## HIV/AIDS Knowledge Scores and Perceptions of Risk Among African American Students Attending Historically Black Colleges and Universities

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#### ABSTRACT

**Objective.** African American young adults are disproportionately affected by the HIV/AIDS epidemic and often unaware of their personal risk for HIV. Historically black colleges and universities (HBCUs) enroll 25% of college-educated African American young adults and can play an important role in HIV prevention. We examined HIV/AIDS knowledge of students at HBCUs to inform and strengthen our HIV prevention efforts at HBCUs.

**Methods.** African American undergraduate HBCU students completed online surveys assessing HIV/AIDS knowledge and behaviors, and we analyzed data to assess their knowledge and behaviors.

**Results.** A total of 1,051 of 1,230 surveys completed (85.4%) were analyzable. Eighty-two percent of students had average/high HIV knowledge scores. Seventy-nine percent of students surveyed perceived themselves to be at low risk for HIV infection; 64% of those who had at least two or more sex partners had not used a condom at last sex encounter. In the final model, significant independent effects were identified for average/high knowledge of HIV risk, including agreeing with assessing a potential partner's HIV risk by all of the five actions listed (adjusted odds ratio [AOR] = 2.7, 95% confidence interval [CI] 1.7, 4.3) and never using a needle to inject drugs (AOR=5.6, 95% CI 3.2, 9.7).

**Conclusions.** Educating students about effectively assessing sex partner risk will improve HIV knowledge and prevention efforts at HBCUs.

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African Americans in the United States have been disproportionately affected by the human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS) epidemic for almost three decades. In 2007, African Americans accounted for 51% of the 42,655 new HIV/AIDS diagnoses in 34 states with long-term, confidential, name-based HIV reporting, but comprised only 13% of the U.S. population. The rate of new HIV infections among African Americans was seven times the rate among white people (83.7 vs. 11.5 new infections per 100,000 population, respectively) and nearly three times the rate among the Hispanic/Latino population (83.7 vs. 29.3 new infections per 100,000 population, respectively).<sup>1</sup> In addition, African American young people were disproportionately affected with diagnoses of HIV infection; African Americans aged 15-19 years had rates of HIV diagnoses that were 25 times the rate of their white counterparts (55.0 vs. 2.2 per 100,000 population, respectively). The disparity was also present in the 20- to 24-year age group (141.4 per 100,000 population for African Americans vs. 11.6 per 100,000 population for white people).<sup>2</sup>

When AIDS data were reviewed by region, the southern states (including Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia) were responsible for the highest number of people with (1) new AIDS diagnoses (46%), (2) people living with AIDS (40%), and (3) people who died with AIDS (50%) at the end of 2007 when compared with the Northeast, Midwest, and West regions. In addition, African Americans accounted for 61% of the estimated number of AIDS diagnoses made in the South.<sup>1</sup> African Americans in the South, therefore, warrant increased attention for HIV prevention efforts.

Recent public health investigations of increased HIV diagnoses among young African American men in southern college towns also suggest that increased collaborative research and intervention efforts with historically black colleges and universities (HBCUs) are an important additional tool to fight the crisis of HIV/AIDS within the African American community.<sup>3–5</sup> HBCUs enroll more than 25% of college-educated African Americans and are predominantly located in 19 states (Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Michigan, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Virginia, and West Virginia), the District of Columbia, and the U.S. Virgin Islands.<sup>6,7</sup> Therefore, understanding the HIV knowledge, attitudes, and behaviors (KAB) of African American students at HBCUs can help provide information about a large segment of young people who are part of a group at increased risk for HIV infection compared with their non-African American peers.

Because many students who attend HBCUs eventually assume positions of leadership and influence within the African American community,<sup>7</sup> partnering with HBCUs is also important for (1) assessing students' current level of understanding and interest in issues related to HIV prevention, (2) targeting HBCUs with HIV prevention programs and messages that are relevant to their students and appropriate to the broader HBCU administrative and parental communities, and (3) equipping HBCUs and their students with prevention strategies that may facilitate risk reduction within the broader African American community.

Previous studies with African American college students have reported that, like college students from other racial/ethnic minority groups, behaviors that can increase the risk of HIV acquisition and transmission (e.g., multiple, congruent sex partners and inconsistent condom use) do occur.8-12 Additional studies with college students and African Americans have shown that some young adults continue to participate in high-risk sexual behaviors even after previous exposure to general HIV educational messages.<sup>13-15</sup> The HIV/ AIDS KAB and perceptions of sex partner risk have not been well-characterized within a representative sample of African American HBCU students. Given the disproportionate impact of HIV in the African American community, the high concentration of African Americans and HBCUs in the South, and the limited information available about the sexual risk perceptions of young African American college students, we sought to describe the HIV/AIDS KAB of a large convenience sample of undergraduate students at southern HBCUs. We also examined how their HIV knowledge related to their perceptions of personal and partner sexual risk behaviors.

#### **METHODS**

The United Negro College Fund—Special Programs Corporation (UNCF-SP), in conjunction with the Centers for Disease Control and Prevention (CDC), conducted anonymous online surveys with students at HBCUs from February 2006 through January 2007. UNCF-SP is a nonprofit organization with the broad mandate of supporting all minority-serving institutions, including the national total of 103 HBCUs. Included in the study were a convenience sample of 24 eligible four-year public and private HBCUs that had preexisting relationships with UNCF-SP and met each of the following criteria: (1) indicated a willingness to participate, (2) produced a letter of support from their institution, and (3) agreed to Institutional Review Board (IRB) review at their school.

This survey was approved by the IRBs of each participating HBCU and deemed exempt from human subjects' regulations by the CDC IRB. A faculty liaison was selected from each HBCU campus to facilitate execution of the online surveys. The liaisons collaborated directly with UNCF-SP to obtain local IRB review and approval, implement the study, recruit students, inform UNCF-SP regarding availability of on-campus HIV testing services, and distribute incentives (approximately \$10 value) to study participants on their campuses. HBCU campus recruitment strategies, including flyer distribution, classroom announcements, banners, posters, and stickers, were developed by campus liaisons with approval from UNCF-SP. Liaisons also collected and provided campus-specific demographic data to ensure a balanced representation of urban, rural, private, and public school designations. Students were eligible to participate if they self-identified as African American or black, were aged 18 years or older, and were currently enrolled at the HBCU.

We developed the online student HIV KAB survey after a comprehensive review of the literature to assess research gaps in HIV KAB for African American college students. We established content validity by reviewing other self-constructed survey items/scales used to measure HIV/AIDS knowledge among college students.<sup>16,17</sup> Using a secure, Web-based, anonymous approach, which has been previously described and validated,<sup>18-20</sup> surveys were administered by UNCF-SP and available at each participating HBCU campus. Instrument content questions for this analysis included two subscales: (1) general HIV knowledge questions and (2) information about sexual behaviors, practices, and beliefs, including perceptions of sex partner risk. In a pilot pre-assessment of these HIV/AIDS knowledge survey questions among African American college students, the Cronbach's alpha scale was >0.70 for each subscale, which was indicative of satisfactory reliability for our target study group. Faculty liaisons identified designated areas on campus (i.e., computer laboratories and student unions) where students could access the survey. After completing a brief online screening questionnaire (including the three eligibility criteria) and a consent form, students were able to access the survey from their own personal computers or public computers using a link to the secure survey website. To prevent duplicate participation by the same student, students were required to construct a unique identifier; the unique identifier data were not sent to CDC.

We cleaned and analyzed data using SAS® ver-

sion 9.2.<sup>21</sup> We created a categorical variable for low, moderate, and high HIV knowledge scores using the 35 online survey items that targeted HIV knowledge (Figure). The scores ranged from 9 to 33, the mean was 26.3, and the median was 27.0. The knowledge scores were approximately normally distributed. The three knowledge score categories were low (knowledge scores <24), average (knowledge scores of 24–28), and high (knowledge scores ≥29), and reliability was maintained at alpha >0.70 for these score categories. We collapsed the knowledge score into two levels (low and average/high) for the bivariate analyses.

We conducted bivariate analyses to describe characteristics of participating students and to test for differences based on the knowledge score levels. For bivariate analyses, we calculated unadjusted odds ratios (ORs) and 95% confidence intervals (CIs). To identify a final model predicting average/high HIV knowledge, we performed forward stepwise regression (entry level <0.10) using only those factors that were significant in the bivariate analysis. The final model included factors that were significant at p < 0.05 using logistic regression. To avoid collinearity in the model, we created a single indicator variable for those who agreed with assessing a potential partner's risk status by all of the following: (1) asking about past sexual activities, (2) asking about past injection drug use, (3) assessing their personal appearance/personal hygiene, (4) asking others if he/she sleeps around, and (5) asking them to reveal whether or not they were HIV-positive. We created a similar variable for participants who considered themselves to be at average/high or low risk for getting HIV when comparing themselves to the average college student and thinking about their own past or present behavior. Then we computed adjusted ORs (AORs) and 95% CIs.

#### RESULTS

From February 2006 through January 2007, 1,230 students were surveyed from 24 HBCUs; 179 surveys with incomplete or inconsistent responses were excluded from this analysis, leaving 1,051 surveys (85.4%) from 20 HBCUs that were analyzable. One school had an unidentified school type. The other 19 HBCUs with available school type data included the following: urban/public (n=2), urban/private (n=6), rural/public (n=6), and rural/private (n=5). Completed surveys were distributed across the HBCU types as follows: urban/public (n=152, 14%), urban/private (n=241, 25%), rural/public (n=334, 32%), rural/private (n=83, 8%).

Table 1 summarizes the demographic and behavioral characteristics of the participating students. Fifty-one percent of respondents were female, 76% were aged 18–21 years, and 57% were in their first two years of college. The majority of students were enrolled full-time (98%), resided in on-campus housing (75%), and had parents or guardians who had completed some college or a bachelor's degree (mothers of students = 56% and fathers of students = 41%). Thirty-eight percent had been tested for HIV in the previous six months, and 56% had ever been tested for HIV outside of blood

donations. Seventy-three percent of respondents were aware of HIV testing services in their local community. Eighty-one percent (847/1,051) of students attended an HBCU with HIV testing services on campus; 67% (564/847) of those students reported being aware of on-campus HIV testing services. Of male student respondents, 282/459 (61%) had two or more sex partners in the previous 12 months. Of female student respondents, 228/519 (44%) reported having two or more sex partners in the previous 12 months (Table 2). Of students reporting two or more sex partners in

### Figure. HIV knowledge survey items used to create knowledge scores<sup>a</sup> in a study of African American students at historically black colleges and universities, February 2006–January 2007

- 1. AIDS is primarily a disease of white, gay men.
- 2. There is a cure for AIDS.
- 3. HIV is the virus that causes AIDS.
- 4. People who are HIV-positive don't always get AIDS.
- 5. AIDS is a medical condition in which your body cannot fight off diseases.
- 6. A person who is HIV-positive has AIDS.
- 7. HIV/AIDS impacts black Americans more than any other racial/ethnic group.
- 8. A mother who is HIV-positive can infect her child through breast milk.
- 9. Latex condoms are more effective than natural skin condoms in preventing HIV.
- 10. A person with HIV can spread it to others even before they get AIDS.
- 11. Having an STD can increase a person's risk of getting HIV.
- 12. Using alcohol or drugs before or during sex can increase a person's risk of getting HIV.
- 13. "Unprotected or unsafe sex" means...
  - a. Having sex with someone that you don't know.
  - b. Having sex without using a foam (e.g., Nonoxynol-9).
  - c. Having sex without using a condom/barrier.
  - d. Having multiple sex partners.
  - e. Having sex without using birth control (i.e., oral contraceptives).
- 14. Which of the following are ways that a person can get HIV?
  - a. Hugging someone with AIDS.
  - b. Sharing a needle to inject drugs with someone who is HIV-positive.
  - c. Having anal sex without using a condom.
  - d. Giving blood.
  - e. Using a dirty toilet seat.
  - f. Having oral sex without using a condom/barrier.
  - g. Sharing an eating utensil with someone who is HIV-positive.
  - h. Getting bitten by a mosquito that is carrying the virus.
  - i. Having vaginal sex without using a condom.
- 15. Which of the following are ways that a person can reduce his/her risk of getting HIV?
  - a. Cleaning needles with bleach and water before sharing them to inject drugs.
  - b. Withdrawing before ejaculation during sex without a condom/barrier.
  - c. Not swallowing the discharge during oral sex without a condom/barrier.
  - d. Using a condom/barrier during sex with a regular partner.
  - e. Having anal sex instead of vaginal sex.
  - f. Using a condom/barrier during sex with casual partners.
  - g. Having sex without a condom/barrier, but reducing the number of partners.
  - h. Having oral sex instead of vaginal sex.
  - i. Having sex only with women.

<sup>a</sup>Knowledge scores were created based on responses to the 35 items listed. Correct answers were scored as 1 and incorrect answers were scored as 0. The correct response for the following items was determined to be true: 3, 4, 5, 7, 8, 9, 10, 11, 12, 13a, 13c, 13d, 14b, 14c, 14f, 14i, 15a, 15d, and 15f. The correct response for the remaining items was determined to be false.

HIV = human immunodeficiency virus

AIDS = acquired immunodeficiency syndrome

STD = sexually transmitted disease

Characteristics	Women (n=535) N (percent)	Men (n=516) N (percent)	Total (n=51,051) N (percent)
Age (in years)			
18–19	225 (42)	194 (38)	419 (40)
20_21	219 (41)	163 (32)	382 (36)
>21	91 (17)	159 (31)	250 (24)
Class rank	, (,,)	137 (31)	200 (24)
Freshman	173 (32)	185 (36)	358 (34)
Sophomore	134 (25)	107 (21)	241 (23)
lunior	120 (22)	111 (22)	231 (22)
Senior	108 (20)	113 (22)	221 (21)
Type of school	100 (20)	113 (22)	221 (21)
	81 (17)	71 (15)	152 (16)
Urban/private	115 (24)	126 (26)	241 (25)
Bural/public	168 (34)	166 (35)	334 (35)
Rural/private	126 (24)	115 (24)	2/1 (25)
Residence status	120 (20)		241 (23)
On-campus	401 (75)	384 (74)	785 (75)
Off-campus in school housing	27 (5)	24 (5)	51 (5)
Off-campus in non-school housing	102 (19)	104 (20)	206 (20)
Other	5 (1)	4 (1)	9 (1)
Enrollment status	3 (1)		, (1)
Full-time student	527 (99)	505 (98)	1 032 (98)
Part-time student	8 (2)	11 (2)	19 (2)
Employment status	0 (2)		17 (2)
	322 (60)	295 (57)	617 (59)
Employed full-time (>30 hours/week)	38 (7)	56 (11)	94 (9)
Employed hart time (<30 hours/week)	175 (33)	165 (32)	340 (32)
Any children?	173 (83)	100 (02)	340 (32)
Yes	43 (8)	43 (8)	86 (8)
No	492 (92)	473 (92)	965 (92)
Highest completed grade level of mother/female guardian	472 (72)	475 (72)	703 (72)
<high school<="" td=""><td>35 (7)</td><td>35 (7)</td><td>70 (7)</td></high>	35 (7)	35 (7)	70 (7)
High school or GED	119 (22)	116 (22)	235 (22)
Some college or bachelor's degree	313 (59)	272 (53)	585 (56)
Some anaduate/master's degree/bigher degree	63 (12)	80 (16)	1/3 (1/)
Don't know	5 (1)	13 (3)	18 (2)
Highest completed grade level of father/male guardian	3 (1)	15 (5)	10 (2)
<high school<="" td=""><td>51 (10)</td><td>46 (9)</td><td>97 (9)</td></high>	51 (10)	46 (9)	97 (9)
High school or GED	165 (31)	118 (23)	283 (27)
Some college or bachelor's degree	215 (40)	218 (42)	433 (41)
Some araduate/master's degree/bigher degree	42 (8)	79 (15)	121 (12)
Tested for HIV in past six months	12 (0)	,,,(10)	121 (12)
Yes	226 (42)	176 (34)	402 (38)
No	281 (53)	277 (54)	558 (53)
Missing	28 (5)	63 (12)	91 (9)
Tested for HIV ever aside from blood donations	20 (0)	00 (12)	. (.)
Yes	322 (60)	263 (51)	585 (56)
No	174 (33)	162 (31)	336 (32)
Missing	39 (7)	91 (18)	130 (12)
Aware of HIV testing services available in community	0, (,)	, . (,	
Yes	418 (78)	347 (67)	765 (73)
No	140 (7)	60 (12)	100 (10)
Missina/don't know	77 (14)	109 (21)	186 (18)
Awareness of on-campus testing availability among students			
attending schools with HIV testing on-campus			
Yes	292 (69)	272 (64)	564 (67)
No	65 (15)	64 (15)	129 (15)
Missina/don't know	68 (16)	86 (20)	154 (18)
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### Table 1. Demographic and behavioral characteristics of African American students surveyed at20 participating historically black colleges and universities, February 2006–January 2007<sup>a</sup>

<sup>a</sup>Some percentages do not add up to 100 because of rounding.

GED = general equivalency diploma

HIV = human immunodeficiency virus

the previous 12 months, 64% had not used a condom at last sex encounter (data not shown).

Eighty-two percent (n=860) of students had an average/high knowledge score of HIV risk. Several demographic and behavioral characteristics were associated with having an average/high HIV knowledge score (Table 2). Having an average/high knowledge of HIV risk was more likely among females compared with males (OR=1.6, 95% CI 1.2, 2.3); students who resided in off-campus, non-school housing compared with students who resided in on-campus housing (OR=1.7, 95% CI 1.1, 2.7); and students who had never used a needle to inject drugs compared with those who had ever used intravenous drugs in the past (OR=6.5, 95% CI 3.8, 11.2). An average/high HIV/AIDS knowledge score was also more likely among students who considered themselves at low risk for HIV when compared with the average college student (OR=1.8, 95% CI 1.3, 2.5), and approached significance among students who worked part-time (OR=1.4, 95% CI 1.0, 2.0) and students who considered themselves at low risk for HIV based on past and present behavior (OR=1.5, 95% CI 1.0, 2.1).

An average/high HIV/AIDS knowledge score was also more likely among students who assessed potential partners' HIV risk by (1) asking about past sexual activities (OR=4.2, 95% CI 3.9, 6.1), (2) asking about past injection drug use (OR=2.4, 95% CI 1.7, 3.5), (3) assessing their physical appearance/personal hygiene (OR=1.6, 95% CI 1.1, 2.2), (4) asking others if he/ she sleeps around (OR=2.1, 95% CI 1.5, 3.0), and (5) asking them to reveal whether or not they were HIVpositive (OR=2.8, 95% CI 1.5, 3.0). An average/high HIV/AIDS knowledge score was unlikely among students who worked full-time (OR=0.6, 95% CI 0.4, 1.0). In the final model, significant independent effects were identified for average/high knowledge of HIV risk, including agreeing with assessing a potential partner's HIV risk by all of the five actions listed (AOR=2.7, 95%CI 1.7, 4.3) and never using a needle to inject drugs (AOR=5.6, 95% CI 3.2, 9.7) (data now shown).

Of note, there were no significant differences in student HIV knowledge scores based on type of HBCU school setting. Also, there were no significant differences in whether or not someone had been tested for HIV in the previous six months based on average/ high vs. low knowledge of HIV risk. When data were reviewed for males, there were no significant differences in HIV knowledge scores based on number or type of sex partners. A similar result was seen for females: no significant differences in HIV knowledge scores were noted based on number or type of sex partners (Table 2).

#### DISCUSSION

The majority of HBCU student respondents in our study had an average/high HIV knowledge score based on survey questions, attended an HBCU with HIV testing services available on campus, and perceived themselves to be at low risk for HIV infection. However, more than 50% of our respondents reported two or more sex partners in the previous 12 months, with inconsistent condom use.

In addition, only 56% of our respondents had ever been tested for HIV. This finding suggests that a substantial disparity exists between HIV risk perception and sexual risk behaviors among students at HBCUs. The lack of congruence between students' behaviors and perception of risk is consistent with previous research studies with HBCU and other college student populations and may be due in part to optimistic bias.22-26 Optimistic bias occurs when an individual engages in high-risk behavior but underestimates his/ her vulnerability to negative outcomes resulting from that behavior.<sup>27</sup> This type of bias has been described as being possibly disproportionate in some at-risk African American communities compared with non-minority communities<sup>28</sup> and may have been a factor among our sample based on the perception of low personal HIV risk and prevalent risky sexual behaviors. This finding warrants a new approach to strengthening HIV risk knowledge regarding the specifics of HIV sexual transmission among students.<sup>13,29</sup> It also suggests that it is important to align more accurate HIV knowledge with decreased risky sexual behaviors at colleges to improve HIV prevention efforts.<sup>10,13,29</sup>

In bivariate analyses, the following respondents were more likely to have average/high HIV knowledge scores: female compared with male students, and students who resided in off-campus, non-school housing compared with students who resided in on-campus housing. Although these findings were not significant in multivariate analyses, additional research with larger samples may be warranted to further explore these associations. Previous studies have not been consistent regarding HIV knowledge differences among college females and males.12,13,26,30 An important component of HIV prevention efforts at HBCUs may include understanding potential HIV knowledge gender differences in the context of the gender ratio imbalance (i.e., a higher number of female students) that is frequently noted at HBCUs and developing targeted interventions that address this gender imbalance.<sup>31–33</sup>

Regarding campus residence, one study described slightly higher HIV knowledge among nontraditional, commuter, and online students compared with a group of mostly dormitory-based students in the same age

Characteristics	Average or high knowledge of HIV risk N (percent)	Low knowledge of HIV risk N (percent)	OR (95% CI)
Gender			
Malo	403 (47)	113 (59)	Rof
Female	403 (47) 457 (53)	78 (/1)	1 6 (1 2 2 3)
Age (in years)	437 (33)	70(41)	1.0 (1.2, 2.3)
18_19	344 (40)	75 (39)	Ref
20–21	314 (37)	68 (36)	1.0 (0.7, 1.4)
>21	202 (23)	48 (25)	0.9 (0.6, 1.4)
Class rank			
Freshman	292 (34)	66 (35)	Ref.
Sophomore	196 (23)	45 (24)	1.1 (0.7, 1.7)
Junior	191 (22)	40 (21)	1.0 (0.7, 1.5)
Senior	181 (21)	40 (21)	1.0 (0.7, 1.6)
Type of school			
Urban/public	125 (16)	27 (15)	Ref.
Urban/private	189 (24)	52 (28)	0.8 (0.5, 1.3)
Rural/public	268 (34)	66 (36)	0.9 (0.5, 1.4)
Rural/private	203 (26)	38 (21)	1.2 (0.7, 2.0)
Residence status		140 (70)	
On-campus	636 (74)	149 (78)	Ret.
Off-campus in school housing	36 (4)	15 (8)	0.6(0.3, 1.1)
Official off	101 (Z1) 7 (1)	20 (10) 2 (1)	1.7(1.1, 2.7)
Enrollmont status	7 (1)	Ζ(1)	0.8 (0.2, 4.0)
Full time student	8/17 (98)	185 (97)	Rof
Part-time student	13 (2)	6 (3)	0.5(0.2, 1, 3)
Employment status	13 (2)	0 (0)	0.0 (0.2, 1.0)
Unemployed	501 (58)	116 (61)	Ref
Employed full-time (≥30 hours/week)	68 (8)	26 (14)	0.6 (0.4, 1.0)
Employed part-time (<30 hours/week)	291 (34)	49 (26)	1.4 (1.0, 2.0)
Any children?			
Yes	65 (8)	21 (11)	Ref.
No	795 (92)	170 (89)	1.5 (0.9, 2.5)
Highest completed grade level of mother/female guardian			
<high school<="" td=""><td>52 (6)</td><td>18 (10)</td><td>Ref.</td></high>	52 (6)	18 (10)	Ref.
High school or GED	191 (22)	44 (24)	1.5 (0.8, 2.8)
Some college or bachelor's degree	485 (57)	101 (54)	1.7 (0.9, 3.0)
Some graduate/master's degree/higher degree	119 (14)	24 (13)	1.7 (0.9, 3.4)
Highest completed grade level of father/male guardian	7( (10)	04 (4.0)	
<high school<="" td=""><td>76 (10)</td><td>21 (12)</td><td>Ret.</td></high>	76 (10)	21 (12)	Ret.
High school or GED	239 (31)	44 (25)	1.5 (0.8, 2.7)
Some college or bachelor's degree	337 (43)	74 (34) 15 (0)	1.0(0.0, 1.7)
Tostod for HIV in past six months	108 (14)	13 (7)	2.0 (0.7, 4.0)
Yoe	337 (39)	65 (34)	Rof
No	465 (54)	93 (49)	10(07 14)
Missing	58 (7)	33 (17)	NA
Condom/barrier at last sex encounter		00 (17)	
Yes	480 (56)	93 (49)	Ref.
No	267 (31)	61 (32)	0.9 (0.6, 1.2)
Don't know/missing	113 (13)	37 (19)	NA
Ever used a needle to inject drugs			
Yes	29 (3)	32 (17)	Ref.
No	740 (86)	125 (65)	6.5 (3.8, 11.2)
Missing	91 (11)	34 (18)	NA
Perceived risk of HIV			
Compared with friends			
Average/high	171 (20)	47 (25)	Ref.
Low	689 (80)	144 (75)	1.3 (0.9, 1.9)
Compared with average college student		14 100	D (
Average/high	1/8 (21)	61 (32)	Ket.
LOW	68Z (79)	130 (68)	1.8 (1.3, 2.5)

# Table 2. Demographic and behavioral characteristics associated with average or high knowledgeof HIV risk among African American students surveyed at 24 participating historicallyblack colleges and universities, February 2006–January 2007 (n=1,051)<sup>a</sup>

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## Table 2 (continued). Demographic and behavioral characteristics associated with average or high knowledge of HIV risk among African American students surveyed at 24 participating historically black colleges and universities, February 2006–January 2007 (*n*=1,051)<sup>a</sup>

Characteristics	Average or high knowledge of HIV risk N (percent)	Low knowledge of HIV risk N (percent)	OR (95% CI)
	· · · ·	ч , ,	. ,
Perceived risk of HIV (continued)			
Based on past and present behavior			
Average/high	186 (22)	55 (29)	Ret.
	674 (78)	136 (71)	1.5 (1.0, 2.1)
Asking potential sex partner about past sexual activities to			
Disagree (strongly disagree	02 (11)	61 (21)	Def
Agroe/strongly disagree	72 (11) 721 (94)	04 (34)	
Does not apply/missing	/21 (04)	8 (1)	4.2 (3.7, 0.1) NA
Asking potential sex partner about past injection drug use	47 (3)	0 (4)	NA
to assess HIV risk			
Disagree/strongly disagree	126 (15)	58 (30)	Ref
Agree/strongly agree	591 (69)	112 (59)	2 4 (1 7 3 5)
Does not apply/missing	143 (17)	21 (11)	NA
Assessing their physical appearance/personal hygiene (e.g.,		( ,	
whether they look clean and neat or smell nice)			
Disagree/strongly disagree	222 (26)	70 (37)	Ref.
Agree/strongly agree	575 (67)	113 (59)	1.6 (1.1, 2.2)
Does not apply/missing	63 (7)	8 (4)	NA
Asking others if he/she sleeps around			
Disagree/strongly disagree	151 (18)	60 (31)	Ref.
Agree/strongly agree	649 (75)	122 (64)	2.1 (1.5, 3.0)
Does not apply/missing	60 (7)	9 (5)	NA
Asking them to reveal whether or not they are HIV-positive			
Disagree/strongly disagree	137 (16)	65 (34)	Ref.
Agree/strongly agree	659 (77)	110 (58)	2.8 (1.5, 3.0)
Does not apply/missing	64 (7)	16 (8)	NA
Males only			
Number of sex partners in the past 12 months	50 (1.4)		
0	52 (14)	13 (13)	Ref.
	93 (26) 142 (4E)	19 (20)	1.3 (0.6, 3.0) 1.0 (0.5, 2.0)
2-3	55 (15)	42 (43)	1.0(0.3, 2.0) 0.7(0.3, 1.5)
≥0 During past 12 months, say partners have been	55 (15)	23 (24)	0.7 (0.3, 1.3)
Males only	30 (7)	A (A)	Ref
Females only	305 (76)	83 (73)	0.5 (0.2, 1.4)
Both males and females <sup>b</sup>	0 (0)	1 (1)	NA
Have not had sex	51 (13)	13 (12)	0.5 (0.2, 1.8)
Missing answer	17 (4)	12 (11)	NA
Females only			
Number of sex partners in the past 12 months			
0	73 (16)	14 (19)	Ref.
1	171 (38)	33 (46)	0.9 (0.5, 1.9)
2–5	191 (43)	22 (31)	1.7 (0.8, 3.7)
≥6	12 (3)	3 (4)	0.7 (0.2, 3.0)
During past 12 months, sex partners have been			
Males only	357 (79)	53 (76)	Ref.
Females only	14 (3)	2 (3)	1.0 (0.2, 4.7)
Both males and temales <sup>o</sup>	4 (1)	0 (0)	
Have not had sex	/1 (16)	13 (19)	0.8 (0.4, 1.6)
iviissing answer	6(1)	∠ (3)	NA

 $^{\circ}$ Some percentages do not add up to 100 because of rounding. Columns that do not add up to the total (n=1,051) represent skipped and/or missed responses.

<sup>b</sup>Undefined ORs and 95% CIs due to cells containing 0

HIV = human immunodeficiency virus

OR = odds ratio

CI = confidence interval

Ref. = reference group

GED = general equivalency diploma

NA = not applicable

groups. Greater understanding of off-campus and on-campus student HIV knowledge differences and their implications for sexual behavior choices may be important for HBCUs to ensure that programmatic efforts are tailored to meet the needs of both their on- and off-campus student populations.<sup>34</sup>

In our final model, average/high HIV knowledge scores were more likely among students who agreed with all of several ways of assessing potential sex partners' HIV risk. Previous reports describe that misperceptions of sex partner characteristics often inaccurately guide HIV risk assessments and that more efforts are needed to enhance communication with sex partners and negotiation skills of students at HBCUs.<sup>22,35,36</sup> These data suggest that teaching HBCU students specific skills about assessing potential sex partner risk, as a means of strengthening HIV knowledge, is an area that should be further explored as part of HIV prevention efforts at HBCUs. Students should be encouraged, empowered, and given tools to have discussions with potential and current sex partners about partners' previous and current risk behaviors, such as number of previous sex partners and current and previous intravenous drug use. Information about the accuracy of individuals' perceptions about personal and sex partners' previous or current risk behaviors; direct, contextual dialogue about specific behaviors; and supporting students' development of a future time orientation might help guide the development of more effective HIV prevention programs at HBCUs by supporting students' efforts to remain sexually healthy.35-39

The personal risk perceptions and sexual risk behaviors of the students in our sample may also have been influenced by local-level perceptions regarding HIV/ AIDS prevalence.<sup>40</sup> Information regarding college-level HIV/AIDS prevalence may impact students' risk perceptions at HBCUs. Although data show that students at HBCUs are willing to participate in routine HIV testing initiatives,<sup>8,41</sup> HIV seroprevalence estimates on college campuses have been low among the general student population.41-43 It may be important to supplement African American students' knowledge of campus HIV/AIDS epidemiology with the broader context of some African American community concurrent sexual partnerships if we are to more accurately influence students' understanding of community prevalence, risk perception, and the HIV epidemic.44

Also significant in our final model was the finding that average/high HIV knowledge scores were more likely among students who had never used a needle to inject drugs. This finding may speak to the effectiveness of community-level HIV prevention messages regarding intravenous drug use among those who have never used intravenous drugs;<sup>45</sup> these messages should be more closely examined for possible components that could provide lessons to help facilitate the development of more effective HIV prevention messages regarding sexual activity.

Finally, HBCU students themselves have noted that HIV risk awareness and prevention efforts at some HBCUs have been a challenge<sup>46</sup> and can be strengthened by directly incorporating feedback from students, a process that they feel has not happened adequately to date. Student suggestions for improved HIV education and prevention efforts on campus included (1)delivery of an HIV/sexually transmitted disease workshop for freshman orientation, (2) facilitating parent/ student discussions about sexual health and HIV, and (3) ensuring confidentiality for on-campus HIV testing services.47 Inherent in improving student awareness of HIV risk would be a process to simultaneously ensure professional development of campus health administrators and faculty members about HIV awareness and prevention, so that they also have accurate, current, and accessible information.48 More recently, broader public-private collaborative partnerships are also beginning initiatives at HBCU campuses that are trying to increase awareness of the magnitude of the HIV/AIDS epidemic in African American communities, increase accurate knowledge and dispel myths about HIV/AIDS among African American college students, and educate and train HBCU students to be HIV/AIDS activists and leaders on their respective campuses.<sup>49</sup> These new types of partnerships play an important role in broadening support and reaching a wider audience for more effective and relevant HIV education and prevention efforts with students.<sup>50</sup>

The role of HBCUs in HIV education and prevention continues to be an important one for African Americans. A unique contribution of HBCUs to HIV prevention, compared with other educational institutions, is that they are largely grounded in a communal/ collectivist approach to student success. This approach can work for HIV prevention by stressing the importance of accurately assessing and reducing risk as part of a family and broader communal imperative.<sup>23</sup> Successful HIV interventions for African Americans can benefit from the inherent strength and communal perspectives of HBCUs.

#### Limitations

This study was subject to several limitations. First, we started with a convenience sample of HBCUs based on those with preexisting UNCF-SP relationships; the 24 HBCUs that participated represent only 23% of existing HBCUs. HBCUs that were not covered by

UNCF-SP were not able to participate and may have different types of students who might have responded differently to our HIV KAB questions. Second, all data from the students were self-reported, and although we tried to decrease concerns regarding privacy by using an anonymous online survey, some students may have given inaccurate responses because of recall bias or perhaps due to issues related to perceptions of HIV and social desirability. Third, self-selection bias was likely, as participating students were not randomly selected for this study. Finally, we did not include students' home cities and states as a variable; therefore, they could not be factored into analyses to examine their impact on knowledge and behaviors.

#### CONCLUSIONS

Our study suggests that HIV knowledge for African American students at HBCUs may be improved through education regarding sex partner risk perception myths and by facilitating access to accurate HIV prevention information. If we are to make more progress in fighting the domestic HIV/AIDS epidemic, HIV prevention efforts with HBCU students warrant improved alignment of accurate partner and personal risk perception with sexual behaviors that decrease risk. HBCUs are in a unique position to be more visible supporters of the HIV education and prevention efforts of their students because of their perceived value and respectability by students, parents, and the broader African American community.

The findings and conclusions in this article are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

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