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Original Research: SEXUALLY TRANSMITTED INFECTIONS

Sexually Transmitted Infections: Perceived Knowledge versus Actual Knowledge

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Abstract

Sexually transmitted infections (STIs) continue to be a serious problem, with potentially severe consequences. Past research has found that people may not seek out treatment for STIs because they do not know what symptoms to look for (Greenberg et al., 2002). The present study investigated many aspects of STI knowledge, including perceived knowledge and actually knowledge. Moreover, this study added a novel and applied aspect to the assessment of STI knowledge: visual knowledge. Overall, participants performed poorly on the actual STI knowledge, however, those who rated their knowledge as high performed significantly better than those who rated their knowledge as low. The data revealed two significant predictors of actual STI knowledge, level of STI education and number of previously contracted STIs. In addition, it was found that participants performed better on the written portion of the test than the visual portion of the test. The authors content that increased education may assist in reducing the transmission of sexually transmitted diseases.

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Original Research: SEXUALLY TRANSMITTED INFECTIONS

Sexually Transmitted Diseases: Perceived Versus Actual Knowledge

Sexually transmitted infections (STIs) are an importunate problem within the United States, with approximately 19 million people infected annually (CDC, 2004). Within the industrialized world, the United States has the highest prevalence of STIs with rates rising since 1981 (American Academy of Pediatrics, 2001; Forste & Morgan, 1998; National Institutes of Health, 1999). Furthermore, incident rates tend to be higher in Georgia and other southeastern states than other regions of the country. The costs associated with STIs have been estimated in excess of 15.5 billion annually for the United States alone (CDC, 2004). Given the economic as well as the health costs associated with STIs, the United States government and other public interest agencies have taken actions designed to reduce the incidence of STIs. Governmental initiatives, identified in Healthy People 2000, are intended to focus on the reduction and eventual elimination of STIs (CDC, 2001).

Although initiatives to decrease the incidence of STIs (bacterial and viral) have been in place since the 1990's (such as Healthy People 2000), rates still remain high. Young people are at exceptionally high risk for contracting almost all STIs (DiClemente et al., 2002). Young people between 15-29 years of age account for about 75% of reported gonorrheal infections in the United States (CDC, 2001). The CDC reported that, in 1999, people between the ages of 20-39 accounted for most of the reported cases of syphilis infections (CDC, 2001). Miller, Ruiz, and Graves (2003) reported that adolescents and young adults account for most primary infections of herpes. Because young people are at high risk for contracting (and spreading) STIs, it is imperative that they become educated about STIs.

Overall, females are at a higher risk for contracting a STI than males. This higher risk for females may translate into greater awareness and knowledge. DiClemente et al. (2002) reported that young women who had previously contracted a sexually transmitted disease had more general knowledge about STIs. Synovitz, Hebert, Kelley, and Carlson (2002) found significant differences in sexuality knowledge between males and females, with females scoring higher.

Identifying symptoms of sexually transmitted diseases is an important factor in deciding to seek treatment for such diseases. Greenberg et al. (2002) found that almost half of the participants in their study delayed visiting a sexually transmitted disease clinic because of lack of knowledge. Participants noticed symptoms, but were unsure which disease would cause the symptoms they were experiencing. Greenberg, et al. also found that of people who had previously contracted an STI, the individuals who scored higher on tests for STI knowledge rated their experience as less negative than individuals with lower levels of STI knowledge.

In the 2003 Youth Risk Behavior Surveillance Survey, the CDC reported that 87.9% of adolescents stated they had been taught about HIV and AIDS in school (CDC, 2004). However, Synovitz, Hebert, Kelley, and Carlson (2002) found that college students generally scored low (55% correct) on a test assessing their sexual knowledge. Participants with college education in human sexuality scored significantly higher on a test assessing sexuality knowledge when compared to college students with only elementary or high school sexuality education. Taken together, these studies imply that while most students had access to sex education, their knowledge remains low; however, increased exposure to sexual education produces increases in knowledge.

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Clark, Jackson, and Allen-Taylor (2002) found that more than half of the individuals who participated in their study identified themselves having "a lot" or "average" knowledge regarding STIs and had reported that they had taken sexual education classes. Moreover, 97% of adolescents in their sample reported that they received sexual education from various sources, yet only a small percentage (2%) were able to identify all eight major sexually transmitted diseases. The researchers concluded that the adolescents' actual knowledge of STIs was below average for their respective ages, as set forth by the SIECUS (The Guidelines for Comprehensive Sexuality Education) guidelines. However, Clark et al. (2002) found that multiple STI education sources were associated with higher STI knowledge. Thus, prior research shows that young people may perceive high levels of STI knowledge, but their actual knowledge of STIs maybe insufficient. This lack of knowledge among youth appears supported by their generally high levels of STI contraction.

While it is important that a person have textbook knowledge of STIs, often visual, physical symptoms are what prompt people to seek treatment. Being able to recognize symptoms by sight may be more useful in self-assessment of actually having a sexually transmitted disease than being able to score high on a written test assessing sexually transmitted diseases. Thus, a novel aspect of the current study is the inclusion of pictorial representations of STIs in the assessment of STI knowledge. An extensive literature review was conducted and no prior studies were found to test STI knowledge in this way.

Given the findings of the studies discussed above, the purpose of the current investigation was two-fold: first to investigate whether perceived knowledge would be related to actual knowledge and second to examine predictors of STI knowledge. The first hypothesis was that actual STI knowledge would be unrelated to perceived knowledge (i.e., people who rate their STI knowledge either high or low would have low actual STI knowledge). The second hypothesis is that women would have more knowledge than men and experience with STI symptoms (e.g., number of previously contracted sexually transmitted diseases, level of sexual education classes taken, and number of educational classes on sexually transmitted diseases) would be reliable predictors of actual STI knowledge. The present study also introduced a more practical component to identifying STIs (i.e., visual) because no previous research has been found that assessed STIs other than in a written method, analyses regarding pictorial versus written format were exploratory in nature.

METHODS

Participants

Participants (n = 92, 71% female, 29% male) were undergraduate psychology students, from a small university located in the Southeastern United States. Participants ranged in age (18 years – 48 years, M = 24.71), ethnicity (64% Caucasian, 29% African-American, 3% Hispanic, and 3% Other), and SES level (12% low SES, 80% middle SES, and 8% high SES). Most participants declared that their sexual orientation was heterosexual (92%), although a small percentage selected homosexual (2%) or bisexual (5%). The average number of sexual partners listed by participants was eight, and the majority of participants were in a monogamous relationship (62%). All participants were treated in accordance with the ethical guidelines set forth by the American Psychological Association (2002).

MATERIALS

Demographic and Sexual Behavior Questionnaire

Demographic questions, including age, gender, and race/ethnicity were presented to participants prior to the questions concerning sexual behavior. The sexual behavior portion included questions regarding sexual orientation, history of sexually transmitted diseases, number of sexual education classes, where sexual education classes were taken, ratings of perceived sexually transmitted disease knowledge (based on a seven point likert scale, 1 = no knowledge to 7 = very knowledgeable), and number of previous sexual partners, along with other questions intended to assess sexual behavior.

Sexually Transmitted Disease Knowledge

Actual knowledge of sexually transmitted diseases was assessed using a test. Questions assessing STI knowledge in a written format were derived from information obtained from the CDC (CDC, 2001). For the pictorial portion, items were gathered from medical books and materials provided by pharmaceutical representatives. Developed specifically for this study, the sexual knowledge test contains 29 written questions and 17 pictorial questions producing a total of 46 items. Questions were restricted to the eight most common sexually transmitted diseases identified by the CDC (2002); this information is accessible to the lay public via the Internet and/or health books or providers, (see Table 1).

Questions assessed general knowledge about STIs (e.g., the most prevalent STIs) and for the more applied component, high resolution pictures (300 X 300 pixels in size) of STIs were presented to participants. Participants were asked to identify the sexually transmitted disease in the picture via a multiple answer forced-choice format. A group of local obstetricians/gynecologists with specialty training in sexually transmitted diseases assisted in test construction with regard to content validity and difficulty of test items. A Kuder-Richardson reliability test was conducted and the reliability for the STI knowledge test was .54.

APPARATUS

An IBM compatible Pentium IV computer, with a 17 inch color monitor, a standard keyboard, and a mouse was used in the experiment. All questions presented to participants, both written and pictorial, were displayed using Macromedia® software, specifically Authorware 6.0©.

PROCEDURE AND DESIGN

Students participated individually, with minimal contact with the researcher or research assistant. Informed consent was obtained from participants as indicated by a mouse click accepting and agreeing to conditions in order to continue in the experiment. Next, basic demographic questions followed by the sexual behavior questionnaire were filled out by each participant on the computer. Those items were completed by mouse clicking on appropriate answers or by manually answering questions with the keyboard. Following the sexual behavior questionnaire portion, participants continued on to the actual sexual knowledge component of the experiment. Written and visual items of sexually transmitted diseases were randomly presented to participants. Below each written question, the participant was asked to click on the answer they believed to be correct, in a forced choice format, with either two, three, four, or six answers to choose from. When picture stimuli were presented to participants, participants were asked to identify the sexually transmitted disease thought to cause the

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symptoms in the picture, also by mouse clicking on their answer. Trials were self-paced, as soon as a participant clicked an answer, the response was recorded by the computer, and the next item was presented. Names or any identifying information were not attached to computer files, to ensure confidentiality. Approximate running time was 45 minutes per participant after which participants were debriefed and allowed to leave.

Table 1.
Common Sexually Transmitted Diseases and Their Symptomology

STD	Symptoms	Men	Women
Chlamydia	Discharge from penis/vagina, Painful urination, additional gender Specific symptoms	Half are symptomatic	Asymptomatic
Genital Herpes	Blisters around genital area Or rectum that develop into Ulcers, pronounced during First episode	Symptomatic during Outbreaks	Symptomatic during Outbreaks
Gonorrhea	Burning sensation during Urination, yellow-white Discharge, additional gender Specific symptoms	Symptomatic	Asymptomatic
Hepatitis B	Dark, tea colored urine, Jaundice, light colored stools, Nausea	Symptomatic	Symptomatic
HIV/AIDS	Severe weight loss, fever, headaches Flu-like symptoms, night sweats, Fatigue, shortness of breath, and Skin lesions	Asymptomatic	Asymptomatic
HPV unless	Genital warts on the genitals, anus,	Asymptomatic, unless	Asymptomatic,
	Or inner thighs	Warts present	Warts present, or Irregular pap smear
Syphilis	Primary Stage: single sore (chancre) But can be multiple sores Secondary Stage: reddish-brown Rash on palms of hands or soles Of feet, hair loss	Symptomatic	Symptomatic
Trichomoniasis	Burning and irritation during urination, Yellow discharge, additional gender Specific symptoms	Asymptomatic	Symptomatic

Note. Information obtained from The National Center for HIV, STD, and TB Prevention of The Centers for Disease Control.

RESULTS

In general, participants' scores on their actual STI knowledge were poor (M = 43.46% correct), (see Table 2).

Participants' actual STI knowledge was measured in two central ways, with a written component, as well as a pictorial recognition component. There were 30 questions on the written component, whereas there were 18 pictorial questions. Participants scored higher on the written portion (M = 52.17%, SD = 10.07%) than the pictorial portion (M = 29.41%, SD = 14.44%) of the test. Since written questions contained either two (T/F), three, four, or six possible multiple choice options, whereas the pictorial questions always contained six possible multiple choice options, viewing performance relative to chance permits a more direct comparison between performance on the two question types then overall percent correct. Participants scored significantly better on the written portion of the assessment 22% above chance, then for the visual portion, 13% above chance, $p < .05$. The visual and written components were added for a total score in all remaining analyses.

Table 2.
Percentages Correct for Actual STI Knowledge (N = 92)

Gender	Written	Pictorial
Male	51.34%	28.19%
Female	52.52%	29.91%
All Participants	52.17%	29.41%

Participant's perceived knowledge was categorized into high (i.e., 5 - 7) and low (i.e., 1 – 3) knowledge, by a median split. There was a significant difference found between those who rated their STI knowledge high (M = 44.06 percent, SD = 10.29) versus low (M = 37.5 percent, SD = 6.94) and their actual STI knowledge, $t(68) = 2.39$, $p < .05$. In addition, the relationship between perceived STI knowledge and the participants' self ratings of the quality of their sexual education was examined. There were positive relationships between participants' perceived knowledge and the number of previous sex education classes ($r = .30$, $p < .01$), as well as their perceived quality of their sex education classes, $r = .55$, $p < .01$. Gender and perceived STI knowledge was also examined, but no significant relationship was found. A correlation matrix was computed to see if there were any other relationships (see Table 3).

A hierarchical regression was computed to assess the hypothesis that gender and experience with STI symptoms (number of previous contracted STIs, level of sexual education obtained and number of STI classes taken) were predictors of participants' actual STI knowledge. Gender was entered first, as it was hypothesized to account for the most variance. Experience with STI symptoms (number of previously contracted STIs, level of sexual education obtained, and number of STI classes taken) were entered next, in a block. Model two was significant and accounted for 15% of the variance of actual STI knowledge. There were two significant predictors, level of sexual education obtained was the best predictor and number of contracted STIs was the next best predictor. Both significant predictors had positive relationships, indicating that the higher the education level obtained and the more STIs an individual contracted, the higher was their STI knowledge (see Table 4).

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Table 3.
Correlation Matrix for Selected Variables

	1	2	3	4	5
1. Perceived STI knowledge	--	.22*	.19	.30**	.55**
2. No. previous partners	--	--	.39**	-.03	.20
3. No. previous STIs	--	--	--	-.08	.01
4. No. previous classes	--	--	--	--	.34**
5. Quality sex education	--	--	--	--	--

Note. * p < .05; ** p < .01.

Due to the fact that gender was not a significant predictor, a stepwise regression was calculated. Model one was significant, with level of sexual education accounting for 10% of the variance of actual STI knowledge. Model two included level of sexual education and number of previously contracted STIs, and was also significant, accounting for 15% of total variance of actual STI knowledge. The stepwise regression also excluded two variables from the calculation, gender and number of sexual education classes taken (see Table 5).

Participants who reported having advanced or medical sexual education training scored significantly higher than those who reported having only high school sexual education training, F (2, 89) = 4.91, p < .01. There was no significant effect found between number of sexual education classes taken and total STI knowledge.

Finally, a simple measure of STI knowledge was explored: participants were asked to name as many STIs as they could. Formal names of STIs (i.e. gonorrhea), as well as slang (i.e. "the clap") were accepted to compute the number of STIs a participant could name. The median and mode of STIs participants could name was five (out of a possible eight), providing further evidence for the overall lack of STI knowledge.

Table 4.
Summary of Hierarchical Regression Analysis for Variables Predicting Actual STI Knowledge (N = 92)

Variable	*B*	*SE B*	β
Model 1			
Gender	1.83	2.14	.09
R^2 = .004			
Model 2			
Gender	1.83	2.14	.09
No. previous STIs	3.90	1.92	.20*
Where sex education taken	5.39	1.72	.31**
No. sex education classes taken	-.26	.63	-.04
R^2 = .15			

Note. *p < .05; **p < .01.

Table 5.
Summary of Stepwise Regression Analysis (N = 92)

Variable	B	SE B	β
Model 1			
Level of sex Education	2.55	1.15	.32**
R^2 = .10			
Model 2			
Level of sex Education	2.42	.80	.30**
No. previous STIs	1.94	.89	.22*
R^2 = .15			

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

DISCUSSION

Synovitz, Hebert, Kelley, and Carlson (2002) reported that participants generally scored low on actual STI knowledge, but that those who experienced college classes in sexual education scored significantly better than people with only middle school or high school sexual education knowledge. Similarly, the present study found that people with advanced or medical training in sexual education scored significantly higher than those that had only taken high school sexual educational classes, supporting the benefits of formal education.

The models proposed by the experimenters accounted for 15% of the variability in participants' STI knowledge.

The two predictors that accounted for significant amounts of variance in the model were the level of sexual education obtained and the number of contracted STIs. While 15% is admittedly a somewhat small portion of the overall variance, human sexuality is a highly complex behavior. A possible reason why the model failed to account for a greater amount of variability is the restricted range of scores produced by the overall poor performance of the participants. Expanding the participant pool to include individuals who are more knowledgeable about STI may improve the models performance.

Many factors may contribute perceived knowledge and actual knowledge. For example, future research and models can expand on the current study by including measures that examine sources of misinformation. Participants may erroneously believe they are knowledgeable about STIs because a trusted source such as a parent of friend provided them with incorrect information.

In addition to examining participants' STI knowledge through written questions, the study added a novel yet practical component, identifying visual symptoms of STIs. Previous research reported that people may not always seek treatment for STIs as they lack symptom recognition. Thus, a logical next step to assess STI knowledge would be to incorporate visual symptoms into calculating STI knowledge. Participants scored significantly lower on visual STI knowledge than written STI knowledge. Therefore, the present study seems to support the notion that people may not have any educational experience or knowledge with presenting STI symptoms, thus may be failing to seek out STI treatment.

Although most participants reported possessing above average STI

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knowledge, their performance indicated that their actual STI knowledge is insufficient. There could be several factors contributing to the discrepancy. As indicated by the positive relationship between perceived quality of sexual education and perceived STI knowledge, participants may be justifying high self-ratings of STI knowledge by elevating, their perceived quality of the sexual education they received. Also, because people may have taken previous sexual education classes, they may assume they have accurate and ample STI education. When in reality, their perceptions may be misleading.

With young people being at-risk and STI numbers high, STI knowledge is extremely important. People may feel that others contract STIs and perceive their risk as being lower, a phenomenon known as "optimistic bias" (Chapin, 2001). The optimistic bias simply states that when comparing oneself to others in a comparative group (i.e., those of the same age, gender, race/ethnicity, etc.), one assumes negative health consequences are higher for those in their peer group than for themselves (Clarke, Lovegrove, Williams, & Machperson, 2000). The optimistic bias has been found to underlie several aspects of research on sexuality, including STI infections and risky sexual behaviors (Chapin, 2001). Chapin found that adolescents with more sexual experience demonstrated higher optimistic biases than adolescents without sexual experience. Another study examined the possibility of the optimistic bias having an influence on risk associated with unintended pregnancies, STIs, and HIV/AIDS in both adolescents and adults (Whaley, 2000). Both the adults and adolescents believed others in comparable peer groups to be at higher risk than one's self for unintentional pregnancies, acquiring STIs, and HIV/AIDS. Thus, the optimistic bias may be at work when dealing with one's perceived STI knowledge, due to the fact people feel they are less likely to contract an STI.

In terms of STI education there are several legal issues. Federal laws dictate how federal money can be allotted for STI education. Moreover, state laws vary significantly in their requirements about sexual education. As an example, two bordering states, Georgia and South Carolina, where most participants would have attended middle and high school, have varying requirements governing the teaching of sex education. In both states sexual education is mandated, with an opt-out permitted. However, Georgia requires that abstinence be stressed but does not require contraception be covered, while South Carolina requires that abstinence be stressed and that contraception is only taught in the context of marriage (Siecus, 2004). The shifting standards between states, local school boards, and even educators contribute to inconsistent and insufficient education. This study provided evidence that there is a clear need for better sexual education. Pictorial representations should be included in sexual education, as visual knowledge may lead one to think they are infected or at risk for infection, and, therefore seek out treatment.

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