some regions and within some populations (AVERT, 2012). India has aggressively tackled its HIV problem and has made significant progress in reversing the epidemic, reducing new infections by 57% from 2001 to 2011, resulting in decreasing HIV prevalence from 0.49% in 2007 to 0.27% in 2014. The National AIDS Control Organization (2005) reported that 31% of India's HIV infections were among the 15–29 age group. Today, India's HIV epidemic has moved from being concentrated in commercial sex worker and IV drug user groups to the general public, particularly to young people. Unfortunately, India's youth harbor misconceptions about HIV and lack education regarding various aspects of the disease. The UNFPA (2010) stated that mass media can be used successfully in educating young people about HIV. The purpose of the study was to study the level of HIV-related knowledge among Indian college students and examine the effect of different media on their knowledge of HIV/AIDS. The participants for the study were chosen as intact groups from colleges in India. Two-way analyses of variance were conducted to investigate the differences in knowledge about the HIV based on sources of information and gender among Indian college students. ANOVA results did not show a statistically significant main effect for gender and type of source of information on knowledge about the HIV; however, the interaction between the Internet as a source of information and gender was statistically significant, $F(1, 345) = 5.618, p = .018, \text{partial } \eta^2 = .016$. When the Internet was identified as being a primary source of information about HIV/AIDS, the level of knowledge of the HIV for males was statistically significantly higher than that of women with 1.6% of the effect on HIV/AIDS knowledge attributed to the interaction between the Internet and gender.

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Keywords

HIV/AIDS in India; preferred sources of HIV-related information; knowledge of HIV; Indian college students

Globally, individuals under age 25 make up about one quarter of the population of individuals living with HIV, and in 2010, people between ages 15 and 24 accounted for 42% of new HIV infections worldwide (Joint United Nations Program on HIV/AIDS [UNAIDS], 2010). HIV/AIDS continues to be a major global health concern especially among young people, who are particularly at risk because they often do not have access to sexual and reproductive health programs, including age-appropriate HIV prevention education. In some parts of the world, it may be illegal or considered culturally inappropriate for young people to be educated formally in sexual matters. In addition, young people engaging in commercial sex work or intravenous drug abuse may experience a greater level of stigma and exploitation than adults, moving them further away from access to HIV prevention education. Young women aged 15 to 24 account for 66% of new HIV infections among young people. They are especially vulnerable because of issues resulting from poverty and low social standing such as sexual coercion, gender-based violence, and transactional sex (UNAIDS, 2010; Yadav, Makwana, Vadera, Dhaduk, & Gandha, 2011).

In India, in recent years, the rates of HIV prevalence have declined overall, but the epidemic is still growing in some regions and within some populations (AVERT, 2012). India has aggressively tackled its HIV problem and has made significant progress in reversing the epidemic, reducing new infections by 57% from 2001 to 2011, resulting in decreasing HIV prevalence from 0.49% in 2007 to 0.27% in 2014. However, over the past decade, HIV prevalence has increased in historically low prevalence states and new groups such as the transgendered community are experiencing a surge in new HIV infection (National AIDS Control Organization [NACO], 2014). In some Indian states, rates of new HIV infection are rising in the younger age group (The World Bank, 2012). In 2005, 35% of all reported AIDS cases in India were in the 15 to 24 age group, indicating the vulnerability of the younger population to the epidemic (NACO, 2005; World Health Organization, 2006).

In the late 20th and early 21st centuries, India experienced rapid globalization and Indian urban youth have easy access to global media. Increased exposure to Western cultures through the media may have influenced changes in the sexual behaviors of Indian youth. According to Jaya and Hindin (2009), Sujay (2009), and Bhugra, Mehra, De Silva, and Bhintade (2007), changes in the sexual behavior of young Indians have increased their vulnerability to HIV/AIDS, STIs, and unintended pregnancies. India's HIV/AIDS epidemic was

initially concentrated among commercial sex workers, their partners, and IV drug users, but now has moved to the general population and also to younger Indians (The World Bank, 2012).

Therefore, HIV prevention education needs to begin early. Education is an important component of HIV prevention that is used to increase HIV-related knowledge and affect sexual behavior (Fonner, Armstrong, Kennedy, O'Reilly, & Sweat, 2014). Risk of exposure to HIV for young people is associated with a lack of knowledge about HIV modes of transmission (Al-Khenji, Al-Kuwari, Al-Khal, & Al-Thani, 2012). In India, targeted HIV prevention programs have been used to successfully raise awareness of the modes of transmission of HIV and have reduced the sharing of needles/syringes and increased the use of condoms among various groups (Armstrong, Humtsoe, & Kermode, 2011). HIV prevention education in India began over two decades ago and has evolved significantly over the years. Today, HIV prevention messages in the Indian media are focused on fighting AIDS-related stigma and discrimination and providing basic information about HIV and preventing HIV through the use of condoms and reducing the use of infected needles (Khan, 2014). The United Nations Population Fund (2010) stated that mass media can be used successfully in educating young people about HIV. Bertrand, O'Reilly, Denison, Anhang, and Sweat (2006) conducted a comprehensive review of mass media interventions and concluded that the media, particularly television and radio, were effective in increasing the knowledge of HIV transmission among young people. A major source of HIV/AIDS-related information for individuals in the developing world is the media, which includes television, radio, the Internet, and magazines or newspapers.

In a study by Singh et al. (2012), women living in rural northern India acquired most of their information regarding HIV/AIDS from television (41.17%), followed by radio (32.94%). The researchers also found that women living in urban areas of northern India also obtained much of their information from the television (90.36%) and radio (48.19%). However, they also acquired a great amount of knowledge from newspapers and magazines (71.08%). Sarkar, Danabalan, and Kumar (2007) found that the sources of knowledge for married women in Pondicherry were the T.V. (81.98%), radio (42.79%), and newspapers (15.76%). Health care providers, who could be considered more reliable sources of HIV/AIDS-related information, were reported by only 10.8% of the women as being a major source of information. Another study about reproductive health awareness among adolescents in a western state of India indicated that for most adolescents aged 14 to 20 the primary sources of information regarding human reproduction were schoolbooks, television, teachers, friends, and parents (Kotecha et al., 2012). Yet another study of pre-university girls in South India reported that the top sources of information about HIV/AIDS were TV and magazines (Manjula, Kashinakunti, Geethalaksmi, & Sangam, 2012).

Despite the ubiquity of HIV/AIDS-related information in the media, much of India's youth harbor misconceptions about HIV and lack education regarding various factual aspects of the disease. In a study of rural Indian youth, Yadav et al. (2011) found that although the majority of Indian youth in the study had heard of HIV/AIDS and knew some of the modes of transmission such as sexual contact and needle sharing, they still had misconceptions about HIV. Many believed that there was a vaccination for HIV, and there was confusion regarding transmission during birth.

UNAIDS (2010) reported that only 17% of Indian males and 21% of Indian females could correctly identify two ways of preventing the transmission of HIV. Indian youth are also less educated about HIV/AIDS than other countries. In a study conducted by Peltzer, Nzewi, and Mohan (2004), HIV knowledge and attitudes of university students across three countries, the United States, South Africa, and India, were compared. The results of the study indicated that compared to South African or American youth, Indian youth were least aware of the HIV modes of transmission. Changes in levels of knowledge can be affected by education. However, prior to implementing educational strategies, it is important to identify the preferred or primary sources of HIV information for such groups.

Purpose

Governmental and nongovernmental HIV/AIDS prevention programs in India are in their second decade and have achieved measurable success in reducing HIV prevalence. Many studies have been conducted to measure the level of knowledge of HIV/AIDS and sexually transmitted diseases (STDs) of Indians over the past decade. The purpose of this study was to ask the question, how much do Indian college students know about HIV/AIDS in the second decade of the HIV epidemic in India? Given that India has wasted no effort in employing mass media (TV, newspapers, radio, etc.) to educate Indians about HIV/AIDS, a secondary purpose of the study was to identify the primary sources of information regarding HIV/AIDS for Indian college students and examine the differences between male and female college students in their knowledge about HIV/AIDS based on their preferred sources of information.

Theoretical Framework

The current study was primarily exploratory in nature; the overarching question was, what do Indian college students know about HIV/AIDS today? The researchers also wondered whether a particular medium had a more or less powerful effect on their knowledge of HIV/AIDS. Elements of Everett Roger's (2003) diffusion of innovation theory were considered in this exploration. Roger's model can be used to explain the spread of innovations expressed as ideas and actions within communities. The model can also be used to describe

the characteristics and social conditions of the “adopters” or users of the innovation. Green, Ottoson, Garcia, Hiatt, and Roditis (2014) stated that factors such as source of the message and credibility of the content of the message, the medium of dissemination of the message, the unique needs of the user, and the context or situation mediate the ultimate utilization of knowledge. Therefore, it is important to create a message that provides consistently accurate information about the “innovation”—the demystification of HIV/AIDS as a disease and clarifying prevention methods. Second, dissemination, which according to Green et al. (2014) is different from the natural diffusion of the message, must be conducted through channels familiar and accessible to the users. In the current study, the efficacy of media channels in their dissemination of the message about HIV/AIDS and STDs was examined.

Method

Ethical Considerations

Data for the study were collected from urban, English-speaking Indian college students. Intact groups of college students from four Indian colleges were chosen for the study. Permission to conduct research in India was obtained from the researchers’ institutional review board after obtaining written permission from the college principals and other administrative personnel. Prior to data collection, the primary researcher provided detailed information to the participants about the study orally and in writing (informed consent form) and outlined the voluntary nature of their participation.

Research Questions

The questions that guided the research were as follows:

- RQ1: What is the overall level of knowledge of HIV/AIDS of Indian college students?
- RQ2: Are there any significant mean differences for knowledge of HIV/AIDS between male and female students?
- RQ3: What are the participants’ primary sources of information regarding HIV/AIDS?
- RQ4: With whom were the participants most likely to discuss STDs or HIV?
- RQ5: Are there any significant mean differences for knowledge of HIV/AIDS by the top four sources of information? Is there a significant interaction effect on knowledge of HIV/AIDS and the different sources of information for males and females?

Research Instruments

A modified version of the International AIDS Questionnaire - English version (IAQ-E) comprising 17 questions about knowledge of HIV/AIDS was

used in the research. The questionnaire has four subscales: Facts About HIV/AIDS, Myths About HIV/AIDS, Personal Risk, and Attitudes Toward People With HIV/AIDS. In other words, the IAQ was designed to assess the participants' ability to tease out the facts from the myths regarding modes of transmission of HIV, their perceptions of personal risk regarding contracting HIV/AIDS, and their attitudes toward people with HIV/AIDS. The subscale about the assessment of attitudes was excluded from the present analysis because it was not relevant to the main research question. The items intended to assess the participants' level of facts regarding modes of transmission of HIV included statements such as "HIV can be contracted by sharing needles." Items regarding myths of modes of transmission included statements such as "Indians are less likely to get AIDS than people in other countries," and items about personal risk included "AIDS only affects intravenous drug users." The response options for all except four items ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). A total of four items were reverse coded; for example, the statement "HIV can be transmitted through oral sex" was coded from 1 (*strongly agree*) to 5 (*strongly disagree*). The overall IAQ-E is known to have a high internal consistency reliability (Cronbach's $\alpha = .88$; Davis, Sloan, Macmaster, & Hughes, 2006). A second demographic survey comprising 19 questions including a question about the participants' preference sources of information about STDs and HIV/AIDS was also administered. The question on the demographic survey pertaining to sources of information was as follows: "In general, what has been your most important source of information about STDs information such as HIV/AIDS?" Response options for this question were as follows: Internet, newspapers/magazines, radio, school teachers, health professionals (e.g., a medical doctor or nurse), friends, and family members. Participants were directed to identify all options that were applicable, with a response of "yes" or "no" for each. A second question in the demographic section queried the participants about with whom they discussed STDs or HIV/AIDS. The options were girlfriend/boyfriend, husband/wife, school teacher, health professionals (e.g., a medical doctor or nurse), family member, friend of the same sex, friend of the opposite sex, online chat, or email with a stranger. As with the earlier question, participants were instructed to identify all options applicable with a "yes" or "no" response for each.

Data Analysis

Data were analyzed using SPSS version 21. Descriptive statistics including frequencies, central tendency, and variability were calculated. The primary measure—the IAQ-E—is a Likert-type scale wherein data are operationalized on the interval scale, such that independent t tests and 2×2 factorial ANOVA tests can be used for analysis (Brown, 2011; Carifio & Perla, 2007). For noncon-

tinuous or categorical data, chi-square (χ^2) tests were conducted on the data to answer the research questions.

Results

Demographics

Data for the study were collected from 426 Indian college students using the IAQ-E and a demographic survey. The students were selected from four universities located in an urban area in a large mid-western city in India. The mean age of the participants was 21 years ($SD = 2.6$), and there were more male participants (71.4%) than female participants, reflecting the gender distribution of the enrollment at the universities. Most of the participants (64.6%) were in their third year of college, and most of them (99.3%) were full-time attendees. Most of the participants were of the Hindu faith (88.7%), reporting that they were *somewhat religious* (40%), and most of them were not (ever) married (96.1%). Fifty-six percent of the participants reported that they were in *good* health and 31.1% indicated that they were in *very good* health. Most of the participants (83.9%) reported that they did not smoke cigarettes, consume illegal drugs (96%), or drink alcohol (75%). For the types of media the participants had at their homes, 85.6% reported they had a radio, 95.3% had a television, 84.2% had Internet access, 91.5% had a telephone, and 94.1% had newspapers and/or magazines.

RQ1: What Is the Overall Level of Knowledge of HIV/AIDS of Indian College Students?

The participants' Knowledge of HIV/AIDS was measured using the IAQ-E, which consisted of 17 questions with response options on a 5-point Likert-type scale ranging from *strongly agree* to *strongly disagree* and included questions such as "HIV can be spread by coughing and sneezing." Cronbach's alpha for overall internal consistency reliability coefficient for this scale was measured at .698. Possible scores on the IAQ-E ranged from 17 to 85, and the higher the score, the more accurate the knowledge about HIV modes of transmission. The scores on the IAQ-E modes of transmission scale for the sample ($n = 351$) ranged from 33 to 74 ($M = 57.09$, $SD = 6.82$), indicating a fairly accurate knowledge of HIV modes of transmission. In other words, the participants were able to indicate correctly that HIV is not transmitted through casual contact.

RQ2: Are There Any Significant Mean Differences for Knowledge of HIV/AIDS Scores Between Male and Female Students?

Overall, there was no statistically significant mean difference for Knowledge of HIV/AIDS scores between males and females. The percentages of responses are indicated in Table 1.

Table 1

Response Percentages on the International AIDS Questionnaire (IAQ -E)

Question	Gender	Strongly agree (%)	Agree (%)	Neither agree nor disagree (%)	Disagree (%)	Strongly disagree (%)
Q1. HIV can be spread by coughing and sneezing.						
	Males	3.2	6.5	5.0	16.8	68.5
	Females	2.5	9.3	2.5	20.3	65.3
Q2. HIV can be contracted by sharing cigarettes.						
	Males	0.7	8.5	11.3	27.1	52.5
	Females	0.9	9.5	19.8	23.3	46.6
Q3. HIV can be contracted by sharing infected needles.						
	Males	83.5	11.3	2.1	1.4	1.8
	Females	77.6	18.1	1.7	1.7	0.9
Q4. HIV/AIDS can be spread through hugging an infected person.						
	Males	2.1	3.2	5.3	13.1	76.2
	Females	0.9	2.6	2.6	14.9	78.9
Q5. HIV can be transmitted through the air.						
	Males	2.1	3.5	8.8	20.7	64.9
	Females	0.9	1.7	10.3	20.5	66.7
Q6. HIV/AIDS can be spread through swimming pools.						
	Males	3.5	12.7	24.3	21.1	38.4
	Females	3.4	11.0	28.0	23.7	33.9
Q7. HIV can be contracted through toilet seats.						
	Males	2.8	12.8	26.0	25.6	32.7
	Females	3.4	14.5	35.0	23.1	23.9
Q8. Mosquitos can spread HIV.						
	Males	9.6	16.0	18.9	21.4	34.2
	Females	5.9	15.1	16.0	26.1	37.0
Q9. HIV can be transmitted from mother to baby during pregnancy.						
	Males	51.6	33.6	8.1	2.8	3.9

Table 1 (cont.)

Question	Gender	Strongly agree (%)	Agree (%)	Neither agree nor disagree (%)	Disagree (%)	Strongly disagree (%)
Q10. HIV is spread through infected sperm.	Females	56.7	28.3	7.5	4.2	3.3
	Males	60.4	23.3	9.5	4.2	2.5
Q11. Indians are less likely to get AIDS than people in other countries.	Females	63.2	26.3	6.1	1.8	2.6
	Males	6.0	18.4	25.4	24.7	25.4
Q12. AIDS only affects intravenous drug users.	Females	8.5	18.6	24.6	24.6	23.7
	Males	5.4	6.8	25.0	31.8	31.1
Q13. AIDS only affects prostitutes.	Females	0.0	4.4	29.2	37.2	29.2
	Males	7.8	7.8	13.1	27.0	44.3
Q14. AIDS only affects homosexuals.	Females	7.8	6.9	8.6	35.3	41.4
	Males	3.2	7.7	9.5	30.3	49.3
Q15. You can protect yourself against AIDS by being vaccinated for it.	Females	3.4	3.4	13.6	37.3	42.4
	Males	8.5	14.1	21.5	20.4	35.6
Q16. Condom use during intercourse decreases the risk of HIV transmission.	Females	7.1	22.1	23.0	24.8	23.0
	Males	61.5	28.9	5.3	1.4	2.8
Q17. HIV can be transmitted through oral sex.	Females	38.5	46.2	8.5	0.9	6.0
	Males	19.5	23.8	17.0	15.5	24.1
	Females	14.4	22.0	28.8	16.9	17.8

As indicated earlier, the response options on each item were *strongly agree*, coded as 1, to *strongly disagree*, coded as 5; therefore, on Questions 3, 9, 10, and 16, a lower mean score indicated a response was generally *strongly agree*, which was appropriate. Noteworthy here is the difference between males' and females' mean response on Question 16, "Condom use during intercourse decreases the risk of HIV transmission." Males (61.6%) were more likely than females (38.5%) to respond correctly (*strongly agree*) to this question. Of all the 17 items on the IAQ-E, Question 16 is one of two items that addresses the issue

of HIV prevention—the differences in mean scores between males and females indicates a difference between the genders about knowledge of preventing HIV.

An independent sample *t* test indicated no statistically significant difference between mean scores for males and females for the overall IAQ-E, $t(349) = .925, p > .05$. See Table 2.

Table 2

Differences in Mean Scores of Items on the International AIDS Questionnaire (IAQ-E) for Males and Females

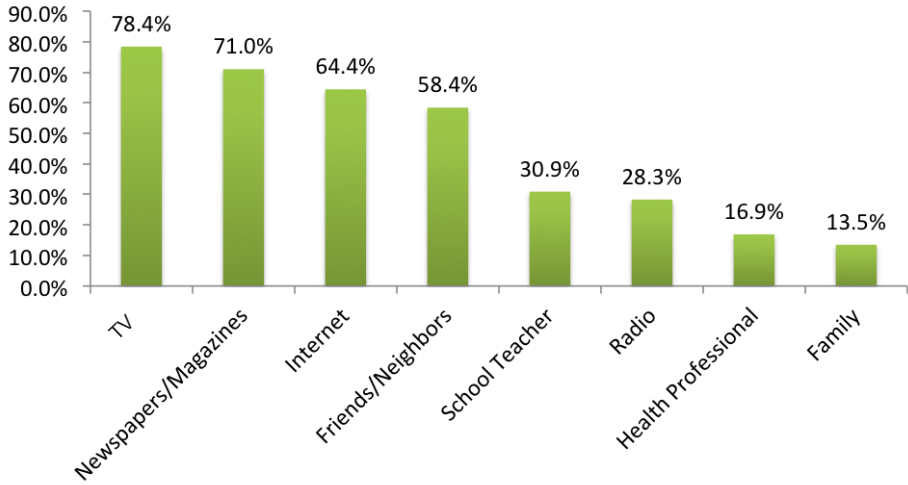
Question	Male <i>M</i> (<i>SD</i>)	Female <i>M</i> (<i>SD</i>)	Mean difference
Q1. HIV can be spread by coughing and sneezing.	4.41 (1.05)	4.36 (1.075)	.044
Q2. HIV can be contracted by sharing cigarettes.	4.22 (.997)	4.05 (1.062)	.170
Q3. HIV can be contracted by sharing infected needles.	1.27 (.732)	1.30 (.675)	-0.34
Q4. HIV/AIDS can be spread through hugging an infected person.	4.58(.894)	4.68 (.733)	-.103
Q5. HIV can be transmitted through the air.	4.43 (.942)	4.50 (.816)	-.076
Q6. HIV/AIDS can be spread through swimming pools.	3.78 (1.187)	3.74 (1.143)	.044
Q7. HIV can be contracted through toilet seats.	3.73 (1.134)	3.74 (1.111)	.230
Q8. Mosquitos can spread HIV.	3.54 (1.354)	3.73 (1.267)	-.187
Q9. HIV can be transmitted from mother to baby during pregnancy.	1.74 (.998)	1.69 (1.011)	.047
Q10. HIV is spread through infected sperm.	1.65 (.986)	1.54 (.894)	.106
Q11. Indians are less likely to get AIDS than people in other countries.	3.45 (1.221)	3.36 (1.265)	.088
Q12. AIDS only affects intravenous drug users.	3.76 (1.124)	3.91 (.872)	-.147
Q13. AIDS only affects prostitutes.	3.92 (1.260)	3.96 (1.219)	-.035
Q14. AIDS only affects homosexuals.	4.15 (1.080)	4.12 (.997)	.029
Q15. You can protect yourself against AIDS by being vaccinated for it.	3.61 (1.321)	3.35 (1.252)	.261
Q16. Condom use during intercourse decreases the risk of HIV transmission.	1.55 (.882)	1.90 (1.020)	-.348**
Q17. HIV can be transmitted through oral sex.	3.04 (1.600)	3.02 (1.301)	.026

** $t(399) = 3.428, p < .01$.

RQ3: What Are the Participants' Preferred Sources of Information Regarding STDs and HIV/AIDS?

The participants' preferred sources of information about sexually transmitted diseases (STDs) and HIV/AIDS is described in Figure 1.

Figure 1. Preferred sources of information about STDs and HIV/AIDS.



The top four significant sources of information about STDs and HIV/AIDS for the participants were the T.V. (78.4%), Newspapers and Magazines (71.0%), the Internet (64.4%), and Friends and Neighbors (58.4%). Relatively less important sources of information regarding STDs and HIV/AIDS were school teachers, the radio, health professionals, and family members. Subsequent analyses about mean differences in Knowledge of HIV/AIDS scores between males and females were restricted to the top four sources of information. The difference between the genders regarding their preferences for the sources of information about STDs and HIV/AIDS is provided in Table 3.

Table 3

Differences Between Males and Females Regarding Preferred Sources of Information About STDs and HIV/AIDS

What has been an important source of information regarding STDs and HIV/AIDS?

Source of information	Male (%)	Female (%)	χ^2
TV	80.1	74.2	1.763
Newspapers/Magazines	70.8	71.7	.034
Internet	70.4	49.2	16.916**

Friends/Neighbors	61.1	51.7	3.163
School Teacher	28.9	35.8	1.93
Radio	30.2	23.3	2.014
Health Professional	16.9	16.7	.005
Family	12.3	16.7	1.40

** $p < .01$.

A chi-square test was conducted to measure the difference between males and females for their choices of sources of information about STDs and HIV/AIDS. Both males and females responded similarly to their preferences regarding sources of information about STDs and HIV/AIDS except for the Internet. Only 49.2% of the female participants chose the Internet as an important source of information compared to 70.4% of the males. The difference between males and females for the Internet was statistically significant.

RQ4: With Whom Were the Participants Most Likely to Discuss STDs or HIV/AIDS?

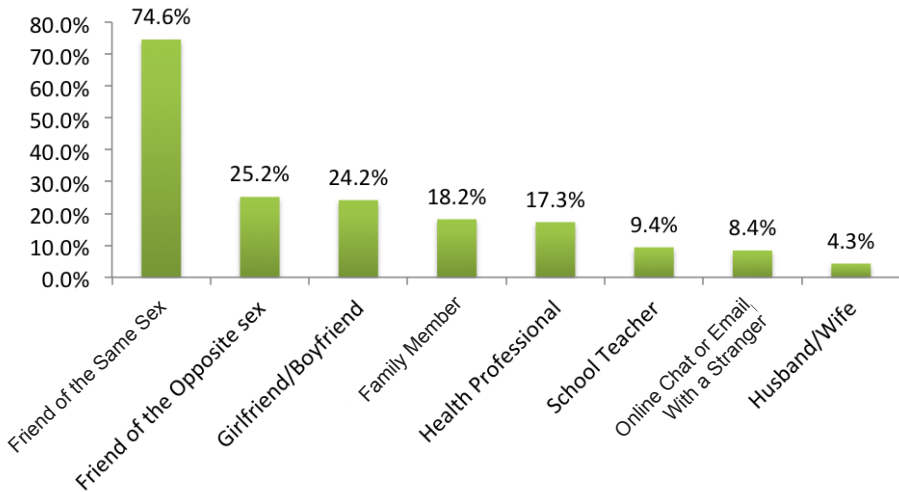


Figure 2. Preferred sources of information about STDs and HIV/AIDS.

A vast majority (88.2%) of the participants reported that they had discussed STDs or HIV/AIDS with one or another person. In particular, 74.6% of the participants reported that they were likely to discuss HIV/AIDS and STDs with a friend of the same sex, 25.2% with a friend of the opposite sex, and 24.2% with a girlfriend or boyfriend. See Figure 2 and Table 4.

Table 4

Differences Between Males and Females Regarding Their Choices of People With Whom to Discuss STDs and HIV/AIDS

With whom of the following people do you discuss STDs and HIV/AIDS?			
Person	Male (%)	Female (%)	χ^2
Friend of the Same Sex	78.0	65.8	6.595*
Friend of the Opposite Sex	30.1	12.8	13.307**
Girlfriend/Boyfriend	21.7	30.8	3.800
Girlfriend/Boyfriend	13.7	29.9	14.910**
Health Professional	18.3	14.5	.852
School Teacher	9.7	8.5	.124
Online Chat or Email With a Stranger	12.3	0	15.835**
Husband/Wife	5.0	2.6	1.209

* $p < .05$. ** $p < .01$.

The top three persons with whom male participants reported discussing STDs and HIV/AIDS were a friend of the same sex (78%), a friend of the opposite sex (65.8%), and a girlfriend or boyfriend (21.7%). In the case of the female participants, the top three persons with whom they chose to discuss STDs and HIV/AIDS were a friend of the same sex (65.8%), a girlfriend or boyfriend (30.8%), closely followed by family members (29.9%). Not only were the differences between males and females in their preferences with whom they chose to discuss STDs and HIV/AIDS statistically significant, but they were also noteworthy. The female participants were not likely to discuss STDs or HIV/AIDS with a friend of the opposite sex, but preferred discussing with a family member. Also, male participants were far more likely than female participants to discuss STDs and HIV/AIDS with a stranger on email or through an online chat. Both male and female participants were less likely to discuss STDs and HIV/AIDS with health professionals, school teachers, or their husbands and wives. The difference between male and female participants' preferences were statistically significant for choosing a friend of the same sex, a friend of the opposite sex, family member, and stranger online as discussion partners on the topic of STDs and HIV/AIDS.

RQ5: Are There Any Significant Differences for Knowledge of HIV/AIDS by the Top Four Sources of Information—TV, Newspapers and Magazines, Internet, Friends and Neighbors? Is There a Significant Interaction Effect on Knowledge of HIV/AIDS and the Top Four Sources of Information for Males and Females?

The effect of the top four sources of information (TV, Newspapers and Magazines, Internet, Friends and Neighbors) and gender on the Knowledge of HIV/AIDS was examined using a factorial (two-way) analysis of variance.

RQ4.1: Is there a significant main effect for TV as a source of information on Knowledge of HIV/AIDS? And is there an interaction effect? The results of the two-way analysis of variance (ANOVA) results did not show significant differences in the mean scores for Knowledge of HIV/AIDS based on TV as a source of information, $F(1, 346) = 2.65, p = .104$. The interaction between gender and source of information on the participants' Knowledge of HIV/AIDS was not statistically significant, $F(1, 345) = 2.291, p = .131$.

RQ4.2: Is there a significant main effect for Internet as a source of information on Knowledge of HIV/AIDS? And is there an interaction effect? The two-way ANOVA results showed a statistically significant main effect for the Internet as a source of information on Knowledge of HIV/AIDS, $F(1, 346) = 6.63, p = .01$. The interaction between gender and the Internet as a source of information on the participants' Knowledge of HIV/AIDS was statistically significant; however, estimates of effect size indicate a low strength of association, $F(1, 345) = 5.618, p = .018, \text{partial } \eta^2 = .016$.

RQ4.3: Is there a significant main effect for Newspapers and Magazines as a source of information on Knowledge of HIV/AIDS? And is there an interaction effect? There was no significant main effect for Newspapers and Magazines as a source of information on Knowledge of HIV/AIDS, $F(1, 346) = .576, p = .448$. The interaction between gender and Newspapers and Magazines as a source of information on the participants' Knowledge of HIV/AIDS was not statistically significant, $F(1, 346) = 1.158, p = .875$.

RQ4.4: Is there a significant main effect for Friends and Neighbors as a source of information on Knowledge of HIV/AIDS? And is there an interaction effect? There was no significant main effect for Friends and Neighbors as a source of information on Knowledge of HIV/AIDS, $F(1, 346) = .640, p = .424$. The interaction between gender and Friends and Neighbors as a source of information on the participants' Knowledge of HIV/AIDS was not statistically significant, $F(1, 346) = .973, p = .325$.

Discussion

The purpose of the study, as indicated earlier, was to explore Indian col-

lege students' level of knowledge of HIV/AIDS, to examine differences between male and female Indian college students in their knowledge of HIV/AIDS, identify their preferred sources of information regarding HIV/AIDS, and explore the possibility of the effect of the type of source of information on their knowledge of HIV/AIDS. The study yielded important results.

Level of Knowledge of HIV/AIDS and Differences Between Males and Females in Their Knowledge of HIV/AIDS

Overall, the participants in the study had highly accurate knowledge about HIV/AIDS. The data indicate that the participants seemed to know that HIV/AIDS could not be acquired through casual contact. Although there was no statistically significant difference between genders for knowledge about HIV/AIDS, males scored slightly higher than females overall. Interestingly, more females than males were likely to be ambivalent, answering “neither agree nor disagree” for items such as “HIV can be contracted through toilet seats” or “HIV can be contracted by sharing cigarettes.” It was apparent that a significant proportion (between 21.5% and 35%) of the participants were apt to answer *neither agree nor disagree*—the mid-value on “sensitive” questions such as “AIDS only affects homosexuals.” Baka, Figgou, and Triga (2012) stated that by choosing the mid-value question on a Likert-type scale, the respondent may be stating that he or she is either “not interested,” “not sure,” or “has no opinion.” On the other hand, the participants might be motivated to choose the mid-value because they are unwilling to state truthfully and conclusively how they feel as they are trying to provide socially appropriate responses. De Jong, Pieters, and Stremersch (2012) stated that embarrassment or cultural taboos associated with sensitive questions can interfere with participants' ability to answer truthfully on surveys. According to Miller (2011), this is common for self-report surveys on sensitive topics, such as topics related to sexual behaviors. Losby and Wetmore (2012) also stated that midpoint responses on a Likert scale can be variously interpreted as “do not know,” “indifferent,” “unsure,” “undecided,” or “unwilling to answer.” For the purpose of this research, a midpoint response was interpreted either as “unwilling to answer” or “do not know.”

A troubling finding was the statistically significant difference in mean scores for males and females for the question, “Condom use during intercourse decreases the risk of HIV transmission.” Of the males, 61% responded *strongly agree* compared to only 38.5% of the females. This indicates a significant—not only statistical, but also practical—disparity in the level of knowledge for this important fact. As Roth, Krishnan, and Bunch (2001) stated, “Consistent, and correct use of condoms....continue to play an important role in the reduction and prevention of HIV/AIDS transmission” (p. 65). It is therefore essential that both men and women understand that condoms are effective in preventing the spread of HIV.

Top Preferred Sources of Information About HIV/AIDS and Sexually Transmitted Diseases

The top four preferred sources of information about HIV/AIDS and STDs for the participants in the study were the T.V., Newspapers, the Internet, and Friends and Neighbors—in this order. This finding supports predictions and evidence from prior studies. In 1999, Chatterjee indicated that T.V. was an important source of AIDS-related information for married women and that information received from T.V. has the potential of increasing AIDS-related awareness. The National Readership Study Survey of 2006 indicated that 112 million households in India have a T.V., and 61% of households have either a cable or satellite service (Jensen & Oster, 2009). Agarwal and de Araujo (2014) also stated that in India newspapers have been successful in increasing HIV/AIDS-related knowledge. Grover, Chakraborty, and Basu (2010) claimed that there are approximately 81 million Internet users in India, of whom 72% are young people (< 50 years old), mainly checking email (87%) and also seeking general information (80%). Akerkar, Kanitkar, and Bichile (2005) studied 880 Indians of whom 75% used the Internet for retrieving medical information. As for Friends and Neighbors as sources of information, Chatterjee indicated that exposure to AIDS-related information on T.V. creates the opportunities for discussion among friends and partners in social networks.

Differences Between Males and Females in Their Top Preferred Sources of Information About HIV/AIDS and STDs

In this study, yet another important finding was revealed: Males were more likely than females to refer to the Internet for HIV/AIDS and STD-related information. This finding too is supported by prior research. More males than females overall seem to use the Internet (Grover et al., 2010). At this time, the reason for this trend is unclear.

Differences Between Males and Females Regarding Their Choice of People With Whom to Discuss HIV/AIDS and STDs

Males were more likely than females to discuss HIV/AIDS and STDs with friends of the same sex and friends of the opposite sex. Females were slightly more likely than males to choose their significant others and overwhelmingly more likely than males to talk to their family members about HIV/AIDS and STDs. Males were also more likely to chat online than females about HIV/AIDS and STDs. This reticence in Indian females to talk to strangers or persons of the opposite sex about private or taboo issues may be born out of cultural

mores. Discussing issues of a personal, private nature may be more comfortable with members of the same sex and family members than with others for young college-going females in a conservative culture.

Difference Between Males and Females in the Knowledge of HIV/AIDS Based on the Source of Information

The results of the study indicate no statistically significant difference in knowledge among males and females for the sources of information except the Internet. This result was not surprising given the difference between males and females for their preferred sources of information and the greater likelihood of more males than females to not only access the Internet but also choose to chat online with strangers about HIV/AIDS and STDs.

Agarwal and de Araujo (2014) proposed that on the whole, mass media improved the quality of HIV/AIDS knowledge for Indian men and women, but its effect may be varied because of the juxtaposition of cultural taboos and need for honest communication about HIV. Messages about HIV prevention, including condom use, on Indian television are often censored, limited, restricted, or diluted by politicians who may be squeamish about addressing culturally taboo issues in public forums (Roth et al., 2001). It was evident from the data that the source of information itself did not have a statistically significant effect on level of knowledge among males and females.

Implications for Health Education

As prior studies have indicated, in the developing world, young people in urban settings are better educated about HIV/AIDS and STDs than young people in rural areas. The setting for the current study was four large urban universities where the youth have considerable exposure to mass media. The students in urban settings, such as those described by Mehrotra, Zimmerman, Noar, and Dumenci (2013) immersed in a less restrictive, even westernized society, are better “plugged in” than young people in rural areas. Their fairly high level of overall knowledge regarding HIV/AIDS was, as a result, not surprising. Mass media have been successfully used to propagate HIV prevention education, and this may be true for young people in urban India.

Similar to young people in China, Botswana, Tanzania, and Turkey, the top sources of information about HIV/AIDS for young Indians were TV, radio, newspaper, and the Internet (Bastien, Leshabari, & Klepp, 2009; Batane, 2013). Consulting a health professional such as a medical doctor or nurse was not a popular option for the participants of the study. Unfortunately, this finding was common across other studies. The best quality of HIV/AIDS information can be obtained from a health professional, but it may be important for the Indian government to advertise the existence of National AIDS Control Organization,

an online clearinghouse of HIV/AIDS information.

The Internet as a source of information was considerably more popular with males than females—a finding reflected in other studies. One can only speculate as to the reason for this disparity between the genders. Further research exploring females and why the Internet was not an important source of information is necessary, especially because the Internet is omnipresent and could be beneficial in disseminating accurate information about HIV/AIDS. More males than females were likely to chat online with a stranger about HIV/AIDS. Given that females preferred, above all, to seek friends of the same sex and family members to discuss HIV/AIDS or STDs, it is understandable that they would be reluctant to chat with a disembodied stranger in a virtual world. In light of this, same-sex peer education programs may be the best source of information for females. The Internet provides information of varying quality and depth regarding HIV/AIDS. India's own NACO is an excellent clearinghouse of information regarding HIV/AIDS, and it would be useful to know how many young people are aware of this online resource and have used it.

There continues to be a small difference between genders for the knowledge of HIV/AIDS, with the females lagging a little behind the males. This finding was similar to those in many other studies. Females contract HIV at different rates than males. As indicated earlier, 66% of new infections in young people in the world are among females. In addition to knowing less than males about HIV/AIDS, females are socially less powerful and therefore unable to negotiate safe sex. This is true in the Indian context. Mehrotra et al. (2013) found that Indian college students are more likely than ever to engage in premarital sexual activity, especially in the urban setting. Indian male college students are more likely than females to access sexual information and culturally had more freedom to engage in sexual activity and sexually risky behavior than females. In light of this power differential, it is imperative for Indian female college students to not only become aware of their own HIV and STD risk, but also be able to maneuver skillfully through the cultural challenges they may encounter. Here as well, same-sex peer education is an appropriate method.

In India, marriage is “universal”—everyone is expected to be married and women are expected to be virginal at the time of marriage—so the female participants of the study were mostly unmarried and may not have been able to perceive themselves being at any risk for contracting HIV and therefore may not be interested in learning about modes of transmission. Again, making this risk more immediate through same-sex peer education could be valuable.

The current study underscored the importance of ensuring that young people and other vulnerable groups have timely and accurate information about threats to their health, particularly from HIV/AIDS. Through capitalization on prominent sources of information, customization of the message, personalization of the HIV risk, and use of peer education, it may be possible

to reduce knowledge gaps between the genders.

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