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The Effect of Age on Human Immunodeficiency Virus Risk Related Behaviors among Undergraduate Students at a Historically Black College and University in the United States of America

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Objective: HIV infections have taken a heavy toll on young adults in the USA. Most undergraduate students fall within the age group who are at high risk of HIV infections. The effect of age on HIV risk related behaviors among African American undergraduate students has never been

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investigated before. Thus, this study assessed the effect of age on HIV risk related behaviors among African American undergraduate students at a Historically Black College and University.
Methods: A total of 400 respondents were randomly selected from Jackson State University of the USA, a Historically Black College and University. A cross-sectional study design was utilized from January to September, 2016. Data were collected using a validated self-administered standardized questionnaire. Chi-square test was used to see the association between age and HIV risk related behaviors.
Results: Over seventy five percent of the study participants have had at least one risk behavior related to HIV infection transmission and there was significant statistical difference between students aged 18-24 years and students aged 25 years and above ($p<0.05$). The students aged 18-24 years were more likely to participate in risk behaviors that could predispose them to HIV infections ($P = 0.02$).
Conclusions: As the HIV related risk behaviors was higher among students aged 18-24 years old, age appropriate HIV preventive programs that are appealing to young people will be required to effectively prevent HIV infection among this vulnerable population.

Keywords: Human immunodeficiency virus; aids; disease; centers for disease control and prevention.

1. INTRODUCTION

"Human immunodeficiency virus (HIV) remains a threat to Acquired Immune Deficiency Syndrome (AIDS), a devastating communicable disease that has claimed 40.4 million lives since the start of the epidemic" [1]. "In 2022, globally estimated about 39 million people were living with HIV, 1.3 million people newly infected and 630, 000 people died from AIDS-related illnesses" [1]. "Centers for Disease Control and Prevention (CDC) estimates that 1.2 million people were living with the virus and 31, 800 people became newly infected with the disease in 2022 in the USA" [2]. "In the same year, the highest HIV infection rate was recorded among African Americans. Despite constituting 12% of the US population, African Americans account for 37% of estimated new HIV infections recorded in 2022" [3].

"Men who have sex with men (MSM) are the population most affected by HIV in the USA. They accounted for 67% of estimated new HIV infections while the individuals who reported heterosexual contact accounted for 22% estimated new HIV infections in 2022" [2-4]. MSM continue to be a major driver of HIV infection in the U.S. African American MSM account for most of HIV infections [4,5]. They accounted for 35% of HIV infections reported among all MSM [2,4].

Although HIV affects people of all ages, the disease has taken a heavy toll on young adults in the U.S. [4,6]. "It is expected that these young adults would have access to health information and tools to make sound decisions that would reduce HIV infection risk" [4]. However, these young adults still indulge in risky sexual behaviors and less likely to be aware of their HIV status [4]. The increasing HIV and other sexually transmitted diseases (STDs) transmission rate that are commonly seen among young adults could be attributed to low rates of condom use, lack of awareness on HIV transmission pathways, multiple sexual partners, substance use (including alcohol and illicit drug abuse) and misconception regarding HIV infection. These aforementioned behaviors continue to aggravate the risk of HIV infection [6-8]. High HIV burden seen among these young adults underscores the need for more aggressive HIV preventive campaigns that focus on consistent use of condoms, sexual partner fidelity and abstinence practice.

In the U.S., most undergraduate students fall within the age group who are at high risk of HIV infections [9,10]. These undergraduate students lack full parental supervision, and this unsupervised environment offers them greater opportunities to test the limits of their new found freedom through experimenting in a variety of behavioral risks such as alcohol abuse, illicit drugs use, and risk sexual behaviors [9-11]. Some of the risk sexual behaviors that are common among U.S. undergraduate students include unprotected anal and vaginal sex, multiple sexual partners, inconsistent condom use, and causal sexual activities that predispose them to greater risk for STIs and unintended pregnancies [10-12]. A study conducted by Andrew and Andrew showed that about 76% of their undergraduate study participants have had at least one risk behavior related to HIV infection and engaged in risk behaviors that predispose

them to greater risk for STIs [9]. This study finding demonstrates that undergraduate students are constantly at risk of HIV infection.

In the US, nearly 20 million new cases of STIs occur annually and nearly half of all new infections occur among young adults aged 15-24 years old [13,14]. According to CDC, HIV infections by age were highest among young people aged 25-34 years old [6]. The age group 25-34 years old accounted for 40% of estimated new HIV infections recorded in 2022 in the USA [6]. Young people aged 13–24 years accounted for 20% of estimated new HIV infections recorded the same year in the USA [6]. Other studies have shown that African American undergraduate students were more engaged in risk behaviors that made them susceptible to HIV acquisition and transmission even after previous exposure to HIV educational messages [15-19]. Considering the fact that young people aged 13 to 34 years accounted for more than half (60%) of estimated new HIV infections in the U.S. and growing body of literature reporting that risk behaviors predispose young people to greater chance for HIV infections [6,9-12]. Thus, it is imperative to explore the effect of age on risk behaviors related to HIV infections among undergraduate students in the U.S. To the best of our knowledge, no study has examined the association between age and risk behaviors related to HIV infections among African American undergraduate students in the U.S. Hence, this study aimed to examine the effect of age on HIV risk related behaviors among African American undergraduate students, a well-described high risk group for HIV infections in the U.S.

2. METHODOLOGY

2.1 Study Design

We conducted a cross-sectional survey study among African American undergraduate students at Jackson State University (JSU) from January to September 2016. This Historically Black University enrolled about 9,000 undergraduate students during the study period. Study participants were randomly recruited, and students met the following inclusion criteria: (a) must be undergraduate students currently enrolled at JSU; (b) must give consent to study participation; (c) must be African American undergraduate students and (d) must be at least 18 years of age.

According to Michel and Talbot formulas, minimum sample of 369 respondents were required for this study [20,21]. However, we recruited 400 African American undergraduate students to accommodate possibilities of non-responses of some participants. The survey questionnaires were answered inside classrooms before or after the class lectures. We obtained a verbal permission from lecturers before distributing the questionnaires to the students. All the students who participated in this study provided consent and signed the informed consent form before participating in the study. The students were informed that the survey was fully voluntary, and they could withdraw anytime from the study and they had the freedom to refuse to respond to any specific question in the questionnaire without penalty or prejudice against them.

2.2 Study Data Collection

This study approval was obtained from JSU Institutional Review Board. This study survey questionnaire was divided into two sections, section 1: participants' demographic backgrounds and section 2: on risk behaviors relating to HIV infection transmission. To validate the study questionnaire, pretesting was done through sharing of the questionnaires to a group of African American undergraduate students at JSU to ascertain clarity of the survey questions and these students were not included in this final study. The Cronbach's alpha coefficient value was 0.76 on risk behaviors related to HIV infections. The Cronbach's alpha coefficient value closer to 1.0 (range 0-1) indicates higher internal consistency of the questionnaire [22]. HIV risk behaviors questions included questions related to sharing of unsterilized sharps such as needles, inconsistent condom use, unprotected vaginal or anal sex, multiple sexual partners, intravenous injection (I.V.) for drugs use and sex under the influence of illicit drugs or alcohol. Data were analyzed using chi-square of SAS® 9.3 statistical software (SAS Institute Inc., Cary, NC, 2012). The value $p<0.05$ was considered as significant.

2.3 Scoring of Risk Behaviors toward HIV Infection

Risk behaviors related to HIV infections were assessed using an 8-item questionnaire, where a student indicates one risk behavior related to HIV infection, such response was considered as having high risk behavior.

3. RESULTS

3.1 Participants' Profile

The mean age of the study participants was 21.9 years, standard deviation ± 5.7 years and ranged from 18 to 57 years (Table 1). Of the 400 study respondents, 259 (64.8%) were female and141 (35.2%) were male African American undergraduate students as shown in Table 1.

Table 1. Characteristics of the study participants

Characteristics	n (%) or Mean ± S.D.
Age	21.9 ± 5.7
Gender	
Male	141 (35.2)
Female	259 (64.8)

% = Percentage; S.D =Standard Deviation; n = Number of students in each group

3.2 Risk Behaviors toward HIV Infection

Study respondents indicated that 16.5% of students had multiple sexual partners. In the last 3 months about 58.5% of the students have had sex without condom and 34.8% reported having sex under influence of alcohol. The result showed that 64.2% of the respondents did not use condom during their last sexual intercourse. Respondents indicated that 13.5% of the students have had sex under the influence of illicit drugs within the last 3 months; about 1.5% of the respondents were IV drug users during the period of the study. Study participants indicated that 1.8% of the students regularly share unsterilized sharps such as needles. Regarding the question of having unprotected anal sexual intercourse, about 13.5% of the students have had unprotected anal sexual intercourse in the past as shown in Table 2. High risk behavior was assessed using an 8-item questionnaire, a report of one negative behavior related to HIV infection transmission was considered as having high risk behavior. After stratifying risk behaviors into risk behavior group and non-risk behavior group, the result revealed that 303 students (75.8%) in this study had at least 1 high risk behavior related to HIV infections and 97 (24.2%) respondents did not report any high risk behavior related to HIV infection transmission.

Table 2. Risky sexual behaviors of students enrolled in the study

Risky sexual behaviors	Frequency (%)
Have you had unprotected anal sex before?	
Yes	54(13.5)
No	346(86.5)
Did you use condom during your last sexual intercourse?	
Yes	143(35.8)
No	257(64.2)
Do you have multiple sexual partners?	
Yes	66(16.5)
No	334(83.5)
Do you regularly share unsterilized sharps such as needle?	
Yes	7(1.8)
No	393(98.3)
Are you currently an intravenous injection (I.V.) drugs user?	
Yes	6 (1.5)
No	394(98.5)
Have you had sex under influence of illicit drug in last 3months?	
Yes	54(13.5)
No	346(86.5)
Have you had sex under influence of Alcohol in last 3months?	
Yes	139(34.8)
No	261(65.2)
Have you had sex without condom in the last 3months?	
Yes	234(58.5)
No	166(41.5)
% = Percentage	

Table 3. Differences in distribution of risk behaviors by age

Age	Risk Behaviors		P
	Risk behavior	Non-risk behavior	
	n	n	
≤ 24 years	251	89	0.02
≥ 25 years	52	8	

P: p-value; p < 0.05 is considered significant; n = Number of students in each group

After stratifying the students' sexual behaviors into risk behavior group and non-risk behavior group, a total of 251 African American undergraduate aged 18-24 and 52 African American undergraduate students aged 25 and above have had at least one high risk behavior related to HIV infection. There was a statistically significant difference between respondents ≤ 24 years and respondents ≥ 25 years regarding risk behaviors toward HIV infection transmissions (p = 0.02) as shown in Table 3.

4. DISCUSSION

We have succeeded in examining the effect of age on risk behaviors related HIV infections among African American undergraduate students. This study demonstrates that a large portion of the students (75.8%) have had high risk behaviors that could predispose them to HIV infection. This study finding is consistent with other studies which have shown that undergraduate students are constantly engaging in HIV risk behaviors such as having unprotected anal or vaginal sex activities, inconsistence condom use, sharing of unsterilized sharps, multiple sexual partners, having sex under the influence of alcohol and illicit drugs [6-8,23,24]. We acknowledge that deep seated socio-cultural factors that may influence these students' behaviors such as delinquency, peer pressure, level of education, poverty, attitude towards ill-health and religion were not evaluated in this study [25-27]. However, it is disturbing that 75.8% of African American undergraduate students that participated in this survey reported having at least one HIV risk behavior. These undergraduate students also reported that 64.2% of them did not use condom during their last sexual encounters. A similar study that was conducted among African American undergraduate in the U.S. revealed that 64% of their study participants who had at least two or more sex partners did not use condom during their last sexual encounters [24]. Lack or inconsistence use of condom during vaginal or anal sexual encounters remains the most common route of HIV infection transmission among young adults in the U.S. [28]. These study findings buttress the urgent need for HIV preventive and condom use awareness programs that are more appealing to these vulnerable young adults.

This study reported that 16.5% of the undergraduate students had multiple sexual partners. However, this figure was lower in comparison to a similar study conducted among undergraduate students. They found that around 40% of their study participants had multiple sex partners [27]. This is quite unsettling since several studies have linked multiple sexual partners to HIV and other STDs infections among these vulnerable youths [23-28]. A similar study conducted among young adults reported that the greatest risk factor for HIV and other STDs infections was the act of having unprotected sex with multiple sexual partners [29]. "More youth friendly HIV preventive programs tailored toward preventing risky behaviors should be implemented across the board. This present study reported that 13% of students have had unprotected anal sexual intercourse in the past. The practice of unprotected receptive anal sexual encounter carries the highest risk of HIV transmission if either partner is HIV-positive" [30]. The high risk of HIV transmission via unprotected anal sexual intercourse could be attributed to the anatomy of rectum. The human rectum consists of thin epithelial lining that creates an easy access to HIV infection during unprotected anal sexual encounters [30]. This risk behavior for HIV infection transmission could be reduced or eliminated during anal sexual encounter through consistent condoms use; daily intake of HIV pre-exposure prophylaxis (PrEP) drugs; antiretroviral therapy (ART) treatment for HIV positive individuals; abstinence or avoidance of risk sexual activities" [30,31].

This study found a significant statistical difference between students aged 18-24 and students aged 25 and above regarding their risk behaviors to HIV Infections (p=0.02). The

engagements of these undergraduate students in high risk behaviors varied between the two age groups and this study found higher rate among students aged 18-24 years. It may be argued that the higher risk behaviors seen among students aged 18 – 24 could be attributed to their level of maturity, peer pressure, level of education, poverty, delinquency and substance abuse that are more pronounced among this vulnerable age group [25-27]. In addition, the higher risk behaviors recorded among these study participants aged 18-24 years may be ascribed to the skewed age distribution in this study. The majority of the study participants (340 students) were within 18-24 years old bracket and the remaining 60 students were aged 25 years old and above. A study conducted among African American students, found that adolescent students seeking for sexual sensation has translated to higher frequency of unprotected sex, spontaneity of sexual encounters, multiple sexual partners and risky sexual experiments [32]. Additionally, previous studies have shown that lack of parental supervision at the universities, offers fresh undergraduate students ample opportunities to test the limits of their newly found freedom through risky sexual activities" [9-11,33,34]. There are nearly 20 million new cases of STIs occurring annually and nearly half of all the new infections occurring among young adults aged 15-24 years old in the U.S. [13,14]. This investigation advocates for an effective age-appropriate HIV preventive programs that would reduce or eliminate these high risk sexual behaviors notable among these young adults. These youth friendly HIV prevention programs should be promoted and properly implemented across the various colleges and universities in the USA.

5. STRENGTH AND LIMITATIONS OF THE STUDY

The study findings could not be generalized to all students in Historically Black Colleges and Universities (HBCUs) in the United States of America because this present study sample pool came from one Historically Black University (JSU). A better picture of HIV related risk behaviors among African American undergraduate students would have been achieved if the study participants were drawn from multiple HBCUs. This study utilized a cross-sectional survey that is centered on retrospective memory data collection process. This exposes this research to the possibility of memory recall bias or selective memory recall among the study respondents. Another limitation associated with the cross-sectional design is the difficulties of differentiating cause and effect from the simple association. Finally, social desirability bias has been linked to self-administered survey, and this may have affected the participants' response to the survey questions due to the sensitive nature of HIV discussion as well as the fact that young people are reluctant to provide information about their sexual lifestyles. Compensation technique was adopted during the study design stage to counteract the non-response bias by drawing larger sample size and ensuring daily quality control during the data collection stage. The standardized instrument utilized in this present study minimalizes the possibility of social desirability bias among the study respondents. Hopefully, the confidentiality and anonymity of the questionnaires encouraged the students to be honest in their responses. However, the strength of this study was the 100% response rate that provided a much reliable estimation of risk behaviors of these respondents. Despite the aforementioned limitations, the study has succeeded in examining HIV risk related behaviors among these African American undergraduate students.

6. CONCLUSION

This study finding has shown that the general assumption that students in institutions of higher learning would be well informed concerning HIV/AIDS and other STDs and therefore should have less risk sexual activities, bears no resemblance to actual reality among these undergraduate students. These students were aware of what construes risky sexual behaviors; nonetheless a lot of these students (75.8%) in this study have had at least one risk behavior that could predispose them to HIV infections. Therefore, emphasis should be placed on designing HIV preventive strategies that are more appealing to these young adults. This study suggests that institutions of higher learning should adopt age appropriate HIV preventive educational programs that will address HIV risk behaviors identified in this study.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

ETHICAL APPROVAL

As per international standards or university standards written ethical approval has been collected and preserved by the author(s).

CONSENT

As per international standards or university standards, Participants' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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