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# From the Editor

*Meeting Public Health Challenges*

McKinley Thomas, Ed.D.
Kinesiology & Health Science, Augusta State University
Department of Community Medicine, Mercer University

In an era which accompanies major concerns regarding the health of Georgians, one must take a moment to reflect upon future challenges that face public health professionals in the state. Such contemplation allows for a broader understanding of the gap between what is and what should be and affords strategic placement of preventive opportunities. For example, Georgia is faced with a growing problem with weight gain with 65% of adult men and 53% of adult women being either overweight or obese[1]. This growing trend is especially problematic for young children and adolescents who, as they age, will become increasingly susceptible to chronic health conditions such as hypertension, some forms of cancer, and diabetes. Related to the issue of weight is that of cardiovascular disease (CVD). Currently, Georgia's death rate from CVD is around 12% higher than the national average[2] and is the number one cause of death. Looking beyond chronic diseases, one must consider infectious diseases (both emerging and reemerging) as potentially threatening, particularly in light of newly discovered pathogens (such as HIV and H5N1), that have surfaced over the past 25 years. [Incidentally, Georgia ranks number eight in the U.S. in terms of cumulative AIDS cases[3]] These concerns are in addition to the omnipresent matters of lifestyle, behavioral choice(s), and social / family composition. Drug abuse, (including tobacco, alcohol and the increasing use of methamphetamine), sexual risk-taking that could result in unplanned pregnancies and sexually transmitted infections, as well as living a sedentary lifestyle each cost the state millions each year. It's been estimated that for every dollar spent on tobacco prevention, for example, yields $15 in savings for Georgians[4]. Each of these threats serves to necessitate consideration of what works and what doesn't as well as collaboration among health professionals in the state relative to research. Such communion allows for the distribution of ideas which can do nothing but expand insights necessary for practitioners who are currently designing intervention strategies in an effort to reduce the impact of these health concerns. To this end, the Georgia Public Health Association has embarked upon a unique method of communication; The *Journal of the Georgia Public Health Association.* The primary goal of *jGPHA* is to serve as an outlet for health professionals within the state; a conduit through which communication on topics ranging from best practices, original research, and commentary may be explored. By opening a window onto the machinery behind public health in Georgia we as a community are in a much better position to formulate additional approaches toward prevention, education, and improvements in health within the state.

[1] *Overweight and Obesity in Georgia, 2005.*
[2] *2005 Georgia Data Summary: Cardiovascular Disease.*
[3] *HIV/AIDS Surveillance Report, 2004*
[4] *Burden of Tobacco in Georgia, 2000*

# Practice in Action: Improving the Public's Health in Georgia

## A Worldwide Crisis: Inappropriate Antibiotic Use and Resistant Bacterial Infections

### OBJECTIVES

The GUARD (**G**eorgia **U**nited against **A**ntibiotic **R**esistant **D**isease) Coalition seeks to reduce the spread of antibiotic-resistant disease and save antibiotic efficacy by decreasing inappropriate antibiotic use throughout the state of Georgia. The GUARD Coalition functions through the collaborative efforts of approximately 148 professional, academic, and community partners.

### ASSESSMENT OF NEED

Antibiotic resistance is a rapidly growing problem that threatens global health. "Georgia and the Southeast in general have one of highest rates of inappropriate antibiotic use in the nation," reports Dr. Wilde, Medical Director of the pediatric emergency department at the Medical College of Georgia (MCG) Children's Medical Center, and Medical Director of GUARD. "Antibiotics should only be used to treat bacterial illnesses such as pneumonia, urinary tract infections, strep throat, bone infections and some ear infections. Antibiotics kill the bacteria causing these illnesses and prevent them from entering the bloodstream, where they can kill you. However, antibiotics have absolutely no effect on viruses, which cause the overwhelming majority of infections in humans.

### IMPLICATIONS FOR PRACTITIONERS

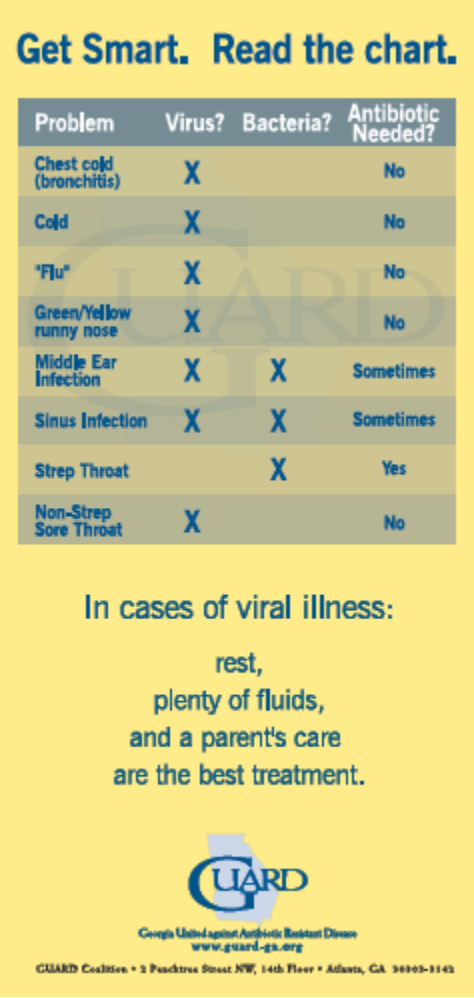
Inappropriate prescribing and overuse of antibiotics are important factors in the development of resistance. Multiple factors are known or suspected to contribute to the widespread practice of inappropriate prescribing and overuse. The most common factors are consumer misconceptions about antibiotics and unwarranted provider practices such as prescribing antibiotics for acute bronchitis.

Antibiotics should not be used to treat common viruses such as those that cause the cold and flu, and in fact can be harmful in the long run if they are used inappropriately. Viral infections should simply be treated by over-the-counter medications and old-fashioned TLC.

Even in the case of a bacterial infection, it's important to use an antibiotic designed to fight that particular bacterium, not a "powerful" broad-spectrum antibiotic that kills all the bacteria in your body. When you overuse or misuse antibiotics, you increase the likelihood of developing antibiotic-resistant bacteria within your body. These bacteria are stronger and harder to kill, and can grow and spread to others. While researchers are continuing to search for more effective antibiotics to fight these types of bacteria, resistance is increasing faster than new drugs can be developed. Unless this trend is stopped, one day we might find ourselves without effective antibiotics to fight bacterial illnesses.

## PROGRAM STRATEGY

GUARD seeks to increase knowledge and positively change behaviors regarding appropriate antibiotic use via community and clinical practitioner education. To accomplish this goal, GUARD will: 1) develop, implement, and evaluate educational programs for clinical practitioners and the community; and 2) develop and disseminate educational materials to clinicians and the community.




## EVALUATION APPROACH

Outcome measures for this project will incorporate pre- and posttests for all participants to determine any immediate changes in knowledge and behaviors regarding appropriate antibiotic use following participation in GUARD presentations. Also, additional measures may include monitoring of secular trends in prescribing antibiotics as measured by health insurance providers or the National Ambulatory Medical Care Survey.

## ACKNOWLEDGEMENTS

This program was established in 2002 by a grant from the Centers for Disease Control and Prevention (CDC), under their "*Get Smart: Know When Antibiotics Work*" campaign. Until the spring of 2005, the GUARD program was coordinated and administered through the state of Georgia Division of Public Health. As of May 2005, GUARD is under the auspices of the Medical College of Georgia. GUARD is one of 28 Coalitions across the United States.

For further information, contact P. Anna Vickery, MHSE, CHES, Program Director for GUARD; Medical College of Georgia, Department of Emergency Medicine, 1120 15th St. AF-2059, Augusta, GA 30912; phone 706-721-7396; email: avickery@mcg.edu; website: www.guard-ga.org, or Dr. James Wilde, Medical Director for GUARD, phone 706-721-3258; email: jwilde@mcg.edu.

# Sexually Transmitted Infections: Perceived Knowledge versus Actual Knowledge

Heather Ferguson, MA
Richard Topolski, PhD
Department of Psychology, Augusta State University

Marc Miller, PhD
College of Business Administration, Augusta State University

## 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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Corresponding Author: Dr. Richard Topolski, Department of Psychology, Augusta State University, Augusta, GA 30909, email:rtopolsk@aug.edu

# 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.

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

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).

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

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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# An Examination of Adolescents' Knowledge and Attitudes Related to Heart Disease, Nutrition, Physical Activity, and Media Influences and the Adoption of a Healthy Lifestyle

Melissa Schenkman, MPH
Rollins School of Public Health, Emory University

Randolph Martin, MD, FACC, FASE
Emory University School of Medicine

Susan Butler, EdD, CHES
Rollins School of Public Health, Emory University

## Abstract

The present pilot study aimed to determine the attitudes, beliefs, behaviors, and degree of knowledge among adolescents related to healthy eating, exercise, heart disease, the influence of television, and possible factors in modifying their attitudes toward adopting a healthy lifestyle. Juniors and seniors from two private high schools (N=62) in metro Atlanta were surveyed. The study was based on the Social Cognitive Theory and the Health Belief Model. The research questions examined the impact of nutrition and heart disease knowledge on physical activity behavior, and the impact of television media exposure on eating habits. A 36-question cross-sectional survey compiled from various sources in the literature and health-related organizations was used to assess the outcomes of interest. Data analysis was conducted using frequencies, descriptive statistics, simple hypothesis tests, and chi-square analysis. Those who reported physical activity participation and those who did not, were not found to differ significantly on their composite nutrition and heart disease knowledge score, $F(6,55)=.763$, $p=.602$. In addition, the three groups, reporting different amounts of physical activity participation in hours/week, were not found to differ significantly on their composite nutrition and heart disease knowledge score $F(6, 50)=1.628$, $p=.159$. In terms of television viewing's effect on eating habits, television viewing was not found to play a significant role in the frequency of breakfast food consumption $F(3, 57)=2.269$, $p=.090$; or on how often adolescents ate fast food, $F(1, 59)=.025$, $p=.875$. Yet, the amount of television hours viewed on a typical weekday were significantly related to how often an adolescent thinks about their health when deciding what to eat ($X=.008$). The 5 groups of amounts of television viewing hours, differed significantly on how often adolescents' thought about their health when deciding what to eat, specifically those who thought about their health always and sometimes $F(3, 57)=3.241$, $p=.029$). The Post Hoc test showed a significant difference of .998 hours in the amount of TV watched by those who always think about their health when deciding what to eat (M=2.11 hours/weekday) and those who sometimes think about it (M=3.10 hours/weekday). Suggested primary implications for public health practice include access to school-sponsored or recreational sports teams for all adolescents, nutrition and heart disease education via sports teams, and parental involvement in their adolescent's food choices and health behavior.

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Corresponding Author: Melissa Schenkman, 624 Rock Springs Court, Atlanta, Georgia 30306, email:Schenkman@bellsouth.net

## An Examination of Adolescents' Knowledge and Attitudes Related to Heart Disease, Nutrition, Physical Activity, and Media Influences and the Adoption of A Healthy Lifestyle

Of the 2.4 million deaths in the United States in 2000, 16.6% or 400,000 deaths were related to poor diet and physical inactivity (Mokdad, Marks, Stroup, & Gerberding, 2004). In comparison, 18.1% of total U.S. deaths or 435,000 deaths were from tobacco usage. The narrowing of the gap between these two leading preventable causes of death led Mokdad et al. (2004) to the conclusion that poor diet and physical inactivity could at some time in the future overtake tobacco use as the leading preventable cause of death.

According to the American Heart Association, many high school students are living unhealthy lifestyles, which can lead to the development of chronic disease (American Heart Association, 2003). A study of 15,349 public and private high school students in the United States, using data from the 1999 Youth Risk Behavior Survey (YRBS) indicated that adolescents do not understand that exercise and dietary choices work together to prevent disease. In that study, Lowry, Galuska, Fulton, Wechsler, and Kann (2002) found only 62% of females and 41% of males utilized a combination of exercise with a reduced fat diet to lose weight or maintain their current weight. However, in an assessment of adolescents' eating habits, Story, Neumark-Sztainer, and French (2002) cited knowledge as being the only factor which would make adolescents adopt healthful eating behaviors.

In addition to knowledge, the media can be an influential factor in adolescents' health behavior. An example of such an influence is the news program, Channel One, which is shown daily in many schools nationwide. According to Story and French (2004) students who viewed Channel One programming, where food commercials were regularly shown, were found during a typical month of viewing to have more positive attitudes about the advertised products. Although students did not report more frequent purchases of the advertised products, they were more likely to report intensions to purchase compared to students who did not watch Channel One (Story & French, 2004).

Despite the negative influences on adolescent health behavior, cardiovascular disease risk factors, including obesity, eating a high fat and high sugar diet, not participating in regular physical activity, and filling leisure-time with hours of television watching and Internet surfing are modifiable. The purpose of the present pilot study was to examine several of the factors that potentially influence adolescents' physical activity and eating habits and behaviors all in one study. Previous research has focused on each of the four areas of interest to the researchers (heart disease knowledge, nutrition knowledge and eating habits, physical activity, and television media) separately or with only one of the other areas. The researchers aimed to combine all of these areas into one survey and to examine angles that have not previously been examined.

The present pilot study investigated the attitudes, beliefs, behaviors, and degree of knowledge among adolescents related to healthy eating, exercise, heart disease, the influence of television, and possible factors in modifying their attitudes toward adopting a healthy lifestyle. It was designed to be both descriptive and exploratory in determining the relationship between knowledge (of both heart disease and nutrition) and physical activity behavior in adolescents, as well as in determining the relationship between adolescents' level of television exposure and their eating habits.

## METHODOLOGY

The target population consisted of high school juniors and seniors, ages 16 and 17, in five counties within the Metro Atlanta area. To measure this population effectively, a stratified multi-stage cluster sample design was implemented for selecting the study sample. The researchers stratified the sample by county and type of school (public vs. private). Initially 33 high schools were randomly selected, consisting of 21 public and 12 private high schools. The current pilot study focused on surveying students in the private high schools. The decision to focus only on the private high schools was made due to time constraints. In order to survey in the public high schools, the project had to go through an institutional review board in each county's school board, a process that was estimated to take three months. This was not initially known by the researchers and was not feasible due to time constraints on completing the thesis study.

After random selection of the 12 private high schools and receiving approval from the authors' Institutional Review Board, packets were sent to the prospective high schools. Each packet contained an introductory letter that introduced the study and requested the school's participation, as well as copies of a student consent form, parental consent form, student assent form, and the survey to be completed by the participating students. Those schools that did not respond by the given deadline received follow-up phone calls and emails from the principal investigator. After follow-up contacts, a total of nine schools responded, three did not respond, and only two schools accepted the invitation to participate. A survey administration date was then scheduled with each high school contact person.

In order for students to be eligible for participation in the study, students had to be enrolled in either of the two private high schools, currently in 11th or 12th grade, 16 or 17 years of age, and had to present the appropriate signed consent form and in some cases assent form as well to the principal investigator before they could complete the survey. Students, who were 16, were required to sign a student assent form and bring in the parental consent form signed by their parent. Meanwhile, students, who were 17, were required to bring in a parental consent form signed by them and their parent. These consent measures were required by Emory's Institutional Review Board. Those students who did not have the properly signed forms at the time of survey administration were not allowed to participate. Prior to the study, all students who met the inclusion criteria, other than having a signed consent form, were given background information about the study, a letter asking for their participation, a student consent form, a parental consent form, and a student assent form for those students who were 16 years old or younger. The total sample consisted of 62 students from two private high schools in Fulton County, Georgia.

The sample design allowed the study's researchers to maximize data collection while providing maximum confidentiality for study participants. All surveys were identified using an ID code number, which accounted for the individual participant, county, type of school, and name of the school. The consent forms were collected separately from the survey instrument and collected separately from the data.

The survey used in this study contained 30 close-ended questions assessing attitudes, knowledge, and behavior in relation to nutrition, heart disease, physical activity, body image, and media influences. They were based on survey items developed by the American Heart Association, the National Heart, Lung, and Blood Institute, and the Eating Disorders Network in Atlanta, Georgia, where their validity and reliability have been tested. These close-ended questions included multiple choice, true/false, Likert scale, and rank order.

An additional five questions collected demographic information on the students, and one final self-reported question asked for approximate weight and height. The thesis committee members acted as a panel of experts and reviewed the survey for face validity. The survey was pilot-tested on five juniors and five seniors from one private and one public high school in metro Atlanta, and appropriate revisions were made. Data collection for the present pilot study's two main research questions was based on 12 of these survey questions (Table 1 and Table 2).

After collecting data from the students, the data were entered, managed, and stored by the principal investigator. The data were analyzed using SPSS 12.0. Analytical methods included descriptive statistics, cross-tabulations simple hypothesis tests (such as one-way ANOVA), and chi-square analyses. Descriptive analysis was utilized to examine the characteristics of the sample in order to determine a profile of the sample and as a safeguard, providing raw data to double check more complex analysis against. Furthermore, cross-tabulations were performed as a base from which to determine if a relationship existed between two variables of interest. ANOVA was used to answer the research questions because the researchers wanted to study if there were differences between two variables which each contained multiple categories or groups in this case. Finally, chi-square analysis was employed to determine the magnitude of any significant relationships, which were found using ANOVA.

## LIMITATIONS

Some of the potential limitations of this study included having a small sample size, having the survey only administered in private high schools, race distribution, and the lack of an incentive offered to students to participate. First, a small sample size may have resulted in a decrease in the number of significant relationships found between variables during data analysis. Secondly, the study cannot be generalizable to all adolescents within each of the initially selected Georgia counties because the survey was only administered in private high schools. Also, the limitation of race distribution stemmed from this because the private schools were not as racially diverse as initially anticipated by the researchers. Finally, the study's inability to offer an incentive to participants is thought to have limited the amount of schools, which chose to participate.

## FINDINGS

A total of 62 students completed the survey. In terms of gender, the majority of the students surveyed were female (61%, n=38), and 39% (n=24) were male. Also, the sample was overwhelmingly Caucasian (86%, n=53). African-Americans were the second highest represented race at 11% (n=7) with Asian, and Native Hawaiian or Pacific Islander both comprising 1.6% (n=1) of the sample respectively. Among the students surveyed, the majority were high school juniors (63%, n=39), and 37% (n=23) were high school seniors. Of the sample, 17-year-olds comprised 64% (n=40) and 16-year-olds comprised 36% (n=22).

### *The Impact of Knowledge on Behavior*

The first research question, "What is the relationship between nutrition and heart disease knowledge and physical activity behavior in adolescents?" examined the impact that adolescents' nutrition and heart disease knowledge had on their decision to participate or not to participate in physical activity, and on the amount of their physical activity participation. In order to perform this analysis, variables were recoded to compute a composite knowledge score based on a total of six nutrition and heart disease knowledge questions (Table 1).

## Table 1

*Survey Questions used for Research Question #1: "What is the relationship between nutrition and heart disease knowledge and physical activity behavior in adolescents?"*

| Source | Survey Question | Measurement | Response Categories | Alteration of Item |
|---|---|---|---|---|
| (Turconi, G., Celsa, M., Rezzani, C., Biino, G., Sartirana, M.A., and Roggi, C, 2003) | Do you participate in physical activity? | Measures whether or not students participate in physical activity in general | Yes, No | Answer choices were changed from (always during the entire year, only in some seasons, sometimes, never) in order to better measure the outcome of interest in the study. |
| | If you answered yes: How many hours do you practice physical activity a week? | Measures amount of time spent participating in physical activity | -1-2 hours in a week<br>-3-4 hours in a week<br>-more than 4 hours in a week<br>-0 hours a week | This item was not altered. |
| (Thakur, N. & D'Amico, F., 1999) | What percentage of one's daily total calories should come from fat? (Choose which range this percentage would fall into) | Measures Nutrition Knowledge | -0%-less than 20%<br>-20%-less than 40%<br>-40%-less than 60%<br>-60%-less than 80%<br>-80%-100% | The answer choices were expanded from three to five based on responses from the pilot test of the survey. |
| (Butler, Susan, 2003) | How many servings of calcium products should you eat on a daily basis? | Measures Nutrition Knowledge | -1<br>-2<br>-3<br>-4<br>-5 | This item was not altered. |
| (Vale, Ann, 2000) | Which of the following is not a risk factor linked to the development of heart disease? | Measures Heart Disease Knowledge | -high blood pressure<br>-high cholesterol<br>-diabetes<br>-arthritis<br>-obesity | This item originally was an open-ended question with no answer choices. It was altered because the panel of experts felt it would be more conducive for data analysis in a close-ended form. |
| (American Heart Association, 1991) | To help decrease your blood cholesterol, which of the following foods should you limit in your daily diet? | Measures Heart Disease Knowledge | -Fish<br>-Salty foods (pretzels, potato chips)<br>-Sugar rich foods (cookies)<br>-Red meat<br>-Breads and cereals | Some of the answer choices were changed to include more specific examples of certain food groups. For example, one of the original answer choices was fats and oils. |
| | Which of these nutrients, when eaten in excessive amounts, affects blood cholesterol the most? | Measures Heart Disease Knowledge | -total fat<br>-saturated fat<br>-cholesterol<br>-sodium<br>-protein | This item was not altered. |

Table 2

*Survey Questions used For Research Question #2: "What is the relationship between adolescents' level of television exposure and their eating habits?"*

| Source | Survey Question | Measurement | Response Categories | Alteration of Item |
|---|---|---|---|---|
| (Turconi, G., Celsa, M., Rezzani, C., Biino, G., Sartirana, M.A., & Roggi, C, 2003) | How many days in a typical week do you eat a meal between the hours of 6 a.m. and 8:30 a.m.? | Measures eating habits | -always (7 days/week)<br>-often (5-6 days/week)<br>-sometimes (3-4 days/week)<br>-never (0 days/week) | The question was only altered in that it included a specific time period to define breakfast. |
| (Butler, Susan, 2003) | How many times a week do you eat meals in a fast food restaurant, meaning restaurants that either have a drive-in-window, they deliver food, or you order your food at a counter inside the restaurant? | Measures eating habits | -Never<br>-Less than once a week<br>-1-2 times a week<br>-3-4 times a week<br>-5-6 times a week<br>-Everyday | This item was not altered. |
| (Shannon, C., Story, M., Fulkerson, J.A., & French, S.A., 2002) | How often do you think about your health when deciding what to eat? | Measures eating habits | -Always<br>-Sometimes<br>-Rarely<br>-Never | The answer choices of "rarely" and "never" were added. The original question had only two answer choices. |
| Stanton, W.R., Willis, M., & Balanda, K.P. (2000) | On weekdays, how many hours do you usually spend doing the following?<br><br>Watching TV: ____ | Measures amount of television viewing | -up to 1/2 hour<br>-1/2-1 hour<br>-1-1-2 hours<br>-2-3 hours<br>-more than 3 hours | This item was not altered. |

Each student received one point if they answered a question correctly and zero points if they answered a question incorrectly. The lowest composite knowledge score obtainable was a zero, meaning not answering any of the questions correctly and the highest composite knowledge score obtainable was a six, meaning answering all of the questions correctly.

The results of the one-way ANOVA revealed that the two groups, those who reported physical activity participation and those who did not, did not differ significantly on their composite nutrition and heart disease knowledge score, $F(6,55)=.763$, $p=.602$, (Table 3). Thus, students' nutrition and heart disease knowledge scores did not show a significant relationship with their physical activity participation. However, the homogeneity of variance was significant at ($p=.001$), indicating that physical activity participation varies greatly among the different knowledge score groups (Table 4). For example, examining the cross-tabulation of physical activity participation and knowledge scores, out of the six students who did not participate in physical activity, three of them answered more than half (4) of the knowledge questions correctly. Meanwhile, 12 of the 56 students who participated in physical activity attained this same knowledge score, answering more than half (4) of the knowledge questions correctly (Table 5).

Also, in comparing the amount of physical activity participation and knowledge score, the results did not show a significant relationship between the two variables. Specifically, the results of the one-way ANOVA revealed that the three groups, reporting different amounts of physical activity participation in hours/week, did not differ significantly on their composite nutrition and heart

**Table 3**

*Analysis of Variance comparing physical activity participation across knowledge scores*

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | .416 | 6 | .069 | .763 | .602 |
| Within Groups | 5.003 | 55 | | | |
| Total | 5.419 | 61 | | | |

**Table 4**

*Homogeneity of Variance for Physical Activity Participation Across Knowledge Scores*

| Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|
| 5.245[a] | 5 | 55 | .001 |

*a. Groups with only one case are ignored in computing the test of homogeneity of variance for 18a. Do you participate in physical activity?*

**Table 5**

*Cross-tabulation of physical activity participation and knowledge scores*

| | | Participate in Physical activity | Do not participate in physical activity | Total |
|---|---|---|---|---|
| Total | 0 | 1 | 0 | 1 |
| Knowledge | 1 | 4 | 0 | 4 |
| Score | 2 | 8 | 1 | 9 |
| | 3 | 14 | 0 | 14 |
| | 4 | [12] | [3] | [15] |
| | 5 | [12] | [2] | [14] |
| | 6 | [5] | [0] | [5] |
| | | [Subtotal 29] | [Subtotal 5] | [Total 34] |
| Sample Total | | 56 | 6 | 62 |

disease knowledge score F (6, 50)=1.628, p=. 159, (Table 6). However, the homogeneity of variance was significant at (p=.017), indicating that the levels of physical activity participation varied greatly among the different knowledge score groups (Table 7). The variation can be seen in the cross-tabulation of the total knowledge score with the amount of physical activity participation students reported doing in hours per week (Table 8). For example, there were ten (10) students who reported exercising more than four hours in a week, and who received a composite knowledge score of four. Yet, three students who reported exercising 1 to 2 hours in a week got an even higher composite knowledge score of five.

### *The Impact of Television Viewing on Adolescent Eating Habits*

The second research question, "What is the relationship between adolescents' level of television exposure and their eating habits?" sought to understand the effect that the amount of television viewing during a typical weekday had on their eating habits. The survey questions assessing eating habits included: 1) How many days in a typical week do you eat a meal between the hours of 6:00 and 8:30 a.m.? 2) How many times a week do you

**Table 6**

*Analysis of Variance comparing the amount of physical activity participation in hours/week across knowledge scores*

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 5.234 | 6 | .872 | 1.628 | .159 |
| Within Groups | 26.801 | 50 | .536 | | |
| Total | 32.035 | 56 | | | |

**Table 7**

*Homogeneity of Variance for physical activity participation in hours/week across knowledge scores*

| Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|
| 3.083[a] | 5 | 50 | .017 |

*Groups with only one case are ignored in computing the test of homogeneity of variance for 18b. If you answered yes: How many hours do you practice physical activity a week?*

**Table 8**

*Cross-tabulation of physical activity participation in hours/week and knowledge score*

| | | 1-2 hours in a week | 3-4 hours in a week | more than 4 hours in a week | Total |
|---|---|---|---|---|---|
| Total Knowledge Score | 0 | 1 | 0 | 0 | 1 |
| | 1 | 1 | 2 | 1 | 4 |
| | 2 | 1 | 2 | 5 | 8 |
| | 3 | 3 | 4 | 7 | 14 |
| | 4 | 0 | 2 | [10] | 12 |
| | 5 | [3] | 2 | 8 | 13 |
| | 6 | 0 | 2 | 3 | 5 |
| | Total | 9 | 14 | 34 | 57 |

eat meals from a fast food restaurant, meaning restaurants that have a drive-in window? and 3) How often do you think about your health when deciding what to eat? (Table 2). Question 2, was recoded dichotomously, into those who do not eat fast food often, which included the answer choices, never and less than once a week, and those who do eat fast food often, which included the answer choices, 1-2 times a week, 3-4 times a week, 5-6 times a week, and everyday.

All three analyses were completed using a one-way ANOVA and the final relationship assessed also included a cross-tabulation and a chi square test. The one case of missing data on the number of television viewing hours was excluded from analysis, leaving a total of N=61 for the analyses completed to answer this research question.

In examining whether or not a relationship between the amount of television watching and frequency of breakfast consumption existed, data analysis did not indicate a significant relationship. Specifically, the results of the one-way ANOVA revealed that the 5 groups based on amounts of television viewing hours, did not differ significantly

on how frequently they ate breakfast, F (3, 57)=2.269, p=.090, (Table 9).

In determining what effect the amount of television viewing hours had on eating habits, analysis did not show a significant relationship between the two variables. In fact, the results of the one-way ANOVA revealed that the amounts of television viewing hours, did not differ significantly on how frequently adolescents ate fast food, F (1, 59)=.025, p=. 875, (Table 10). Although not significant, descriptive statistics showed that, overall, slightly more adolescents (34) did fall into the category of often eating fast food, in comparison to 27 adolescents who were shown not to eat fast food often.

Table 9

*Analysis of Variance for Eating Breakfast across groups of television watching by hours*

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 9.182 | 3 | 3.061 | 2.269 | .090 |
| Within Groups | 76.883 | 57 | 1.349 | | |
| Total | 86.066 | 60 | | | |

Table 10

*Analysis of Variance for amount of time eating fast food across groups of television watching by hours*

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | .036 | 1 | .036 | .025 | .875 |
| Within Groups | 86.029 | 59 | 1.458 | | |
| Total | 86.066 | 60 | | | |

A final one-way ANOVA was conducted to examine if a difference existed in how often adolescents' thought about their health when deciding what to eat, based on their differing amounts of television viewing. The results of the one-way ANOVA revealed that the 5 groups based on amounts of television viewing, differed significantly on how often adolescents' thought about their health when deciding what to eat, specifically those who think about their health "always" and "sometimes" F (3, 57)=3.241, p=. 029, (Table 11). Tukey's post-hoc test showed a significant difference of .998 in the amount of TV watched by those who always think about their health when deciding what to eat and those who sometimes think about it (Table 12). Those who answered that they sometimes think about their health when deciding what to eat watched more hours of television (M=3.10) than those who answered that they always think about their health when deciding what to eat (M=2.11) (Table 13). The cross tabulation of the two variables displays the raw data, which are representative of such conclusions (Table 14). Overall, a chi-square test showed that the amount of

**Table 11**

*Analysis of Variance for how often one thinks about health when making food choices across groups of television watching by hours*

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 12.541 | 3 | 4.180 | 3.241 | .029 |
| Within Groups | 73.525 | 57 | 1.290 | | |
| Total | 86.066 | 60 | | | |

**Table 12**

*Multiple Comparisons:*
*Tukey Post Hoc Tests for how often one thinks about health when making food choices across groups of television watching by hours*

| How often do you think about your health when deciding what to eat? | | Mean Difference (I-J) | Std. Error | Sig. |
|---|---|---|---|---|
| 1=Always | 2=Sometimes | -.998* | .335 | .022 |
| | 3=Rarely | -.258 | .430 | .931 |
| | 4=Never | -.395 | .844 | .966 |
| 2=Sometimes | 1=Always | .998* | .335 | .022 |
| | 3=Rarely | .740 | .402 | .266 |
| | 4=Never | .603 | .830 | .886 |
| 3=Rarely | 1=Always | .258 | .430 | .931 |
| | 2=Sometimes | -.740 | .402 | .266 |
| | 4=Never | -.136 | .873 | .999 |
| 4=Never | 1=Always | .395 | .844 | .966 |
| | 2=Sometimes | -.603 | .830 | .886 |
| | 3=Rarely | .136 | .873 | .999 |

**Table 13**

*Mean hours of television watched per group of attitude toward health when making food choices*

| How often do you think about your health when deciding what to eat? | Mean | N | Std. Deviation |
|---|---|---|---|
| 1=Always | 2.11 | 19 | 1.449 |
| 2=Sometimes | 3.10 | 29 | .976 |
| 3=Rarely | 2.36 | 11 | .924 |
| 4=Never | 2.50 | 2 | .707 |
| Total | 2.64 | 61 | 1.198 |

television hours viewed on a typical weekday were significantly related to how often an adolescent thinks about their health when deciding what to eat, $X^2(4, N=61)=12, p=.008$, (Table 15).

In addition to the findings on relationships between variables of interest, there were interesting descriptive statistics based on responses to the questions assessing physical activity and breakfast eating habits. Interestingly, the majority of the 62 adolescents surveyed reported either eating breakfast often (5-6 days/week) or always eating breakfast (7 days/week), at 36% (n=22) and 23% (n=14) respectively. An overwhelming 72% (n=41) out of a sample of the 57 adolescents, who responded to this question, were not currently enrolled in any physical education class. However, adolescents

Table 14

*Cross-tabulation of hours of television watched and how often adolescents think about their health when deciding what to eat*

| | | How often do you think about your health when deciding what to eat? | | | | |
|---|---|---|---|---|---|---|
| | | 1=Always | 2=Sometimes | 3=Rarely | 4=Never | Total |
| Watching TV (In hours) | 1=up to1/2hour | 9 | 2 | 2 | 0 | 13 |
| | 2=1/2-1 hour | 5 | 5 | 4 | 1 | 15 |
| | 3=1-2 hours | 2 | 11 | 4 | 1 | 18 |
| | 4=2-3 hours | 0 | 10 | 1 | 0 | 11 |
| | 5= >3 hours | 3 | 1 | 0 | 0 | 4 |
| Total | | 19 | 29 | 11 | 2 | 61 |

Table 15

*Chi-Square Tests of hours of television watched and how often adolescents think about their health when deciding what to eat*

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 27.016 | 12 | .008 |
| Likelihood Ratio | 30.615 | 12 | .002 |
| Linear-by-Linear Association | .794 | 1 | .373 |
| N of Valid Cases | 61 | | |

reported participating in physical activity via sports teams. A total of 31% (n=18) of the 59 adolescents, who responded to that question, had been a member of one sports team in the past year and 48% (n=28) of the adolescents reported participating on two sports teams in the past year. Also, the majority of 62 adolescents surveyed (69%, n=43) found eating disorders to be only a minor problem at their school. Finally, adolescents were evenly split in response to the question about eating sweet snacks between meals. A total of 50% (n=31) reported eating sweet snacks between meals, while the other 50% (n=31) reported not doing so.

## SUMMARY

In conclusion, this study showed a significant relationship between television viewing and thinking about health when deciding what to eat. This relationship was found to be significant by the Chi-Square Test and by the one-way ANOVA. In addition, the Tukey Post-Hoc Test showed those who watched more television on average were more likely to consider their health either sometimes, rarely, or never when deciding what to eat. While those who watched the least amount of television on average were likely to always consider their health when deciding what to eat.

This pilot study examined knowledge, attitudes, and behaviors among adolescents related to heart disease, physical activity, healthy eating, media influence, and the adoption of a healthy lifestyle. The cross-sectional survey employed was unique in that it combined questions on health behavior, television viewing, chronic disease knowledge, and health behavior practice. The study found that the amount of television viewing was significantly related to how often adolescents thought about their health when deciding what to eat. This finding is supported by the American Academy of

Pediatrics, who found that the effect television had on health behaviors related to nutrition, dieting, obesity, and self-image were primarily negative (American Academy of Pediatrics, 2001).

However, there were no significant relationships established between the total nutrition and heart disease knowledge scores and physical activity behavior. Yet, the finding of significant variability among knowledge scores in light of physical activity participation and non-participation suggests a relationship may exist between knowledge and physical activity behavior. Also, there were no significant relationships established between breakfast eating patterns and amount of television viewing, or between the frequency of fast food consumption and amount of television viewing. The lack of significant relationships may have been due to the smaller than anticipated sample size.

Also, it should be noted that despite a significant relationship not being found between knowledge and physical activity behavior, the majority of the adolescents surveyed had participated in physical activity through a least one sport's team in the past year. This result reflects findings from a study by Winters, Petosa, and Charlton (2003). In an examination of 9th and 10th grade students in Ohio these researchers found that a total of 52% of the females and 68% of the males in the sample had participated in an organized team sport in the past year (Winters, Petosa, & Charlton, 2003). The overwhelming majority of adolescents in the present study who were found to not be enrolled in a physical education class were also supported by results of a previous study. In a study of 9th and 10th grade students in Ohio, Pearman, Valois, Thatcher, and Drane (2001) found that 58% of the public high school students and 70% of the private high school students in their sample did not take a physical education class. These findings suggest that before and after school activities, if any, provide most of adolescents' physical activity participation.

## PUBLIC HEALTH IMPLICATIONS

This study has two primary implications for public health practice. First, since most of the indicated physical activity participation by the sample came from participation on sports teams, this study recommends that all students, regardless of ability, have access to and be encouraged to participate in sports teams, whether school-sponsored or recreational. Crucial information on healthy nutrition and heart disease prevention should be communicated through these sports teams, in order to make this knowledge more meaningful and of interest to adolescents.

Secondly, although fast food consumption and breakfast eating patterns were not significantly influenced by the amount of television viewing, food choice decisions were affected. This finding suggests that parents themselves need to educate their children about nutrition. Conflicting health messages on television can confuse adolescents and prevent them from thinking about their health when deciding what to eat.

At this time, there is a lack of data on the relationship between the multitude of factors influencing adolescent health decisions, their attitudes, and their behaviors related to heart disease prevention. In light of surging rates of heart disease risk factors and obesity in the adolescent population, further research is imperative.

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# Knowledge and Attitudes of Restaurant Operators Concerning the Requirements of the Georgia Smoke-Free Air Act

Jeffery B. Fountain
Coffee County Health Department
Occupational Safety and Health, Columbia Southern University

## Abstract

The State of Georgia enacted the Georgia Smoke-Free Air Act (GSAA) in 2005 to limit smoking in public places including restaurants. The purpose of this study was to determine if a correlation exists between restaurant operators' attitude toward smoking regulation and prevention and their knowledge of requirements of the GSAA. Participants from Atkinson, Bacon, and Jeff Davis counties, three of the smaller populated rural counties of the Southeast Health District, completed questionnaires for this study (n = 41). The correlation was weak and not determined to be statistically significant (r = -.251) but did indicate restaurant operators agree they have not lost more customers than have been gained as a result of the enactment of the GSAA. The study also indicates that these restaurants do not have access to computers, printers, and the Internet for GSAA information, education, or requirements.

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Corresponding Author: Jeffery Fountain, Occupational Safety and Health, Columbia Southern University, 3910 Old Axson Rd., Douglas, GA 31535-3824, email:jfountain@accessatc.net

## Knowledge and Attitudes of Restaurant Operators Concerning the Requirements of the Georgia Smoke-Free Air Act

The health effects of smoking and exposure to environmental tobacco smoke (ETS) have been concerns of public health practitioners for years. Only recently have these exposures received intense public attention (Akbar-Khanzadeh, 2003). Tobacco kills 4.2 million people in the world annually and is forecasted by the World Health Organization, as cited in *Lancet*, "to kill over ten million people per year by the late 2020's if robust steps to curb the epidemic are not taken immediately" (2002, p. 267). The Surgeon General's report, as cited in Kaur, Cohen, Dolor, Coffman, & Bastian, concludes that smoking is "the leading cause of preventable death in the United States" (2004, p. 888). From 1997 to 2001, the annual attributable cost of smoking in the United States was estimated at 167 billion dollars (Morantz, 2005). In Georgia alone, over 11,000 tobacco-related deaths occur each year (S. Brown, personal communication, November 9, 2005).

Tobacco smoke contains over 4,000 substances, of which over 40 are known to be carcinogenic. Lung cancer is often attributed to smoking (U.S. Department of Health and Human Services, 2004). Kaur et al. report that in women alone "since 1950 there has been a 600% increase in death rates from lung cancer, surpassing breast cancer as the leading cause of cancer death in women in 1997" (2004, pp. 888-889). In addition, other components of smoke attribute to heart, lung, and other deadly diseases (American Cancer Society, 2005; Akbar-Khanzadeh, 2003). Laboratory research now indicates smoking causes disease at the molecular and cellular levels of the body. Hebert reports that smoking is considered a primary risk factor for cardiovascular disease because it increases the tendency of blood platelets to clot and obstruct blood vessels (2004). In addition, Kaur et al. suggests that ETS tends to decrease levels of high-density lipoprotein and to damage the internal lining of heart and blood vessels (2004). The Centers for Disease Control and Prevention also indicate that exposure to ETS " . . . causes approximately 35,000 heart disease deaths and 3,000 lung cancer deaths among nonsmokers in the United States every year" (2005, p.649).

Tobacco smoke sometimes referred to as mainstream smoke, as defined by the American Cancer Society, is the smoke that is inhaled and exhaled from the cigarette. Environmental tobacco smoke (ETS) is not only mainstream smoke, but also the smoke in the environment that consists mainly of smoke escaping from the burning end of a cigarette (2005). The largest source of ETS is from ". . . side stream smoke coming directly from the burning end of the cigarette, not smoke exhaled by a smoker. Side stream smoke releases greater concentrations of both nicotine and other toxic and carcinogenic substances than what a smoker exhales" (Hebert, 2004, p. 754).

ETS-related cancer is so great that in 1992 the United States Environmental Protection Agency designated ETS ". . . as a Group A carcinogen to which no safe level of exposure exists . . ." (Williams et al., 2004, p.36). This designation resulted in regulatory efforts at federal, state, and local levels to minimize public smoking, such as in restaurants. The elevated danger of ETS in non-regulated bars and restaurants has recently been reported by many studies (Cramer et al., 2003; Williams et al., 2004). As a result, smoking must be limited in these working and family environments. Holloway et al., indicates that reducing public exposure to ETS is one of the national health objectives for 2010. To accomplish a reduction in exposure, the Centers for Disease Control and Prevention

recommends smoking bans and restrictions in public places (2003).

The State of Georgia recently enacted the Georgia Smoke-Free Air Act in 2005 (GSAA) – a set of regulations designed to limit smoking in public places, including restaurants (2005). Effective July 1, 2005, the new Act prohibits smoking inside most indoor public areas where children are admitted, including restaurants, and outlines specific guidelines for allowing smoking within establishments that serve the public (S. Brown, personal communication, November 9, 2005). Large fines may be imposed for uncooperative patrons and owners who knowingly continue to allow violations and threats to public health.

This study is designed to gain knowledge regarding the correlation between restaurant operators' attitudes toward the regulation and prevention of smoking within restaurants and their knowledge of the GSAA requirements. This study will support or disprove the hypothesis that restaurant operators with more positive attitudes will also better understand the GSAA requirements. The results will provide information on training needed for restaurant operators to reach total compliance. A Georgia Southeast Health District study found that restaurant operators manage smoking accommodations differently (some correctly, others incorrectly) (Holloway et al., 2003). As a result of this and the frequent turnover of restaurant employees, it is important that public health officials continuously monitor restaurant accommodations.

## METHOD

A total of 72 non-governmental restaurants or food service facilities were mailed surveys. These included all such facilities within the three small rural counties surveyed in Georgia: 15 from Atkinson County, 22 from Bacon County, and 35 from Jeff Davis County (U.S. Census Bureau, 2000). Surveys were designed to assess the restaurant operators' knowledge of the GSAA requirements (18 questions); attitude toward smoking regulation and prevention (three questions); and ability to access, download, and print items needed or required from the Internet (one question). The survey instrument was developed from frequently asked questions recorded by the Georgia Department of Human Resources.

## RESULTS

Of the 72 restaurants surveyed, 41 responses were collected resulting in a response rate of 56.9%. The restaurant operators' attitudes toward smoking regulation and prevention questions were tabulated along with their responses to knowledge of the GSAA questions. The mean score on the survey relating to knowledge of the requirements of the GSAA was determined to be 35.7% answered correctly (range: 0.0 to 66.7%, SD = 17.14), with a median score of 38.9%. A statistical review of the attitude responses versus knowledge scores using an SPSS 13.0 software statistical package revealed a very large range and wide standard deviation of scores for those answering two (range: 0.0 to 66.7%, SD = 17.3) and three (range: 5.6 to 61.1%, SD = 17.8) attitude determining questions positively. Very few responses were collected that answered positively to one or none of the attitudinal questions. Overall, there were an insufficient number of responses to each category of the attitudinal questions (range: 2 to 21).

## DISCUSSION

Although a best-fit line can always be drawn through data points, there is too much variation within this data to be a reliable trend. Analyzing a graph of the restaurant operators' knowledge scores versus the number of positive attitude answers toward smoking regulation and

prevention revealed only a weak Pearson correlation coefficient of the data (r = -.251, coefficient of determination ($r^2$) = .063, coefficient of alienation = 93.7%). Therefore, there is not a clear correlation between these two results as was hypothesized in this study.

One of the most interesting attitudinal questions on the questionnaire revealed that 90.2% of the 41 restaurant operators completing the survey agreed their restaurant has not lost any more customers than it has gained since the enactment of the GSAA in 2005. In addition, according to those surveyed in the three-county area, 26 restaurants (63.4%) did not have access to a computer, printer, or Internet capabilities. Respondents that do have access to a computer, printer, and the Internet (36.6% of those surveyed), on average, were more likely (in 16.0% more of the cases) to answer more of the smoking regulation attitude questions in a positive manner (Pearson's correlation coefficient (r) = .440). This could be a result of their ability to use a computer and the Internet to enlighten themselves on current issues including the hazards of smoking.

## CONCLUSION

Although the findings of this research were determined to be statistically insignificant, this study did demonstrate that over 90% of those surveyed agreed that the GSAA requirements have not negatively affected their businesses.

Overall, the knowledge assessment section of the questionnaire resulted in a relatively low score—an average of only 35.7% correct. Therefore, educational materials regarding the GSAA are needed by restaurant operators to fully comply with the requirements.

Finally, access to a computer, printer or the Internet was not available to 63% of the responding restaurants. Restaurant operators need to be able to use computers and the Internet to independently obtain written regulations, pamphlets, and required signs for compliance of the GSAA. A significant number of restaurant operators need different means of obtaining the signs required for notifying potential customers of smoking designation.

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