

AN EXAMINATION OF THE ASSOCIATION BETWEEN COLLEGE
STUDENTS' PERCEPTIONS OF INTERNET AND HEALTH EDUCATOR
CREDIBILITY AND HIV SCREENING

by

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ABSTRACT

TONY DERRICK MCLAURIN II. An examination of the association between college students' perceptions of Internet and health educator credibility and HIV screening. (Under the direction of Dr. JAN WARREN-FINDLOW)

Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS) remain a significant worldwide public health issue, especially for young adults and college students. Epidemiological evidence among this demographic indicate high rates of risky sexual behaviors and low levels of HIV testing. The current study examined students' perceptions of health educator and Internet credibility in relation to ever being screened for HIV. This cross-sectional study was a secondary data analysis of the Spring 2008 National College Health Assessment-I (NCHA-I). After excluding students who reported not being sexually active, were not a current undergraduate, had missing data, and students who did not know or recall being tested for HIV infection, the final analytic sample size consisted of 61,918 student participants. Logistic regression was used to model the crude association between health educator and Internet credibility in relation to ever being tested for HIV. Of the students analyzed, only 26.9% reported ever being tested for HIV infection. In the unadjusted analyses, students who perceived health educators as credible had 9% increased odds of ever being screened for HIV (OR=1.09; 95% CI: 1.03-1.16). Similarly, students who perceived the Internet as credible had 10% increased odds of ever being screened for HIV (OR=1.10; 95% CI: 1.06-1.15). After adjusting for age, gender, and sexual preference the relationship between health educator and Internet credibility and ever being tested for HIV infection persisted. Students who perceived health educators as credible had 8% increased odds of ever being screened for

HIV (OR=1.08; 95% CI: 1.02-1.15). Likewise, students who perceived the Internet as a credible source had 11% increased odds of ever being screened for HIV (OR=1.11; 95% CI: 1.07-1.16). These findings are suggestive for potential programmatic considerations and future research. Future studies should examine the use and believability of health information sources by topics that are most trusted by college students. Because college students consistently find health educators to be a credible source to acquire health information, the expansion of programs delivered by health educators should be a programmatic consideration. Lastly, because health literacy is broadly defined as the ability to discern credible information sources (Zarcadoolas, Pleasant, & Greer, 2005), health literacy should be a high priority item in the college curriculum so that students are good information consumers.

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INTRODUCTION

The Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS) continue to be a public health problem. Globally, the genesis of the HIV/AIDS epidemic has resulted in approximately 80 million infections and nearly 39 million deaths (World Health Organization [WHO], 2014). Similarly, in the United States, an estimated 25 million deaths have stemmed from HIV infection (Centers for Disease Control and Prevention [CDC], 2013a). Considering the paramount advantages of HIV testing, roughly 16% of infected persons in the United States are nescient of their HIV status (CDC, 2013a).

HIV is a virus that gradually suppresses the immune system by destroying CD4 T cells. As a result, the body becomes incapable of fighting off infections, potentially putting persons at a greater risk to develop AIDS (National Institutes of Health, 2012).

The US Department of Health and Human Services reports that 56,000 Americans become infected with HIV/AIDS each year (US Department of Health and Human Services [US DHHS], 2012). However, over the past three decades, deaths related to HIV have declined and the life expectancy of persons infected has improved dramatically. Major advancements in biomedical research and successful HIV educational tools have played a key role in controlling the incidence of new HIV cases (Centers for Disease Control and Prevention National Prevention Information Network, 2014). Significant gains in life expectancy are also continuing to increase over time with the availability of

effective and better tolerated antiretroviral regimens (CDC, 2014c). However, the costs associated with treating persons with HIV/AIDS may be viewed as an economic burden. The Centers for Disease Control and Prevention (CDC) estimates that approximately \$370,000 per person are spent during the average lifetime of persons seeking HIV treatment (CDC, 2013b).

The routes of transmission for HIV have been well documented. In the United States, unprotected sexual intercourse (including anal, vaginal and oral sex) with infected persons, the sharing of unsterilized injection equipment, and mother-to-child transmission (in utero or through breastfeeding) are among the most common routes for HIV transmission (USDHHS, 2014).

Demographically, African Americans remain a group that is disproportionately affected with HIV/AIDS. In 2010, African Americans outpaced every other racial/ethnic group, accounting for 44% of all new HIV cases in the United States, followed by non-Hispanic Whites (31%), Hispanic/Latino (21%), multi-racial (1%), American Indian/Alaskan natives (<1%) and Native Hawaiian/Pacific Islander (<1%) (CDC, 2013a).

Throughout the literature, young adults are highlighted as a vulnerable population that contributes to HIV infection (MacDonald, Wells, Fisher, Warren, King, Doherty, Bowie, 1990; Paul, McManus, & Hayes, 2000). Consistently, research among college students indicate high levels of HIV risk behavior, as college students are recognized as having multiple sexual partners and infrequent condom use (Iconis, 2011). In 2010,

young adults accounted for approximately 26% of all newly identified HIV infections (CDC, 2014a). The burden of HIV among this population emphasizes the pressing need to target prevention efforts towards this demographic.

Considering the variety of factors that put young adults at high risk for HIV infection, the overall effect and quality of secondary school-based sex education is of much concern. School-based sex education is integrated into the curricula in many secondary schools in efforts to: delay the initiation of sexual activities, provide students with a knowledge base to make conscious and informed decisions, and communicate the potential ramifications associated with risky sexual behaviors, such as the spread of sexually transmitted infections (STIs), including HIV (AVERT , 2014). However, only 22 states and the District of Columbia, are required to implement sex education courses in public secondary schools; while 20 of those states are mandated to include HIV education as a part of their instruction (Guttmacher Institute, 2014). Despite evidence which suggest that sex education is an effective method to attenuate the increasing rates of HIV and other STIs, students in the remaining 28 states may not be exposed to comprehensive sex education, potentially putting them at a greater risk to develop and adopt unhealthy behaviors.

In the event where persons choose to become sexually active, it is recommended that they be screened for HIV at least once per year, as a part of standard health care (CDC, 2014b). Caldeira et al. (2012) describe HIV testing as an effective preventive measure in reducing HIV transmission, especially among college students [(Caldeira,

Singer, O'Grady, Vincent, & Arria, 2012)]. A Healthy Campus 2020 objective (American College Health Association, 2012) is to increase the proportion of students who report ever being tested for HIV. Findings from the most recent 2013 National College Health Assessment (NCHA) revealed that 70.4% of college students participated in oral, vaginal, or anal sexual intercourse within the past 12 months. However, only 29.2% of college students reported ever being tested for HIV infection (American College Health Association, 2013). Thus, it is of high importance to examine what factors are related to HIV testing among college students.

When examining outlets that possibly serve as a conduit for health information, the omnipresence of the Internet should not be ignored; today's college students have never known a time when the Internet was not readily accessible. Past studies indicate that today's college students were exposed to the Internet at a relatively young age compared to previous generations (Jones, 2002), with 20% being introduced to the Internet between the ages of 5 and 8 (Jones, 2002). Further statistics indicate that 75% of current students average four or more hours per week of using the Internet, nearly 85% of students are current owners of personal computers and laptops, and 57% are owners of smart phones (Jones, 2002; Yu, 2012). Inevitably, today's technology is becoming a widely accepted approach that students employ for multiple purposes.

With the immense power and unprecedented capabilities of the Internet, researchers today are describing college students as "digital natives" (Prensky, 2001). From an educational perspective, online learning, or what is considered "e-learning" is

becoming a popular choice for college students, in comparison to learning environments that are highly teacher centralized and are traditionally face-to-face (Parkes, Stein & Reading, 2014). Just as the literature supports the idea that college students use the Internet to supplement formal parts of their education, additional studies argue that students are active consumers of the Internet for non-academic purposes, including health-information seeking. As such, the Internet is referenced as being interactive, convenient and a source that secures anonymity (Cline & Hayes, 2001; Hanauer, Dibble, Fortin & Col, 2010).

Consistent with the literature, institutions of higher learning are uniquely positioned to educate students on topics associated with healthy behaviors (Brenner & Gowda, 2001). According to the American College Health Association (ACHA), the core mission of colleges/institutions is to promote health beyond the focus of individual behavior and towards a broad range of socio-environmental factors (American College Health Association, 2014). However, with its rapid growth, students are frequently reporting the Internet as a source to find, seek and appraise health information (Escoffery, Miner, Adame, Butler, McCormick, & Mendell, 2005; Stellefson, Hanik, Chaney, Chaney, Tennant & Chavarria, 2011).

In addition to the Internet, health educators are celebrated throughout the literature as credible sources to transmit and disseminate health-related information. Findings from a recent study indicate that college students acknowledge health educators

to be one of the most believable sources to seek health information and advice from as they matriculate in higher academic settings (Vader, Walters, Roudsari & Nguyen, 2011).

In summary, the importance of HIV screening is beyond question. While both the Internet and health educators are acknowledged as important sources for health information among college students, their relationship with HIV screening is less clear. This study investigated whether college students who perceive the Internet and/or health educators to be credible are more likely to be screened for HIV. A secondary analysis was performed using national data from the Spring 2008 National College Health Assessment (NCHA).

LITERATURE REVIEW

Sources of health-related information used by young adults and college students

Health communication is understood to be an effective way to convey information with the goal of encouraging and modifying behaviors, attitudes, and beliefs. For many years, individuals have solely relied on providers and clinicians as a central resource to acquire health information. However, with advances in modern technology, the context in which persons are consuming health information continues to evolve. With the rapid diffusion of information online, the Internet and other forms of traditional media are becoming preferred options to acquire health information, especially among college students (Hesse, Nelson, Kreps, Croyle, Arora, Rimer & Viswanath, 2005). Interpersonal relationships (among providers, peers, health educators, and family members) are also well-documented as resources college students use to collect health information (Vader, Walters, Roudsari & Nguyen, 2011).

A recent study was conducted to specifically identify where college students are likely to seek health information and the believability associated with each source. The cross-sectional study included a sample of 94,806 students at 117 colleges and universities which participated in the Spring 2006 NCHA survey. Health educators, health center medical staff, faculty/coursework, and parents were consistently described as sources college students report ever using; a common trend that has been observed in previous survey years. Findings of the study revealed that Blacks (OR=1.78; 95%

CI=1.47- 2.16) and Hispanics (OR=1.21; 95% CI= 1.11-1.32) were more likely to use health educators as a source for health information as compared to white students.

Students who lived off campus (OR=1.19; 95% CI= 1.09-1.30) or were Black (OR=1.18; 95% CI= 1.08-1.30) had greater use of faculty/coursework for health information, in comparison to students who currently lived in residence halls and were White. Medical staff were often cited as a source for health information among college students who were classified as graduate students (OR= 1.48; 95% CI= 1.33-1.65), were engaged or in committed relationships (OR= 1.15; 95% CI= 1.11-1.19), and persons who were Black (OR=1.43; 95% CI= 1.31-1.56), and Hispanic (OR=1.19; 95% CI= 1.10-1.29) in comparison to students who were single, living in residence halls, and were White (Vader, Walters, Roudsari & Nguyen, 2011).

Similarly, a cross-sectional study was conducted to examine sources of health information among first-year university students and whether the predictors of information-seeking varied by information source. A total of 1,060 students aged 18 to 29 from an urban public research university in the Midwest were included in the final analyses. The following sources were reported as being used by students at least 3 or more times to obtain any health information: web sites (36.5%), medical professionals (28.5%), and traditional media (25.2%) including newspapers (7.6%), magazines (12.5%), television radio programs (11.7%) (Percheski & Hargittai, 2011).

In 2010, a study examined college students' Internet use, along with health seeking behaviors on the Internet and the attitudes towards the use of the Internet for

health information using an anonymous cross-sectional survey. The sample was comprised of 743 students attending two southeastern universities in the fall of 2002 and spring of 2003. Of the sample, 542 students (72.9%) reported getting health related information from the Internet, and of those, 7.7% retrieved information from the Internet “a lot,” 49.3% retrieved information “sometimes,” and 43.0% reported retrieving information from the Internet a “little.” Students frequently mentioned using the Centers for Disease Control and Prevention, WebMD, Mayo Clinic, Planned Parenthood, and MensHealth as common sources to obtain any health information (Escoffery , Miner, Adame, Edd, McCormick & Med, 2005).

Likewise, a cross-sectional study conducted in 2010 assessed health topics students received, how students obtained health-related information, and the perceived believability of each source. A total of 1,202 students from Canada were surveyed using the National College Health Assessment. Although the Internet was commonly reported as a prominent health information source, compared to health educators (90%), the Internet (17%) was considered to be one of the least believable sources of health information. In examining gender differences, females perceived health educators to be significantly more believable in comparison to males ($\chi^2 = 13.03$, $p < .01$). Students more likely to report not receiving any health information were single and lived away from home ($\chi^2 = 13.14$, $p < .01$). However, it was suggested that the Internet could possibly serve as a channel to target students who were living away from home and were more

likely to report not having any health information (Kwan, Arbour-Nicitopoulos, Lowe, Taman & Faulkner, 2010).

Sources of health-related information for young adults about HIV and HIV screening

As information online proliferates, the Internet is increasingly becoming the most preferred option to acquire information related to specific health topics, especially topics college students feel embarrassed or uncomfortable discussing with educators, health care providers, and parents. A recent study indicated that the Internet was a source persons primarily undertook due to its perceived usefulness, interactivity, and ability to act independently in self-managing their own healthcare (Cline & Hayes, 2001).

In 2010, an observational qualitative study was conducted to determine how college students search for information and whether the information they retrieve provides accurate answers to their sexual health questions. The sample consisted of 34 students who reflected the sex and racial composition of all first year undergraduates enrolled at a local university in South Florida. Students identified the Internet as the source most visited to seek information about STIs/HIV. Findings from this study also indicated that most students considered web sites ending in dot gov (.gov) or dot org (.org) as the most valid and reliable sources to find information related to sexual health, including STIs and HIV counseling (Buhi, Daley, Fuhrmann & Smith, 2010).

Factors associated with young adults and college students and HIV screening

Although HIV screening services are provided through a variety of settings including, health centers, clinics, hospitals, and local health departments, college students

often avoid seeking testing for STIs and HIV. Several factors such as denial, lack of STI knowledge, low perceived severity of STIs/HIV, and perceived negative consequences of testing, including public shame, negative emotions, and a fear of what others think contribute to students delay in getting screened for HIV (Barth, Cook, Downs, Switzer and Fischhoff, 2010). In the same manner, relief from negative tests, the belief that it is better to know your status, and past sexual history serve as plausible explanations as to why college students are actively screened for HIV (Barth, Cook, Downs, Switzer and Fischhoff, 2010).

A recent study at a large southwestern university was conducted to identify factors associated with students being screened for HIV. The sample consisted of 367 undergraduates and student health center clients. Findings from this study indicate that students who engage in high-risk behaviors, such as having sex without condoms or inconsistent use of condoms, are more likely to seek HIV testing and counseling compared to students who are frequent users of condoms (Mattson, 2002; Bontempi et. al, 2009). Moreover, students who sought HIV testing reported practicing unsafe vaginal intercourse ($\chi^2 = 5.39, p < .05$) and unsafe oral sex ($\chi^2 = 7.51, p < .05$).

In 2005, an exploratory cross-sectional study identified the prevalence and correlates of HIV testing among college students. The study included a sample of 903 students currently attending a local college in Kentucky. Measures of sexual risk behaviors were assessed. Findings indicate that HIV testing is more common among

students ages 20 or older versus younger students (27.8% v. 14.7%; $p=0.0001$), females as compared to males (25.4% v. 17.8%; $p=0.01$), and racial minorities as compared to Whites (42.7% v. 20.3%; $p=0.0001$). After adjusting for confounding variables, those reporting ever having vaginal sex (AOR=5.5; 95% CI =3.1-9.6), anal sex (AOR=2.4; 95% CI =1.6-3.6), and oral sex (AOR=6.3; 95% CI=3.0-13.3) were statistically significantly more likely to report ever being tested for HIV as compared to students who did not report those sexual activities. Further results illustrate that students having sex in the past 12 months (AOR=5.3; 95% CI=3.1-9.1), students reporting four or more sex partners (AOR=3.2; 95% CI=2.2-4.6), and persons reporting at least one episode of forced vaginal sex (AOR=3.9; 95% CI=2.1-7.2) were also statistically significantly more likely to report being tested for HIV (Crosby, Miller, Staten & Noland, 2005).

In 2009, a cross-sectional study was conducted to examine HIV testing among a sample of 957 unmarried recent college students in the United States. Data were collected as a part of the College Life Study, an ongoing longitudinal study of incoming first-year college students at a large public university in an urban region of the mid-Atlantic United States. Measures of HIV testing, number of sex partners, frequency of unprotected sex, and personal characteristics (including religion, first sexual encounter, and sexual orientation) were assessed. Results of the study revealed that HIV testing was more prevalent among females (49.8%) than males (32.9%), and non-heterosexuals (77.7%) than heterosexuals (39.8%). Similarly, HIV testing was more prevalent among Blacks (59.7%) and Hispanics (59.1%) and less prevalent for Whites (40.3%) and Asians

(28.3%). Findings also suggested a significant association between HIV testing and gender, race/ethnicity, sexual orientation, lifetime and recent same-sex and opposite-sex activity, lifetime STI treatment, and plans to get tested for HIV in the next year.

Compared to females, men were half as likely to be tested for HIV (AOR= 0.48, 95% CI= 0.37- 0.62, $p<.001$) after controlling for race/ethnicity and sexual orientation. Blacks (AOR=2.46, 95% CI=1.31-4.63, $p=.005$) were more than twice as likely to be tested for HIV compared to Whites. In addition, heterosexuals were one-third as likely as non-heterosexuals (AOR= 0.34, 95% CI= 0.17- 0.66, $p=.001$) to be tested for HIV (Caldeira, Singer, O'Grady, Vincent & Arria, 2012).

In summary, few empirical studies have explicitly investigated the relationship between students' perception of credible sources of health information and HIV screening. Many studies have examined where college students are likely to retrieve health information, and the degree of believability associated with each source. However, only two studies have used a large national population-based sample; the remaining studies have solely relied on campus-wide sampling strategies. Although measures of HIV testing were assessed throughout the literature, no study has explicitly examined the association between health educators and the Internet as credible sources of health information, in relation to being screened for HIV.

HYPOTHESES

The purpose of this study was to investigate whether college students' perceptions of credible sources of health information, specifically health educators and the Internet, are associated with getting screened for HIV, using data obtained from the Spring 2008 NCHA survey. The following hypotheses were assessed:

1. College students who perceive the Internet as a credible source will have increased odds of having been screened for HIV as compared to those students who do not perceive the Internet as credible.
2. College students who perceive health educators as a credible source will have increased odds of having been screened for HIV as compared to those students who do not perceive health educators as credible.

STUDY METHODS

Study Design and Population

This secondary data analysis used the National College Health Assessment-I (NCHA-I) dataset from Spring 2008. The NCHA-I is a national, comprehensive cross-sectional survey instrument that is administered on college campuses to assess and gauge the current health status of students. To achieve the goal of creating healthy campus communities, the NCHA-I contains 300 items which evaluate student health status and health problems, protective and risk factors, and impediments to academic performance. Data from the NCHA are collected during both Fall and Spring semesters each year.

One hundred and thirteen post-secondary institutions self-selected to participate in the Spring 2008 NCHA-I, resulting in 83,070 surveys completed by students currently attending those institutions. Only institutions that randomly selected students were included in the data set for final analyses. Before any exclusion criteria were applied, the data set consisted of 106 post-secondary institutions and 80,121 student responses.

Of the 106 campuses surveyed, 65 were public universities and 41 were private. Nearly all (95%), were 4 year institutions. Geographically, 17 schools were located in the Northeast, 18 were located in the Midwest, 35 were located in the South, 32 were located in the West, and 4 were located outside of the United States. With regard to school size variation, 25 schools had a student population of 20,000 or more, 35 schools had 10,000-

19,999 students, 18 schools had 5,000-9,999 students, 12 schools had 2,500-4,999 students and 16 institutions had less than 2,500 students.

Exposure Assessment

Students' perception of credible sources of health information was examined as the main exposure for this study. Participants were provided with a list of information sources that included: friends, parents, religious centers, campus peer educators, leaflets, pamphlets, flyers, campus newspaper articles, health center medical staff, health educators, residential assistants/advisors, television, magazines, faculty/coursework, and the Internet/world wide web. The believability of each source of health information was assessed using a Likert scale, in which participants responded to each source of health information as, "BELIEVABLE," "NEITHER BELIEVABLE NOR UNBELIEVABLE," or "UNBELIEVABLE." For this study, health educators and the Internet/world wide web were assessed as the primary exposures. Variables were dichotomized and coded as "BELIEVABLE" (1), versus "OTHER" (NEITHER BELIEVABLE NOR UNBELIEVABLE and UNBELIEVABLE) (0).

Outcome Assessment

The main outcome of interest, HIV screening, was measured on the NCHA-I survey with the following question: "Have you ever been tested for HIV infection?" Participant response categories included the following: "NO," "YES" or "DON'T KNOW." For the current study, persons who reported "DON'T KNOW" (n=3,912) were excluded from data analysis. Therefore, ever being tested for HIV infection was defined

as those participants who have been screened (1) versus those who have not been screened for HIV infection (0).

Measurement of Confounders of Interest

The confounders considered were consistently found throughout the literature and are not considered to be factors that appear on the causal pathway between the defined exposures and outcome. Confounders considered for the purpose of this study included: gender, age, race/ethnicity, student status, year in school, residence, region of college in the United States, Historically Black Colleges and Universities (HBCUs), relationship status, sexual preference, and condom utilization during oral sex, anal intercourse, and vaginal intercourse. For the current study, gender was categorized as Male or Female. Age was categorized as persons <21 or ≥ 21 . Each ethnic/racial minority was coded as a separate variable. Five race/ethnicities were considered: “Black-not Hispanic,” “Hispanic,” “Asian,” “Indian,” or “Other.” White-not Hispanics were considered as the referent in all models. Student status was similar to initial coding from the NCHA-I with the following response options: Full-time student or Not. Year in school was categorized to include only undergraduate students from first to fifth year (1-5). Residence categories were collapsed and categorized as: with parent/other or University related housing (residence hall, fraternity/sorority house, off campus, other). Region of college in the United States were based on the NCHA guidelines, but categorized as South or Other (Northeast, Midwest, South, West). Attendance at HBCUs reflected the initial coding from the NCHA-I with response options of Yes or No. Relationship status categories

were collapsed and categorized as Single or Other (married, engaged, separated, divorced, or widowed). Sexual preference categories were collapsed and categorized as Heterosexual or Other (gay/lesbian, bisexual, transgendered, or unsure). Condom utilization during oral sex, vaginal intercourse, anal intercourse were categorized to define students who were “most at risk” and “least at risk” for HIV infection. Students who were considered to be “most at risk” for HIV infection reported “never,” “rarely,” or “sometimes” using condoms during oral sex, vaginal intercourse, or anal intercourse in the past 30 days. In contrast, students were considered “least at risk” for HIV infection if they reported “never participating in activity,” “not in the past 30 days” “always,” or “mostly,” using condoms during oral sex, vaginal intercourse, or anal intercourse in the past 30 days. The study considered females, persons ≥ 21 , White-not Hispanic, full-time students, higher academic classification, persons residing in university related housing, students attending schools in the regions other than the South, students not attending HBCUs, single persons, heterosexuals, and persons “least at risk” for HIV infection through oral sex, anal intercourse, and vaginal intercourse, as referent categories; it was hypothesized that these persons are more likely to be screened.

Data Analysis

Univariate Analysis

The frequencies and percentages of all variables were summarized for the participants in the study.

Bivariate Analysis

Logistic regression was used to calculate odds ratios (OR) and 95% confidence intervals (CIs) to model the crude association between health educators as a credible source and ever tested for HIV and the Internet as a credible source and ever tested for HIV. Logistic regression was also performed to identify if any other factors were related to ever being tested for HIV.

Multivariate Analysis

Multivariate logistic regression was used to calculate adjusted ORs and 95% CIs to model the association between health educators as a credible source and ever tested for HIV, and the Internet as a credible source and ever tested for HIV, while controlling for confounders. Variables were considered as confounders if the magnitude of the association between the defined exposure and outcome changed by 10% (Maldonado & Greenland, 1998). Because no variables met the threshold for confounding in the current study, gender, age, and sexual preference were used in the multivariate analysis to calculate adjusted ORs and 95% CIs. All data analyses were conducted using the IBM Statistical Package for Social Sciences (SPSS) 21 software.

Power and Sample Size

Approximately 80,121 students were available for analysis. The study excluded students who did not report being sexually active (n=1,447), were not current undergraduates (graduate students, adult special, other) (n=9,382), missing values (n=3,462), and students who did not know or recall being tested for HIV (n=3,912). The final analytic sample size included 61,918 student responses.

Setting alpha at .05 and power at 80%, and the frequency of health educator credibility at 93.9% (Zullig, Reger-Nash, & Vaolis, 2012), the smallest detectable OR for the association between health educator credibility and ever testing for HIV infection is 1.11. Considering students who did not perceive health educators as credible as unexposed, the ratio of unexposed to exposed was estimated at approximately 4.88:1.

Setting alpha at .05 and power at 80%, and the frequency of Internet credibility at 17% (Kwan, Arbour-Nicitopoulos, Lowe, Taman, & Faulkner, 2010), the smallest detectable OR for the association between Internet credibility and ever testing for HIV infection is 1.07. Considering students who did not perceive the Internet as credible as unexposed, the ratio of unexposed to exposed was estimated at approximately 0.06:1.

Human Subjects Protection

This is a secondary data analysis. The information in the dataset is de-identified; no human subjects were involved.

RESULTS

Characteristics of the Participants

Of the college students surveyed (see Table 1), the majority were females (64.7%), less than 21 years of age (56.7%), and White (77.5%). Most (96.1%) participants were full time students, first year undergraduates (26.5%), and resided in university related housing (86%). Compared to “other” regions, one-third of schools represented were in the South. Historically Black Colleges and Universities (HBCU’s) accounted for less than 1% of the sample. More than half of the study participants reported they were single (57.6%), and nearly all (93.8%) identified themselves as heterosexuals. Approximately 45% of students who reported participating in oral sex were considered “most at risk” for HIV; 29.6% of those who engaged in anal sex and only 7.0% who engaged in vaginal intercourse were categorized as being “most at risk.” Most (89.2%) students perceived health educators to be a credible source of health information. In comparison, only one quarter (25.0%) of students perceived the Internet as a credible source of health information. With regard to HIV testing, only 26.9% of the study population reported ever being screened.

Bivariate Analysis of Baseline Characteristics

All variables were significantly associated with the outcome of interest (see Table 2). Females had 16% increased odds of ever being screened for HIV when compared to males (OR=1.16; 95% CI: 1.08-1.24). For age, participants 21 years or older, had 2.65

times the odds of having been screened for HIV than those who were younger than 21 (95% CI: 2.56-2.75). Considering race/ethnicity, Black-non Hispanic (OR=2.25; 95% CI: 2.10-2.43), Hispanic (OR=1.26; 95% CI: 1.17-1.35), Indian (OR=1.60; 95% CI: 1.41-1.83), and Other (OR=1.21; 95% CI: 1.10-1.32) students had increased odds of being tested for HIV as compared to White-non Hispanic students. Asians, however, experienced 35% decreased odds of being screened for HIV (OR=0.65; 95% CI: 0.61-0.69) as compared to all other racial or ethnic groups. Participants who were not full-time-students had 2.99 times the odds of having been screened for HIV as compared to full-time students (95% CI: 2.73-3.28). For each additional year of undergraduate education, students had 41% increased odds of being screened for HIV (OR=1.41; 95% CI: 1.39-1.43). Participants who lived in university related housing had decreased odds of ever being screened for HIV when compared to students living with a parent/other (OR=0.83; 95% CI: 0.79-0.87). Similarly, students from schools located in the South exhibited a decreased odds of being screened, compared to “other” regions (OR=0.97; 0.93-1.00). HBCUs had more than four times the odds of being screened for HIV compared to institutions that were not HBCUs (OR=4.24; 95% CI: 3.34-5.37). Participants who identified themselves as non-heterosexual (OR=0.47; 95% CI: 0.44-0.50), and those who were not single (OR=0.47; 95% CI: 0.44-0.50) had decreased odds of being screened for HIV as compared to students who were single and heterosexual. In addition, students who were most at risk during oral sex had significantly increased odds of ever being screened for HIV (OR=2.31; 95% CI: 2.23-2.40) in comparison to students

who were “least at risk.” This finding was similar for students who were most at risk during anal intercourse (OR=2.55; 95% CI: 2.40-2.72) and vaginal intercourse (OR=2.84; 95% CI: 2.73-2.95).

In unadjusted analyses (see Table 3), students who perceived health educators as a credible source had 9% increased odds of ever being screened for HIV (OR= 1.09; 95% CI: 1.03-1.16). Similarly, students who perceived the Internet as a credible source had 10% increased odds of ever being screened for HIV (OR= 1.10; 95% CI: 1.06-1.15).

Multivariate Analysis

After adjusting for age, gender, and sexual preference (see Table 3), the relationship persisted with increased odds of ever being screened for HIV. Students who perceived health educators as a credible source had 8% increased odds of being screened for HIV as compared to students who did not perceive health educators as credible (OR=1.08; 95% CI: 1.02-1.15). Likewise, students who perceived the Internet as a credible source had 11% increased odds of being screened for HIV as compared to students who did not perceive the Internet as credible (OR= 1.11; 95% CI: 1.07-1.16). However, the association between health educator credibility and ever being tested for HIV, and Internet credibility and ever being tested for HIV had no meaningful change, as both associations changed by 1% respectively.

DISCUSSION

Summary of Main Findings

The current study examined college students' perception of health educator and Internet credibility, in relation to ever being screened for HIV. As in previous studies (Adefuye, Abiano, Balogun & Lukobo-Durrell, 2009; Barth et al., 2010; Bontempi et al., 2009), findings indicate the prevalence of high risk behaviors, and low perceptions of risk for infection among this cohort. Of the study population, only 26.9% reported ever receiving an HIV test. As hypothesized, students who perceived health educators as a credible source of health information had increased odds of ever being screened for HIV. The associations between health educator and Internet credibility and ever being screened for HIV remained statistically significant after adjusting for age, gender, and sexual preference. Findings indicate that students who perceived health educators as credible had 8% increased odds of ever being screened for HIV. Similarly, students who perceived the Internet as credible had 11% increased odds of ever being screened for HIV.

Consistency with Prior Studies

To date, no study has explicitly examined health educator and Internet credibility in relation to ever being screened for HIV among college students. Thus, the results from the current study will be compared to findings from studies which have explored credible health information sources and HIV screening.

Parallel to findings from previous studies, findings from the current study suggest that a significant number of college students report receiving the majority of their health-related information from health educators (Zullig, Reger-Nash & Valois, 2012). Likewise, more students perceived health educators as a credible source for health information, in comparison to the Internet (Vader et al., 2011; Kwan et al., 2010). Similar to past findings, the Internet was often associated with high rates of ambivalence and non-believability (Kwan et al., 2010). Nationally, as in our sample, females appeared to be at lower risk for HIV as compared to males (Caldeira et al., 2012; Crosby et al., 2005). Age differences were largely consistent with prior studies, as older age was often associated with higher rates of being tested for infection (Crosby et al., 2005). Results from the current study echo findings from previous studies, as persons who have a history of same-sex partner relations had lower rates of being tested for HIV infection. Considering race/ethnicity, most racial categories demonstrated increased odds of HIV testing; a consistent finding in regards to past research (Crosby et al., 2005; Caldeira et al., 2012).

Consistent with previous literature, findings from the current study found that persons with high-risk behaviors, such as being infrequent condom users, were more likely to be screened for HIV (Mattson, 2002; Bontempi et al., 2009). With respect to relationship status, persons who were in committed partnerships were less likely to be screened in comparison to single persons. However, these findings are not consistent and

parallel to results from a recent study which concluded that relationship status was associated with HIV testing (Trieu, Modeste, Marshak, Males & Bratton, 2010)

Limitations and Strengths

Findings from this study must be interpreted in light of certain limitations. Since the NCHA-I survey is self-reported, data may be subjected to questions left unanswered and social desirability. Misclassification of the outcome, HIV testing, is also likely due to the timeframe of reporting. Self-selection bias is an additional limitation of the current study, as the mean response rate was 29.0%. Due to the cross-sectional nature of the current study, it is difficult to identify a causal relationship between the defined exposures and outcome of interest, as it is unclear of when screening occurred. Lastly, with regard to external validity, variations in data collection, such as the use of a paper survey, Web-based survey, or a combination of both, which the NCHA allows, limits the interpretation of the study findings.

The selection of potential confounders in the current study were consistently found throughout the literature and appeared on the NCHA-I survey instrument. However, none of the variables considered in the current study met the threshold for confounding. There is a possibility that there are other confounders related to the defined exposures and outcome of interest that were not examined in this study. Failure to control for these unknown confounders could result in an over or under estimation of the true association.

Despite these limitations, this study has important strengths. First, the NCHA-I serves as a comprehensive survey that covers a host of health topics and risk behaviors, including sexual activities. Secondly, data from the NCHA-I are collected among a large sample of students and universities nationally, thus providing a snapshot of student health statuses. Because the NCHA-I survey instrument is valid and nationally representative, results may be generalizable to schools and students similar to those surveyed. Other strengths include having a large representative sample to examine the association between the defined exposures and outcome of interest, while considering possible moderating effects. Lastly, with limited empirical studies conducted using national samples, the current study itself is a strength, as it fills gaps that currently exist in the literature.

CONCLUSION

Results of the current study, while statistically significant, are not of sufficient magnitude to support large scale policy changes. However, the findings are suggestive and offer some potential avenues for future research.

With college being an environment that offers many opportunities for high-risk HIV behaviors, it is important that future research examine HIV screening characteristics among this cohort and also identify an earlier timeframe for when persons were screened for HIV. For example, instead of researchers asking if participants were “ever screened for HIV,” ask “in the previous six months were you screened for HIV?” Because college students often underestimate their susceptibility for HIV infection, there is a pressing need for targeted HIV prevention strategies and continued outreach on college campuses. Because participants of the current study were most at risk for HIV infection through oral sex, future studies might need to provide college students with more education related to HIV transmission during oral sex. Since HBCU students were largely underrepresented in the current study, further research needs to explore and examine health information credibility in relation to HIV screening among students attending these institutions. Additional studies might consider examining the use and believability of health information sources by topics that are most trusted by college students.

On a programmatic level, because students consistently find health educators to be a credible source, the expansion of programs delivered by health educators should be

an important consideration. Lastly, because health literacy is broadly defined as the ability to discern credible information sources (Zarcadoolas, Pleasant, & Greer, 2005), health literacy should be a high priority item in the college curriculum so that students are good information consumers.

Overall, the key findings of this study may be useful for colleges and institutions, similar to those surveyed, to design appropriate and effective health information campaigns that encourage students to be screened for HIV. In addition, findings may assist researchers with developing better strategies to distribute and disseminate health information towards different demographics, assist with eliminating barriers in receiving comprehensive sex education in higher academic settings, and discuss the effectiveness of health educators, specifically sexual health specialists.

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APPENDIX: TABLES

Table: Baseline characteristics of NCHA-I survey respondents, Spring 2008		
Variable Name	n	(%)
Gender		
Male	21,351	34.5
Female	40,046	64.7
Missing	521	0.8
Age		
<21	35,117	56.7
≥21	26,594	43.0
Missing	207	0.3
Race/Ethnicity		
White-non Hispanic	47,992	77.5
Black-non Hispanic	3,141	5.1
Hispanic	4,079	6.6
Asian	6,803	11.0
Indian	979	1.6
Other	2,307	3.7
Student Status		
Full time	59,510	96.1
Not full time	1,888	3.0
Missing	520	0.8
Year in School		
1 st year undergraduate	16,406	26.5
2 nd year undergraduate	14,552	23.4
3 rd year undergraduate	15,100	24.4
4 th year undergraduate	12,366	20.0
5 th year undergraduate	3,494	5.6
Residence		
With parent or other	8,773	14.2
University related housing	52,923	85.5
Missing	222	0.4
Region of USA		
South	20,218	32.7
Other	41,700	67.3
HBCU campus		
Yes	285	.5

No	61,633	99.5
Table 1: (Continued)		
Relationship Status		
Single	35,686	57.6
Other	26,040	42.1
Missing	192	0.3
Sexual Preference		
Heterosexual	58,061	93.8
Other	3,492	5.6
Missing	365	0.6
Condom Utilization		
<i>Oral Sex</i>		
Least at risk	33,622	54.3
Most risk	27,651	44.7
Missing	645	1.0
<i>Anal Intercourse</i>		
Least at risk	42,886	69.3
Most at risk	18,347	29.6
Missing	685	1.1
<i>Vaginal Intercourse</i>		
Least at risk	56,811	91.8
Most at risk	4,317	7.0
Missing	790	1.3
Credibility of Health Educators		
Believable	55,692	89.2
Other	6,226	10.0
Credibility of Internet		
Believable	15,504	25.0
Other	46,414	75.0
Ever screened for HIV		
Yes	16,643	26.9
No	45,275	73.1

Table 2: Unadjusted odds ratio and 95% confidence intervals for the association between characteristics of college students and HIV testing of NCHA-I survey respondents, Spring 2008	
Variable Name	Unadjusted OR (95% CI)
Gender	
Male	Referent
Female	1.16 (1.08-1.24)
Age	
<21	Referent
≥21	2.65 (2.56-2.75)
Race/Ethnicity	
White-non Hispanic	Referent
Black-non Hispanic	2.25 (2.10-2.43)
Hispanic	1.26 (1.17-1.35)
Asian	0.65 (0.61-0.69)
Indian	1.60 (1.41-1.83)
Other	1.21 (1.10-1.32)
Student Status	
Full time	Referent
Not full time	2.99 (2.73-3.28)
Year in School	
	1.41 (1.39-1.43)
Residence	
With parent or other	0.83 (0.79-0.87)
University related housing	Referent
Region of USA	
South	0.97 (0.93-1.00)
Other	Referent
HBCU campus	
Yes	4.24 (3.34-5.38)
No	Referent
Relationship Status	
Single	Referent
Other	0.55 (0.53-0.57)
Sexual Preference	
Heterosexual	Referent

Other	0.55 (0.53-0.57)
Condom Utilization	
<i>Oral Sex</i>	
Table 2. (Continued)	
Least at risk	Referent
Most at risk	2.31 (2.23-2.40)
<i>Anal Intercourse</i>	
Least at risk	Referent
Most at risk	2.55 (2.40-2.72)
<i>Vaginal Intercourse</i>	
Least at risk	Referent
Most at risk	2.84 (2.73-2.95)

Table 3: Unadjusted and adjusted odds ratios and 95% confidence intervals for the association between credibility of health information sources and HIV screening among college students (n=61,918)		
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Credibility of Health Educators	1.09 (1.03-1.16)	1.08 (1.02-1.15)
Credibility of Internet	1.10 (1.06-1.15)	1.11 (1.07-1.16)

*adjusted for age, gender, and sexual preference