Published in final edited form as:

J Natl Med Assoc. 2010 December ; 102(12): 1173–1182.

HIV Knowledge and its Contribution to Sexual Health Behaviors of Low-Income African American Adolescents

Rebecca R. Swenson, Ph.D.*,

Bradley/Hasbro Children's Research Center of Rhode Island Hospital, Brown University, One Hoppin Street, Coro West Building, Suite 204, Providence, Rhode Island, USA, Phone: 401.444.8539 / Fax: 401.444.4645, rswenson@lifespan.org

Christie J. Rizzo, Ph.D.,

Bradley/Hasbro Children's Research Center of Rhode Island Hospital, Brown University, One Hoppin Street, Coro West Building, Suite 204, Providence, Rhode Island, USA, Phone: 401.444.8539 / Fax: 401.444.4645, crizzo@lifespan.org

Larry K. Brown, M.D.,

Bradley/Hasbro Children's Research Center of Rhode Island Hospital, Brown University, One Hoppin Street, Coro West Building, Suite 204, Providence, Rhode Island, USA, Phone: 401.444.8539 / Fax: 401.444.4645, lkbrown@lifespan.org

Peter A. Venable, Ph.D.,

Department of Psychology and Center for Health and Behavior, Syracuse University, 430 Huntington Hall, Syracuse, New York, USA, pvenable@syr.edu

Michael P. Carey, Ph.D.,

Department of Psychology and Center for Health and Behavior, Syracuse University, 430 Huntington Hall, Syracuse, New York, USA, mpcarey@syr.edu

Robert F. Valois, Ph.D.,

Arnold School of Public Health, University of South Carolina, 800 Sumter Street, Room 216, Columbia, South Carolina, USA, RFValois@gwm.sc.edu

Ralph J. DiClemente, Ph.D., and

Rollins School of Public Health, Emory University, 1518 Clifton Road, NE, Suite 554, Atlanta, Georgia, USA, rdiclem@sph.emory.edu

Daniel Romer, Ph.D.

Annenberg Public Policy Center, University of Pennsylvania, 3535 Market Street, Suite 550, Philadelphia, Pennsylvania, USA, dromer@asc.upenn.edu

Abstract

Objectives—Although many factors contribute to racial disparities in HIV/AIDS among young African Americans, knowledge is a particularly modifiable factor. However, little information has been published about the current HIV knowledge of African American teens or to what extent knowledge independently contributes to their sexual behavior and health. This study aimed to describe the level of knowledge among this at-risk population and determine whether knowledge contributes to variance in sexual behavior and health beyond that of sociodemographic and psychological factors.

*Please address correspondence to: Rebecca R. Swenson, Ph.D., Bradley / Hasbro Children's Research Center, Coro West Building, Suite 204, One Hoppin Street, Providence, RI 02903. Telephone: 401-793-8539. Fax: 401-444-4645. rswenson@lifespan.org.

Methods—African American adolescents (n = 1,658) were recruited in two northeast and two southeast U.S. cities (74% eligible for free/reduced-price school lunch). Analyses utilized data gathered from adolescents using an audio computer-assisted self-interview (ACASI) program.

Results—On average, participants answered only 50% of HIV knowledge items correctly and were least accurate concerning effective condom use and HIV testing. Controlling for associated sociodemographic and psychological factors, greater knowledge was associated with sexual experience and, among experienced adolescents, with STI/HIV testing and, unexpectedly, less condom use.

Conclusions—HIV knowledge, which is modifiable, is limited among at-risk African American adolescents and is an important contributor to sexual behavior and health. Findings indicate a need for more comprehensive HIV/AIDS education, *particularly* with regard to condom use and the benefits of routine STI/HIV testing. Although knowledge might not be sufficiently protective in and of itself, having accurate information about HIV may benefit sexual health by impacting health-promoting attitudes necessary for successful engagement in healthcare-seeking behavior.

Keywords

HIV knowledge; HIV testing; condom use; African American; sexual health

The HIV/AIDS epidemic disproportionately affects young economically disadvantaged African Americans. In 2007, African Americans accounted for only 17% of U.S. adolescents between 13 and 19 years and 72% of reported HIV/AIDS diagnoses among this age group.¹ African Americans also face shorter survival times and more deaths due to HIV/AIDS than other ethnic/racial groups.^{2,3} Although many factors contribute to racial health disparities in HIV/AIDS, a particularly modifiable factor is knowledge.^{4,5,6} Nevertheless, little is known about the current HIV knowledge of low-income African American teens or to what extent knowledge contributes to the sexual behavior and health of this at-risk population.

Among adults, inadequate health literacy (e.g., less HIV/AIDS knowledge) decreases the likelihood of engaging in preventative health behaviors and may contribute to HIV-related stigma by perpetuating misconceptions about how HIV is transmitted.^{7,8,9,10} Findings regarding the impact of HIV knowledge on adolescent sexual behavior, however, have been inconsistent. Studies have demonstrated that knowledge tends to be higher among youth who have had sex.¹¹ Among sexually experienced youth, findings suggest that greater HIV knowledge is associated with more consistent condom use and greater likelihood of HIV testing.^{12,13,14} However, other studies have either failed to replicate this relationship or have found that more knowledge is associated with greater risk-taking.^{15,16,17}

Despite its potential importance, deficits in HIV knowledge exist among adolescents in general, and this is especially true for African Americans.^{18,19} One explanation for this may be greater economic disadvantage among minorities in the United States (U.S.). Children living in poverty are more likely to be uninsured and thus, have less access to healthcare.^{20,21} Poverty is also associated with poorer schools, less school engagement, more absences, and higher dropout rates, all of which are likely to impact knowledge.^{22,23} As such, poverty may reduce the health literacy of those with low incomes living in disadvantaged neighborhoods by decreasing access to HIV information from healthcare providers and other health educators. Poverty may also impact health literacy through an association with HIV stigma, given that negative attitudes toward people living with HIV/AIDS are prevalent among low-income Black populations and may lead to decreased willingness to seek out and attend to information about HIV prevention, diagnosis, and treatment.²⁴

The information-motivation-behavioral skills (IMB) model is a well-established theory of HIV risk and preventive behavior with demonstrated intervention efficacy for ethnic/racial minority and low-income populations.^{25,26,27,28} The IMB model would predict that HIV knowledge should be related to measures of motivation (e.g., intentions to use condoms and perceived risk of unprotected sex) and behavioral skills (e.g., self-efficacy for risk reduction), as well as better sexual health. In addition, recent research has enhanced the IMB model by including HIV-related stigma as a correlate of information and motivation.²⁹ Because misconceptions about HIV transmission contribute to stigma, and because stigma has been demonstrated to be associated with sexual health behaviors, it is especially important to examine whether HIV knowledge contributes to adolescent sexual health apart from the impact of stigma.^{10,30,31} In sum, it is known that HIV knowledge is low among African American adolescents and that knowledge is associated with both sociodemographic and psychological factors. What is not known, however, is whether knowledge impacts sexual behavior and health *over and above* these associated factors.

Therefore, the objectives of the present study were to: 1) describe relative areas of strengths and deficits with regard to the HIV knowledge of low-income African American adolescents, 2) investigate the associations of HIV knowledge to sociodemographic factors and theoretically-related psychological constructs (perceived risk of unprotected sex, condom use intentions, risk reduction self-efficacy, HIV-related stigma), and 3) determine whether HIV knowledge uniquely contributes to variance in sexual behavior and health over and above the contribution of associated sociodemographic and psychological constructs. Specifically, we hypothesized that greater HIV knowledge would be associated with: 1) older age, female gender, better academic performance, higher income, and less neighborhood stress and 2) more perceived risk of unprotected sex, greater condom use intentions, greater risk reduction self-efficacy, and less HIV-related stigma. Controlling for these sociodemographic and psychological variables, we expected that greater HIV knowledge would be independently associated with a history of sexual intercourse given that knowledge may be gained through experience. Among sexually experienced adolescents, we expected that greater HIV knowledge would be associated with more condom use and STI/HIV testing and a history of fewer STIs and pregnancies.

Methods

Participants

Participants were 1,658 African American adolescents recruited in two matched northeast (Providence, RI and Syracuse, NY) and two matched southeast U.S. cities (Columbia, SC and Macon, GA) for a multilevel HIV preventive-intervention, Project iMPPACS.^{32,33} The four selected cities are in regions of the U.S. with high HIV/AIDS rates, have similar population sizes, and a high concentration of African-American youth living at or below poverty levels. All adolescents ages 13 to 18 that were able to speak and read English were eligible to participate. Participants were recruited through direct outreach to partnering community-based organizations (21%) such as community centers that provide recreational, social, and educational services for African American youth, and through participant referral (29%), respondent driven sampling (15%), referral from adults in the community (14%), and street outreach (9%). A detailed report of our experiences working with community partners during the planning and implementation phase of Project iMPPACS has been previously published by Vanable and colleagues.³³ Of the 2,145 adolescents invited to participate in the study, 1,658 were consented, assessed at baseline, and randomized to a treatment condition (77%). The 23% who did not participate included adolescents who reported having scheduling conflicts, parent/guardian disapproval of the program, or lack of interest in the program and those adolescents who could not be reached to schedule their baseline appointment.

The present study examined baseline data from the longitudinal project. The sample consisted of 60% females with 5% of participants reporting Latino ethnicity. Mean age of participants was 15.08 years ($SD = 1.10$). The study successfully recruited a low-income sample with 74% of participants reporting eligibility for free or reduced-price school lunch. Adolescents living in the northeast region of the U.S. were significantly more likely to report eligibility for free/reduced-price lunch than adolescents in the southeast [$\chi^2(1, N = 1648) = 6.508, p < .05$].

Procedures

All study protocols were approved by the Institutional Review Boards (IRBs) at the four study sites. Informed consent was obtained from adolescents age 18 and older and adolescent assent and parental consent were obtained from those ages 13 to 17. Participants completed assessment measures on laptop computers using an audio computer-assisted self-interview (ACASI) program. The assessment battery took approximately 45 minutes to complete and participants were compensated \$30 for their time and effort.

Measures

Brief HIV Knowledge Questionnaire (HIV-KQ-18)—This 18-item scale assesses factual information about HIV transmission, diagnosis, and prevention. Response options were *mostly true* or *mostly false* or *don't know* if they were unsure.³⁴ Correct answers were summed, with a possible range of 0 to 18. Because we could not assume that the individual HIV-KQ-18 items would be equivalent in their relations to the outcomes, a factor analysis was conducted to determine whether items clustered together into subscales that might be differentially associated with outcomes.³⁵ Regression analyses were also conducted to examine associations between individual items and the outcomes. No interpretable patterns emerged from the data using either strategy, therefore, the total index score was determined to be the most appropriate measure of cumulative HIV knowledge to use in the analyses.

The HIV-KQ-18 has demonstrated internal consistency, stability, validity, and sensitivity to change among diverse adult samples. Among the African Americans teens in the pilot stage of Project iMPPACS, the test-retest reliability estimate for the HIV-KQ-18 has previously been reported to be .73.³⁶ In the present sample, acceptable internal consistency was demonstrated with a Cronbach's alpha coefficient of .77.

Sociodemographics—Participants' age, gender, ethnicity, academic performance, eligibility for free or reduced-price lunch status, and neighborhood stress were assessed. Perceptions of neighborhood stress were indexed with 10 items from the City Stress Inventory ($\alpha = .85$), which assesses perceived neighborhood disorder and exposure to violence in participants' urban neighborhoods during the past year (e.g., "A family member or friend was robbed or mugged in the past year" or "I saw people dealing drugs near my home in the past year;" 1 = *never/none* to 4 = *often/most*).³⁷ Validity and reliability of this inventory of neighborhood stress have previously been demonstrated among urban adolescents in both the U.S. and India.³⁸

Sexual Health-Related Cognitions—HIV-related stigma was measured with seven items ($\alpha = .84$) assessing negative attitudes toward persons with HIV (e.g., "People who have HIV should be ashamed" and "I do not want to be friends with someone who has HIV").³⁹ Participants also responded to seven items ($\alpha = .73$) assessing HIV risk reduction self-efficacy, such as "If you have sex after drinking or using drugs, how hard or easy would it be for you to make sure you and your partner use a condom every time."⁴⁰ A single item assessed how risky participants thought having sex without using a condom would be for their health (1 = *not at all risky* to 4 = *very risky*). Additionally, one item assessed condom

use intentions: “If I have vaginal sex in the next 3 months, I intend to use a condom every time” (1 = *strongly disagree* to 6 = *strongly agree*). Measures used in the present study were piloted with urban African American adolescents in preparation for Project iMPPACS to assess their relevance to this population prior to inclusion in the final assessment battery.^{33,36}

Sexual Health Behaviors—Sexual intercourse (defined as lifetime history of receptive and insertive vaginal, anal, or oral intercourse) and behaviors were assessed using items from previous research.^{41,42,43} Participants were asked whether or not they had ever had sexual intercourse (yes/no) and whether they had ever been tested for HIV and/or other STIs (yes/no). Additionally, proportion of safe sex acts was computed by dividing the number of times condom use was reported for all vaginal and anal sex acts by the total number of sex acts reported during the last three months.

Sexual Health Outcomes—Participants reported on whether they had ever been told by a medical professional that they had a sexually transmitted infection (yes/no) and whether they had ever been pregnant or gotten someone pregnant (yes/no).

Data Analytic Strategy

First, the individual items of the HIV-KQ-18 were examined to determine relative areas of strengths and deficits with regard to the HIV knowledge of low-income African American adolescents. Next, we conducted Pearson product moment and point-biserial correlations to examine associations between the HIV-KQ-18, sociodemographics, and psychological constructs that were expected to covary with HIV knowledge based on the extant literature. Then hierarchical multivariate logistic regressions (MLR) were conducted to determine whether HIV knowledge uniquely contributed to associated sexual behaviors and health outcomes when accounting for significant covariates ($p < .10$). Separate MLR analyses were conducted for the following outcomes: sexual intercourse, STI/HIV testing, STI history, and pregnancy. Additionally, a hierarchical multiple regression was conducted for proportion of safe sex acts. Significant sociodemographic variables were entered on the first step, psychological constructs on the second step, and HIV knowledge on the third step.

Results

Sixty percent of the adolescents reported ever having had sexual intercourse (vaginal, anal, or oral). Among those with sexual experience ($N = 990$), 37% had been tested for STIs and/or HIV and 5% had received a past STI diagnosis. In addition, 11% of the sexually experienced adolescents had had a past pregnancy or had gotten a partner pregnant. Of those who were sexually experienced, 57% reported having had vaginal, anal, or oral sex during the past three months.

Descriptive Statistics for Individual HIV Knowledge Items

Table 1 contains item means and standard deviations for the Brief HIV Knowledge Questionnaire (HIV-KQ-18). The frequency of correct responding was examined. In the top quartile of items with correct responses, 85% of the adolescents correctly answered True to the statement, “having sex with more than one partner can increase a person’s chance of being infected with HIV;” 67% correctly answered False to the statement, “a person can get HIV by sitting in a hot tub or a swimming pool with a person who has HIV;” and 66% correctly answered True to the statements, “a woman can get HIV if she has anal sex with a man” and “a person can get HIV from oral sex.” Of items in the bottom quartile, 41% correctly thought it was false that “using Vaseline or baby oil with condoms lowers the chance of getting HIV;” 25% correctly thought it was false that “a natural skin condom

works better against HIV than does a latex condom;” 18% correctly thought it was false that “taking a test for HIV one week after having sex will tell a person if she or he has HIV;” and 15% of the participants correctly thought it was false that “most pregnant women infected with HIV will have babies born with AIDS.”

Factors Associated with HIV Knowledge

Gender differences in HIV knowledge were evident with girls outperforming boys, although this difference was slight (girls: $M = 9.30$, $SD = 3.74$; boys: $M = 8.65$, $SD = 3.86$), $t(1656) = -3.41$, $p < .001$. Because gender differences were demonstrated, bivariate correlations were conducted separately for boys and girls to examine the relation of the HIV-KQ-18 total score with potential correlates including age, academic performance, neighborhood stress, and eligibility for reduced-price lunches. Correlation coefficients for males and females, compared using Fisher’s r to z transformation, were not significantly higher for males or females with one exception. The negative correlation between HIV knowledge and stigma was larger for girls (girls: $r = -.40$; boys: $r = -.30$; $z = 2.13$, $p < .05$). Given the overall similarities in the magnitudes, directions, and significance of correlations, data for males and females were aggregated for subsequent bivariate and multivariate analyses.

Intercorrelations of HIV knowledge with sociodemographic characteristics, psychological constructs, and sexual behaviors and outcomes are reported in Table 2. As expected, greater HIV knowledge was associated with older age, female gender, better academic performance, less HIV-related stigma, more risk reduction self-efficacy, more perceived risk for unprotected sex, greater intentions to use condoms, a history of sexual intercourse, and, as reported in a previous study by Swenson et al., with having received STI or HIV testing.¹⁴ Contrary to expectations, greater knowledge was associated with a lower proportion of safe sex acts, history of STI diagnosis and pregnancy, and greater neighborhood stress. Knowledge was not associated with eligibility for free or reduced-price lunch; however, the sample was predominantly low-income (74% eligibility). Finally, HIV knowledge was not associated with geographical region, with participants in the northeast and southeast regions of the U.S. displaying similar levels of factual information about HIV transmission, diagnosis, and prevention.

Contribution of HIV Knowledge to Sexual Behavior and Health

Controlling for associated sociodemographic factors (age, gender, academic performance, neighborhood stress) and psychological constructs (stigma, self-efficacy, perceived risk, intentions), HIV knowledge made a unique contribution to the prediction of several sexual behaviors (see Table 3). Greater HIV knowledge was uniquely associated with a history of sexual intercourse among the entire sample ($OR = 1.06$, $CI = 1.02-1.09$). Limiting the sample to adolescents with sexual experience, knowledge was also associated with STI/HIV testing in the expected direction ($OR = 1.04$, $CI = 1.00-1.08$). However, HIV knowledge was not uniquely associated with either STI history or pregnancy among the sexually experienced youth when controlling for associated sociodemographic factors and psychologically constructs. Lastly, greater HIV knowledge was uniquely associated with a lower proportion of safe sex acts. Table 4 indicates that, after entry of sociodemographics and psychological constructs, addition of HIV knowledge to the equation significantly improved the predicted variance ($R^2 = .19$, $F_{inc}(1, 648) = 7.51$, $p < .01$).

Discussion

The present study extends prior research by examining the independent contribution of knowledge to sexual health behaviors and outcomes among low-income African American adolescents. Studies conducted more than ten years ago demonstrated knowledge deficits

among this population and our findings indicate that these deficits persist, with an average of only 50% correct on the HIV-KQ-18.^{18,19} Given the disproportionate rates of HIV among young African Americans and the role of health literacy in eliminating racial health disparities, the continuing knowledge deficit among this high-risk group is cause for concern.^{1,6}

Examination of individual knowledge item scores indicates a need for more comprehensive HIV/AIDS education for low-income African American adolescents. Not surprisingly, participants fared better on items assessing general versus specific knowledge. In particular, increased education regarding effective condom use and HIV testing is needed. Adolescents did not understand the importance of condom material, with three-fourths believing natural skin condoms were more effective at preventing HIV than latex condoms. Most participants also had inaccurate knowledge of lubricants, with nearly 60% believing that oil-based lubricants (which degrade latex and increase the likelihood of breakage) reduce HIV risk. Additionally, over 80% believed that HIV could be detected as soon as one week following an exposure. Because HIV antibodies can take up to three months following an exposure to reach levels detectable by an HIV test, recent seroconverters who get tested soon after becoming infected may believe they are HIV negative and continue to transmit the virus during this period of high infectiousness.⁴⁴ Also concerning, 85% of participants thought that most pregnant women with HIV give birth to infants with AIDS. In actuality, less than 30% of infants born to untreated mothers are perinatally infected with HIV, the virus that causes AIDS.⁴⁵ Additionally, prophylactic use of antiretroviral therapy during pregnancy and in the newborn has decreased mother-to-child-transmission to less than 1%.^{46,47} Although it is possible that participants interpreted this item as referring to pregnant mothers not treated with antiretroviral therapy and ignored the difference between HIV and AIDS, the misconception that mother-to-child-transmission is unavoidable may decrease motivation for prenatal HIV testing among young pregnant African Americans.

As expected, greater HIV knowledge was associated with a variety of important sexual health-related cognitions and attitudes. Although causality cannot be determined from cross-sectional data, it is reasonable to assume that teens who possess more accurate knowledge about HIV transmission and prevention are less likely to fear people with HIV, have a better understanding of risk factors, and feel more capable of reducing their risk for contracting HIV. Therefore, comprehensive sex education that improves adolescents' HIV/AIDS health literacy may also have a beneficial effect on motivation and self-efficacy for safer sex skills, which are in turn associated with preventive behaviors.^{17,28,48}

Accounting for sociodemographics and psychological constructs, greater HIV knowledge was independently associated with sexual experience, fewer safe sex acts, and STI/HIV testing. The finding regarding safe sex acts was unexpected, however, prior examinations of the IMB model have reported inconsistent results for the relationship between information and HIV-preventive behavior.¹⁷ These inconsistencies may result from methodological (i.e., measurement specificity) and/or conceptual problems.²⁵ Methodologically, a measure of condom-specific knowledge may yield different results than a general measure of HIV knowledge. Nevertheless, exploratory analyses from a recent study found similar associations between greater knowledge and less condom use when using three condom specific knowledge items and when using the full knowledge measure (Scott-Sheldon et al., under review).⁴⁹ These data are a reminder that youth may have accurate information regarding condom use but insufficient motivation or skill required to enact condom skills with a sex partner.

It is possible that youth who are sexually active acquire more HIV knowledge through the process of becoming sexually experienced or because the experience makes sexual

information more salient to them. Furthermore, those who engage in unprotected sex are more likely to seek sexual healthcare for STI or pregnancy diagnosis and treatment. As a result of contact with healthcare providers, youth may be exposed to HIV/STI educational materials and interventions. Also, informed health-literate youth may be more aware of their sexual healthcare needs and more motivated to seek STI/HIV testing or other preventive healthcare services.⁹ Nonetheless, STI/HIV testing rates remain relatively low among adolescents (37% of the sexually active teens in this sample).

The HIV knowledge deficits might be addressed in several ways. Incorporating sexual health education into routine adolescent healthcare may help to improve the HIV knowledge of many adolescents, yet low-income teens often do not have regular access to healthcare.²⁰ School-based health centers can both increase healthcare access for uninsured youth and provide accurate information.⁵⁰ Comprehensive sexual education in schools is another viable method of reaching low-income youth but 10% of students have *never* been taught about HIV in school and 36% of Black adolescents report *not* having received formal instruction on methods of birth control, as well.^{18,19,51,52} Unfortunately, abstinence-only sexual education, which is all that is available in some schools, provides limited education regarding HIV transmission, diagnosis, and prevention, and may result in “too little information too late” for at-risk youth.

The findings of this study should be interpreted in light of its limitations. First, despite recruitment from four cities in two geographical regions of the U.S., the sample may not be representative of the entire population of African American adolescents. Second, we do not know whether our findings are *specific* to African Americans as our sample did not include youth from other racial backgrounds. Future studies should examine whether results generalize to other sociodemographic groups. Third, additional indicators of socioeconomic status (SES) would have provided a more precise estimation of participants' SES. However, eligibility for the free/reduced-price school lunch program (determined on the basis of income level) has been found to be moderately correlated with other indicators of socioeconomic status. For example, eligibility for free/reduced-price school lunch was significantly negatively correlated with both median income ($r = -0.50$) and mean education level ($r = -0.40$) by zip code in a predominantly African American adolescent sample.⁵³ Fourth, it is possible that HIV knowledge could be related to cognitive ability or educational opportunities. Although better academic performance (a rough proxy for cognitive ability) was associated with more HIV knowledge at the bivariate level, we found that this relationship was not maintained when accounting for sociodemographics and psychological constructs. Fifth given the large sample size, it is possible that some of the smaller correlations may be *statistically* significant and yet not *clinically* significant. Thus, future intervention-based research should examine the clinical relevance of the impact of increased HIV knowledge on sexual risk behaviors. Sixth, it should be noted that the data were cross-sectional, which limits causal inferences. A mediational model with relevant attitudes as potential mediators of baseline knowledge and subsequent sexual health behaviors should be tested to assess causal pathways. In the present study, the fact that knowledge remained associated with sexual behavior even after accounting for the influence of psychological constructs demonstrates the importance of accurate knowledge. Finally, the data are from a single source, which could lead to shared method and source variance bias. Nonetheless, data were collected using ACASI methods, which are reliable among adolescents and demonstrate decreased socially desirable responding for sensitive topics.⁵⁴

Notwithstanding these limitations, this study emphasizes the independent contribution of HIV knowledge to sexual behavior and health among low-income African American adolescents over and above the influence of age, gender, neighborhood stress, and associated psychological constructs. Increasing HIV knowledge among African Americans is

particularly important given disproportionate rates of HIV infection.¹ This study provides compelling evidence that HIV prevention programs need to increase accurate HIV knowledge among at-risk African American adolescents, particularly with regard to condom use and the benefits of routine HIV and STI testing. Although knowledge might not be sufficiently protective in and of itself, having accurate information about HIV may benefit adolescent sexual health by impacting health-promoting attitudes necessary for successful engagement in healthcare-seeking behavior.²⁵

Acknowledgments

This research was supported by National Institutes of Health grant UO1 MH066785, a collaborative project awarded to participating sites: Rhode Island Hospital, Emory University, Syracuse University, University of South Carolina, and University of Pennsylvania and by a National Institutes of Mental Health Program in Child/Adolescent Biobehavioral HIV Research Training at Rhode Island Hospital / Brown University (T32-MH-07878, PI: L. Brown).

References

- Centers for Disease Control and Prevention. Percentages of HIV/AIDS Cases and Population among Adolescents 13 to 19 Years of Age, by Race/Ethnicity Diagnosed in 2007—34 States. 2009 May 14. http://www.cdc.gov/hiv/topics/surveillance/resources/slides/adolescents/slides/Adolescents_1.pdf
- Centers for Disease Control and Prevention. HIV/AIDS Surveillance Report, 2005. US Department of Health and Human Services. 2007; 17:1–46. Revised Edition.
- Rangel M, Gavin L, Reed C, et al. Epidemiology of HIV and AIDS among adolescents and young adults in the United States. *J Adolesc Health*. 2006; 39:156–163. [PubMed: 16857526]
- Baptiste D, Voisin DR, Smithgall C, Martinez D, Henderson G. Preventing HIV/AIDS among Trinidad and Tobago teens using a family-based program: Preliminary outcomes. *Social Work in Mental Health*. 2007; 5:333–354.
- Di Noia J, Schinke SP. Gender-specific HIV prevention with urban early-adolescent girls: Outcomes of the Keepin' it Safe program. *AIDS Educ Prev*. 2007; 19:479–488. [PubMed: 18190273]
- Osborn CY, Paasche-Orlow MK, Davis TC, Wolf MS. Health literacy: An overlooked factor in understanding HIV health disparities. *Am J Prev Med*. 2007; 33:374–378. [PubMed: 17950402]
- Haile BJ, Chambers JW, Garrison JL. Correlates of HIV knowledge and testing: Results of a 2003 South African survey. *Journal of Black Studies*. 2007; 38:194–208.
- Kickbusch IS. Health literacy: Addressing the health and education divide. *Health Promotion International*. 2001; 16:289–297. [PubMed: 11509466]
- White S, Chen J, Atchison R. Relationship of preventive health practices and health literacy: A national study. *American Journal of Health Behavior*. 2008; 32:227–242. [PubMed: 18067463]
- Herek GM, Widaman KF, Capitano JP. When sex equals AIDS: Symbolic stigma and heterosexual adults' inaccurate beliefs about sexual transmission of AIDS. *Social Problems*. 2005; 52:15–37.
- Silver EJ, Bauman LJ. The association of sexual experience with attitudes, beliefs, and risk behaviors of inner-city adolescents. *Journal of Research on Adolescence*. 2006; 16:29–45.
- Bruine de Bruin W, Downs JS, Fischhoff B, Palmgren C. Development and evaluation of an HIV/AIDS knowledge measure for adolescents focusing on misconceptions. *Journal of HIV/AIDS Prevention in Children & Youth*. 2007; 8:35–57.
- St. Lawrence JS. African-American adolescents' knowledge, health-related attitudes, sexual behavior, and contraceptive decisions: Implications for the prevention of adolescent HIV infection. *J Consult Clin Psychol*. 1993; 61:104–112. [PubMed: 8450095]
- Swenson RR, Rizzo CJ, Brown LK, et al. Prevalence and correlates of HIV testing among sexually active African American adolescents in 4 U.S. cities. *Sex Transm Dis*. 2009; 36:584–591. [PubMed: 19661840]
- Boyer CB, Shafer M, Wibbelsman CJ, Seeberg D, Teitle E, Lovell N. Associations of sociodemographic, psychosocial, and behavioral factors with sexual risk and sexually transmitted diseases in teen clinic patients. *J Adolesc Health*. 2000; 27:102–111. [PubMed: 10899470]

16. Dudley C, O'Sullivan LF, Moreau D. Does familiarity breed complacency: HIV knowledge, personal contact, and sexual risk behavior of psychiatrically-referred Latino adolescent girls. *Hispanic Journal of Behavioral Sciences*. 2002; 24:353–368.
17. Fisher WA, Williams SS, Fisher JD, Malloy TE. Understanding AIDS risk behavior among sexually active urban adolescents: An empirical test of the information-motivation-behavioral skills model. *AIDS and Behavior*. 1999; 3:13–23.
18. DuRant RH, Ashworth CS, Newman CL, McGill L. AIDS/HIV knowledge level and perceived chance of having HIV among rural adolescents. *J Adolesc Health*. 1992; 13:499–505. [PubMed: 1390817]
19. Hancock T, Mikhail BI, Santos A, Nguyen A, Nguyen H, Bright D. A comparison of HIV/AIDS knowledge among high school freshmen and senior students. *Journal of Community Health Nursing*. 1999; 16:151–163. [PubMed: 10478509]
20. DeNavas-Walt, C.; Proctor, BD.; Smith, JC. Income, Poverty, and Health Insurance Coverage in the United States: 2007. U.S Government Printing Office; Washington, DC: 2008. U.S. Census Bureau, Current Population Reports, P60-235.
21. Abernathy TJ, Webster G, Vermeulen M. Relationship between poverty and health among adolescents. *Adolescence*. 2002; 37:55–68. [PubMed: 12003291]
22. Gutman LM, Sameroff AJ, Eccles JS. The academic achievement of African American students during early adolescence: An examination of multiple risk, promotive, and protective factors. *Am J Community Psychol*. 2002; 30:367–399. [PubMed: 12054035]
23. Hill M, Duncan GK. Parental family income and socioeconomic attainment of children. *Social Science Research*. 1987; 16:39–73.
24. Gardezi F, Calzavara L, Husbands W, Tharao W, Lawson E, Myers T, et al. Experience of and responses to HIV among African and Caribbean communities in Toronto, Canada. *AIDS Care*. 2008; 20:718–725. [PubMed: 18576174]
25. Fisher JD, Fisher WA. Changing AIDS-risk behavior. *Psychol Bull*. 1992; 111:455–474. [PubMed: 1594721]
26. Carey MP, Braaten LS, Maisto SA, Gleason JR, Forsyth AD, Durant LE, Jaworski BC. Using information, motivational enhancement, and skills training to reduce the risk of HIV infection for low-income urban women: A second randomized clinical trial. *Health Psychol*. 2000; 19:3–11. [PubMed: 10711582]
27. Carey MP, Senn TE, Venable PA, Coury-Doniger P, Urban MA. Brief and intensive behavioral interventions to promote sexual risk reduction among STD clinic patients: Results from a randomized controlled trial. *AIDS and Behavior*. 2009 in press.
28. Fisher JD, Fisher WA, Bryan AD, Misovich SJ. Information-motivation-behavioral skills model-based HIV risk behavior change intervention for inner-city high school youth. *Health Psychol*. 2002; 21:177–186. [PubMed: 11950108]
29. Kalichman SC, Simbayi L, Cain D, Jooste S, Skinner D, Cherry C. Generalizing a model of health behaviour change and AIDS stigma for use with sexually transmitted infection clinic patients in Cape Town, South Africa. *AIDS Care*. 2006; 18:178–182. [PubMed: 16546776]
30. Weiser SD, Heisler M, Leiter K, Percy-de Korte F, Tlou S, DeMonner S, et al. Routine HIV testing in Botswana: A population-based study on attitudes, practices, and human rights concerns. *PLoS Med*. 2006; 3:1013–1022.
31. Wolfe WR, Weiser SD, Bangsberg DR, Thior I, Makhema JM, Dickinson DB, et al. Effects of HIV-related stigma among an early sample of patients receiving antiretroviral therapy in Botswana. *AIDS Care*. 2006; 18:931–933. [PubMed: 17012082]
32. Romer D, Sznitman S, DiClemente R, Salazar LF, Venable PA, Carey MP, et al. Mass media as an HIV-prevention strategy: Using culturally-sensitive messages to reduce HIV-associated sexual behavior of at-risk African-American youth. *Am J Public Health*. 2009 in press.
33. Venable, PA.; Carey, MP.; Bostwick, RA., et al. Community partnerships in adolescent HIV prevention research: The experience of Project iMPPACS. In: Stanton, B.; Galbraith, J.; Kalgee, L., editors. *The uncharted path from clinic-based to community-based research*. Nova Science Publishers; 2008.

34. Carey MP, Schroder KEE. Development and psychometric evaluation of the brief HIV knowledge questionnaire. *AIDS Educ Prev.* 2002; 14:172–182. [PubMed: 12000234]
35. Steiner DL. Being inconsistent about consistency: When coefficient alpha does and doesn't matter. *J Pers Assess.* 2003; 80:217–222. [PubMed: 12763696]
36. Vanable PA, Carey MP, Brown JL, et al. Test-retest reliability of self-reported HIV/STD-related measures among African-American adolescents in four U.S. cities. *J Adolesc Health.* 2009; 44:214–221. [PubMed: 19237106]
37. Ewart CK, Suchday S. Discovering how urban poverty and violence affect health: Development and validation of a neighborhood stress index. *Health Psychol.* 2002; 21:254–262. [PubMed: 12027031]
38. Suchday S, Kapur S, Ewart CK, Friedberg JP. Urban stress and health in developing countries: Development and validation of a Neighborhood Stress Index for India. *Behav Med.* 2006; 32:77–86. [PubMed: 17120383]
39. Kalichman SC, Simbayi LC, Jooste S, et al. Development of a brief scale to measure AIDS-related stigma in South Africa. *AIDS and Behavior.* 2005; 9:135–143. [PubMed: 15933833]
40. Williams SS, Doyle TM, Pittman LD, et al. Roleplayed safer sex skills of heterosexual college students influenced by both personal and partner factors. *AIDS and Behavior.* 1998; 2:177–188.
41. Brown JL, Vanable PA. Alcohol use, partner type, and risky sexual behavior among college students: Findings from an event-level study. *Addict Behav.* 2007; 32:2940–2952. [PubMed: 17611038]
42. Carey MP, Carey KB, Maisto SA, et al. Reducing HIV-risk behavior among adults receiving outpatient psychiatric treatment: results from a randomized controlled trial. *J Consult Clin Psychol.* 2004; 72:252–268. [PubMed: 15065959]
43. Vanable PA, McKirnan DJ, Buchbinder SP, et al. Alcohol use and high-risk sexual behavior among men who have sex with men: The effects of consumption level and partner type. *Health Psychol.* 2004; 23:525–532. [PubMed: 15367072]
44. Colfax GN, Buchbinder SP, Cornelisse PGA, Vittinghoff E, Mayer K, Celum C. Sexual risk behaviors and implications for secondary HIV transmission during and after HIV seroconversion. *AIDS.* 2002; 16:1529–1535. [PubMed: 12131191]
45. Connor EM, Sperling RS, Gelber R, Kiselev P, Scott G, O'Sullivan MJ, VanDyke R, Bey M, Shearer R, Jacobson RL, et al. Reduction of maternal-infant transmission of human immunodeficiency virus type 1 with zidovudine treatment. *N Engl J Med.* 1994; 331:1173–1180. [PubMed: 7935654]
46. Hughes CA, Zuk D, Foisy M, Robinson J, Singh AE, Houston S. Prenatal screening and perinatal transmission in Northern Alberta, 1999–2006. *Am J Public Health.* 2009 in press.
47. Stek AM. Antiretroviral medications during pregnancy for therapy or prophylaxis. *Current HIV/AIDS Reports.* 2009; 6:68–76. [PubMed: 19358777]
48. Lemieux AF, Fisher JD, Pratto F. A music-based HIV prevention intervention for urban adolescents. *Health Psychol.* 2008; 27:349–357. [PubMed: 18624599]
49. Scott-Sheldon LAJ, Carey MP, Vanable PA, Senn TE. Predicting condom use among STD clinic patients using the information-motivation-behavioral skills (IMB) model. *Journal of Health Psychology.* 2010; 15:1093–102. [PubMed: 20453055]
50. Klein JD, Handwerker L, Sesselberg TS, Sutter E, Flanagan E, Gawronski B. Measuring quality of adolescent preventive services of health plan enrollees and school-based health center users. *J Adolesc Health.* 2007; 41:153–160. [PubMed: 17659219]
51. Centers for Disease Control and Prevention. Sexual and Reproductive Health of Persons Aged 10–24 Years – United States, 2002–2007. *Surveillance Summaries*, July 17, 2009. *MMWR.* 2009; 58(No. SS-6)
52. Centers for Disease Control and Prevention. Youth Risk Behavior Surveillance – United States, 2007. *Surveillance Summaries*, June 6, 2008. *MMWR.* 2008; 57(No. SS-4)
53. Scarinci IC, Robinson LA, Alfano CM, Zbikowski SM, Klesges RC. The relationship between socioeconomic status, ethnicity, and cigarette smoking in urban adolescents. *Prev Med.* 2002; 34:171–178. [PubMed: 11817912]

54. Romer D, Hornik RC, Stanton B, Black M, Li XM, Ricardo I, et al. "Talking" computers: a reliable and private method to conduct interviews on sensitive topics with children. *J Sex Res.* 1997; 34:3–9.

Table 1

Individual item means and standard deviations for the Brief HIV Knowledge Questionnaire (HIV-KQ-18) among low-income African American adolescents

Item	Total (N = 1658)	
	<i>M</i>	<i>SD</i>
14. Having sex with more than one partner can increase a person's chance of being infected with HIV (T)	.85	.357
16. A person can get HIV by sitting in a hot tub or a swimming pool with a person who has HIV (F)	.67	.471
4. A woman can get HIV if she has anal sex with a man (T)	.66	.476
17. A person can get HIV from oral sex (T)	.66	.474
11. There is a female condom that can help decrease a woman's chance of getting HIV (T)	.60	.491
5. Showering, or washing one's genitals/private parts, after sex keeps a person from getting HIV (F)	.59	.493
3. Pulling out the penis before a man climaxes/cums keeps a woman from getting HIV during sex (F)	.58	.494
7. People who have been infected with HIV quickly show serious signs of being infected (F)	.58	.494
10. A woman cannot get HIV if she has sex during her period (F)	.57	.495
2. A person can get HIV by sharing a glass of water with someone who has HIV (F)	.53	.499
1. Coughing and sneezing DO NOT spread HIV (T)	.48	.500
8. There is a vaccine that can stop people from getting HIV (F)	.46	.498
9. People are likely to get HIV by deep kissing (that is, putting their tongue in their partner's mouth) if their partner has HIV (F)	.43	.495
13. A person will NOT get HIV if she or he is taking antibiotics (F)	.43	.496
18. Using Vaseline or baby oil with condoms lowers the chance of getting HIV (F)	.41	.491
12. A natural skin condom works better against HIV than does a latex condom (F)	.25	.432
15. Taking a test for HIV one week after having sex will tell a person if she or he has HIV (F)	.18	.381
6. Most pregnant women infected with HIV will have babies born with AIDS (F)	.15	.354
Total Score (% correct)	9.04 (50%)	3.797

Table 2

Intercorrelations of HIV knowledge with sociodemographic characteristics and main study variables among at-risk African American adolescents

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Knowledge	--														
2. Age	.20***	--													
3. Gender	.08***	-.04	--												
4. Academics	.05*	-.05*	.13***	--											
5. Neighborhood	.09***	.06*	-.08***	-.12***	--										
6. Lunch Price	.03	.03	.01	-.03	.09***	--									
7. U.S. Region	-.04	-.01	.02	.16***	-.12***	-.06*	--								
8. Stigma	-.36***	-.11***	-.16***	-.01	.04	.06*	.12***	--							
9. Self-Efficacy	.14***	.08**	.15***	.04	-.00	.08***	-.04 [†]	-.11***	--						
10. Risk	.09***	.05*	.07**	.07**	-.09***	-.00	.03	-.11***	.10***	--					
11. Intentions	.05*	-.01	.04	.03	-.03	.01	.00	-.12***	.19***	.12***	--				
12. Had Sex	.13***	.26***	-.19***	-.14***	.15***	.02	.06*	-.05	.03	-.05	-.07**	--			
13. Testing	.10***	.19***	.03	-.06*	.11***	.04	.04	.02	.02	-.00	-.09***	.23***	--		
14. Safe Acts	-.11**	-.09*	-.16***	-.03	-.06	.06	-.00	.01	.21***	.13***	.34***	-.03	-.13***	--	
15. STI	.09***	.15***	.11***	-.08**	.09***	-.00	-.02	-.09***	.05*	-.01	-.03	.13***	.30***	-.13***	--
16. Pregnancy	.07*	.14***	.08*	-.06	.10**	.04	-.09*	-.07*	-.02	.00	-.10**	.02	.25***	-.20***	.19***

Note. Gender coded as 1 = female and 0 = male. Lunch price coded as 1 = free or reduced-price lunch and 0 = full-price lunch. U.S. region coded as 1 = southeast and 0 = northeast.

[†]
p < .10.

*
p < .05.

**
p < .01.

p < .001.

Table 3

Hierarchical multivariate logistic regression analyses to examine the independent contribution of HIV knowledge to the sexual health behaviors and outcomes of low-income African American adolescents.

Criterion and Predictors	β	SE	Wald (df=1)	p	OR (95% CI)
<i>Sexual Intercourse (N = 1647⁴)</i>					
Step 1					
Age	0.50	0.05	91.99	.000	1.65 (1.49-1.83)
Gender (1=male, 2=female)	-0.75	0.11	44.50	.000	0.47 (0.38-0.59)
Academic performance	-0.28	0.07	16.74	.000	0.76 (0.66-0.87)
Neighborhood stress	0.43	0.08	25.73	.000	1.53 (1.30-1.80)
Step 2					
Stigma	-0.13	0.05	6.29	.012	0.88 (0.79-0.97)
Self-efficacy	0.12	0.06	4.09	.043	1.13 (1.00-1.26)
Perceived risk	-0.10	0.08	1.85	.173	0.90 (0.78-1.05)
Intentions	-0.10	0.04	6.61	.010	0.90 (0.83-0.98)
Step 3					
HIV Knowledge	0.06	0.02	11.94	.001	1.06 (1.02-1.09)
<i>STI/HIV Testing (N = 980)</i>					
Step 1					
Age	0.33	0.06	27.56	.000	1.39 (1.23-1.57)
Gender (1=male, 2=female)	0.53	0.14	14.46	.000	1.70 (1.29-2.23)
Academic performance	-0.05	0.08	0.45	.504	0.95 (0.81-1.11)
Neighborhood stress	0.33	0.10	10.96	.001	1.40 (1.15-1.70)
Step 2					
Stigma	0.06	0.07	0.86	.354	1.06 (0.93-1.21)
Self-efficacy	0.13	0.08	2.57	.109	1.14 (0.97-1.32)
Perceived risk	-0.05	0.09	0.31	.579	0.95 (0.80-1.13)
Intentions	-0.08	0.05	2.90	.089	0.92 (0.83-1.01)
Step 3					
HIV Knowledge	0.04	0.02	4.18	.041	1.04 (1.00-1.08)
<i>STI Diagnosis (N = 980)</i>					

Criterion and Predictors	β	SE	Wald ($df=1$)	p	OR (95% CI)
Step 1					
Age	0.62	0.15	16.46	.000	1.86 (1.38-2.50)
Gender (1=male, 2=female)	2.40	0.56	27.38	.000	11.00 (4.48-27.00)
Academic performance	-0.43	0.17	6.81	.009	0.65 (0.47-0.90)
Neighborhood stress	0.76	0.22	12.10	.001	2.13 (1.39-3.27)
Step 2					
Stigma	-0.46	0.18	6.29	.012	0.63 (0.44-0.91)
Self-efficacy	0.08	0.18	0.19	.663	1.08 (0.76-1.54)
Perceived risk	-0.04	0.20	0.05	.832	0.96 (0.65-1.42)
Intentions	-0.02	0.10	0.02	.880	0.99 (0.81-1.20)
Step 3					
HIV Knowledge	0.05	0.05	1.33	.249	1.06 (0.96-1.16)
<i>Pregnancy (N = 859)</i>					
Step 1					
Age	0.40	0.11	14.57	.000	1.50 (1.22-1.84)
Gender (1=male, 2=female)	0.63	0.23	7.32	.007	1.87 (1.19-2.95)
Academic performance	-0.21	0.12	2.91	.088	0.81 (0.63-1.03)
Neighborhood stress	0.46	0.16	8.23	.004	1.58 (1.16-2.16)
Step 2					
Stigma	-0.19	0.12	2.47	.116	0.83 (0.66-1.05)
Self-efficacy	-0.01	0.13	0.00	.952	0.99 (0.78-1.27)
Perceived risk	0.08	0.16	0.25	.617	1.08 (0.80-1.47)
Intentions	-0.15	0.07	4.04	.045	0.97 (0.75-0.99)
Step 3					
HIV Knowledge	0.01	0.03	0.10	.750	1.01 (0.95-1.08)

Note. SE = standard error. Wald = Wald statistic. OR = Odds Ratio. CI = Confidence Interval.

^aN may vary across outcomes according to random missing data patterns and sexual experience. Analyses for STI/HIV Testing and STI Diagnosis were constrained to participants that reported having had vaginal, anal, or oral intercourse (N = 990). Analyses for Pregnancy were constrained to participants with a history of vaginal intercourse (N = 869).

Hierarchical multiple regression analysis to examine the independent contribution of HIV knowledge to the proportion of safe sex acts of low-income African American adolescents.

Table 4

Criterion and Predictors	B	β	sr^2	p
<i>Proportion of Safe Sex Acts (N = 648)</i>				
Step 1				
Age	-0.02	-0.07	-0.07	.056
Gender (1=male, 2=female)	-0.11	-0.16	-0.15	.000
Academic performance	-0.01	-0.03	-0.03	.520
Neighborhood stress	-0.04	-0.08	-0.08	.049
Step 2				
Stigma	0.01	0.03	0.03	.391
Self-efficacy	0.07	0.17	0.16	.000
Perceived risk	0.03	0.06	0.06	.107
Intentions	0.07	0.30	0.29	.000
Step 3				
HIV Knowledge	-0.01	-0.11	-0.10	.006
			$R^2 = .19$	
			Adjusted $R^2 = .18$	
			$R = .43^{**}$	

Note. B = Unstandardized coefficients, β = Standardized coefficients, sr^2 = semipartial correlations.