

Knowledge, Attitudes, and Utilization of HIV PrEP among Black College Students in the United States: A Systematic Review

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Abstract

Considering the diverse socio-cultural norms, sexual attitudes, and mental and emotional immaturity that generally exist among young adults, Black college students are behaviorally vulnerable to acquiring new HIV infections before requisite exposure to HIV prevention education. Black college students (aged 18 to 34) fall within the description of one of the highest priority populations at risk for new HIV infection given the overall under-utilization and racial disparities in the HIV pre-exposure prophylaxis (PrEP) coverage among Black people in the United States (U.S). Yet, research addressing sexuality and HIV PrEP amongst Black college students are limited. This systematic review undertakes a comprehensive exploratory search of eight databases and includes four studies that have been conducted regarding Black college students HIV PrEP knowledge, attitudes and PrEP utilization in the U.S. Our findings suggest a high rate of sexual activity and hesitancy to initiate PrEP due to fear, exacerbated by low comprehensive knowledge of PrEP, low self-perceived HIV risk, and low HIV testing before any PrEP educational intervention. Positive PrEP utilization was closely associated with high self-perceived HIV risk following PrEP education, particularly when individual and structural factors were satisfactorily addressed. Current evidence suggests that PrEP is grossly under-utilized by Black college students who may benefit from it, and attitudes are driven by multiple determinants informed by psycho-social and structural barriers to PrEP access or acceptability in the U.S. Therefore, PrEP education is a potent tool for improving sexual health behaviour and attitude among Black college students.

Keywords: *Attitude, Black College Students, HIV/AIDS, Knowledge, Prevention, Pre-exposure Prophylaxis, PrEP, Utilization.*

Introduction

Despite recent progress in HIV prevention, Blacks/African Americans (referred to as Black hereafter) account for more than 40% of new HIV infections [1], a reality compounded by empirical evidence associating young Black adults with the highest risk for new HIV infection [2]. Nevertheless, some young Black students have touted a low HIV risk regardless of their HIV status or the current state of the domestic HIV epidemic [3]. HIV pre-exposure

prophylaxis (PrEP) is remarkably effective in preventing HIV if taken as prescribed [4, 5]. PrEP utilization reduces the incidence of HIV infection and is highly recommended by the World Health Organization (WHO) for key populations experiencing higher exposure to HIV [6], such as Black college students. PrEP coverage is the number of people who have received a PrEP prescription, divided by the overall number of individuals estimated to be eligible for PrEP, and could benefit from the drug [7, 8] Unfortunately, over the past four

years (2019 – 2022) in the United States (U.S.), Black persons had the lowest HIV PrEP coverage on average of 10.25%, compared to 18.9% coverage of Latinos/Hispanics, and 74% coverage of Whites [9]. Generally, HIV remains a significant public health challenge among teenagers and young adults between 13 to 34 years [10], exacerbated by the higher risky sexual behavior, compared to the general population [11, 12]. In the U.S, young people aged 13-24 account for 20% of new HIV diagnoses, and people aged 25 – 34 years account for 39% of new HIV infections [13]. Unfortunately, half of young people with HIV are unaware that they have it [14].

College students (18 – 34), typically fall in this age cohort, and as such generally experience the highest rates of new HIV diagnosis – 21,265 in 2019 – compared to 12,614 for individuals aged 35 to 54 years [10]. In the general Black population, factors contributing to high infection rate (i.e., low risk self-perception for HIV, fear of HIV PrEP side effects, and cultural resistance to HIV-PrEP) may also be responsible for low knowledge, misdirected and unfavourable attitudes, and low utilization of PrEP among Black college students [15, 16]. Surprisingly, few studies have explored Black college students in the context of HIV PrEP; clearly, research addressing sexuality and HIV PrEP amongst Black college students are limited [17-20].

Thus, the purpose of this article was to present a systematic review of studies focused on HIV PrEP among Black college students in the U.S. To advance the science in this area, the Preferred Reporting Items for Systematic Review (PRISMA) structure and the theory of planned behavior were used to undertake a comprehensive exploratory search of eight databases (see Table 1). The findings were synthesized in the context of the knowledge, attitude, beliefs, behavior, and utilization of

HIV PrEP among Black college students in the U.S. Specifically, terms such as *Knowledge*, represent an awareness of HIV PrEP by Black college students in this context. *Attitude* is the degree of favour or disfavour from underlying beliefs, which in turn determine the behaviour of participants toward HIV as a disease and HIV PrEP as a prevention method. *Utilization* refers to the uptake of HIV PrEP in this context. *Beliefs* refer to self-perceived HIV risk, and *behaviors* imply HIV testing. The outcome variables in these studies were HIV PrEP knowledge (awareness), attitudes (perception), and utilization (uptake).

Methods

The eligibility criteria for this systematic review reflect the purpose of this article and include: a) written in English and conducted in the U.S; b) targeted Black college students (ages 18 – 34), and HIV PrEP; c) study must have at least 50% of participants as Black college students; d) focused on HIV PrEP or the factors that influence them; and e) were published in peer-reviewed journals from July 1, 2012 (the year PrEP was approved) to May 20, 2023.

A comprehensive electronic search of eight databases was conducted and resulted in several identified articles: PubMed ($n=17$), CINAHL ($n=8$), EMBASE ($n=38$), PsychInfo ($n=10$), Web of Sciences ($n=5$), EBSCOhost ($n=6$), Science.gov ($n=17$), and Scopus ($n=12$) (see Table 1). Key words varied according to peculiarities of these databases and sites, for example Mesh terms were included for PubMed search. The search for articles was refined in accordance with the eligibility criteria. The search terms, synonyms of these key words, and appropriate subject terms that were identified and incorporated in the search across databases used are presented in Table 2.

Table 1. Screening Method for Literature Search

Database	PubMed (n=17) CINAHL (n=8) Embase (n=38) PsycINFO (n=10)	Web of Sciences (n=5) EBSCOhost (n=6) Science.gov (n=17) Scopus (n=12)
Identification		
	Identified records from all searches (n=113)	Duplicate records removed (n=51)
Screening		
	Records screened by title/abstract (n=62)	Records removed after initial screening (n=52)
Eligibility		
	Articles screened for eligibility (n=10)	Records remaining after exclusion criteria applied (n=4)
Included		
	Records included in final review (n=4)	

Table 2. Terms Used to Search for Targeted Articles in Databases

Database	Search
PubMed (retrieved 17 articles) – Searched on May 20, 2023	(perception* OR utiliz* OR use OR knowledge* OR aware* OR attitude* OR opinion* OR Accept* OR Attitude* OR Feel* OR Uptake OR Understand* OR comprehen* OR "Attitude to Health"[Mesh]) AND (hiv OR antiretroviral OR anti-hiv) AND (prep OR "pre-exposure prophylaxis") AND (black* OR African-american* OR "Black or African American"[Mesh]) AND (student* OR "Students"[Mesh])
CINAHL (retrieved 8 articles) – Searched on May 20, 2023	((MH "Attitude" OR MH "Attitude to Health" OR perception* OR utiliz* OR use OR knowledge* OR aware* OR attitude* OR opinion* OR Accept* OR Attitude* OR Feel* OR Uptake OR Understand* OR comprehen*) AND (((MH "Human Immunodeficiency Virus" OR hiv OR antiretroviral OR anti-hiv) AND (prep OR "pre-exposure prophylaxis"))) OR MH "Anti-Retroviral Agents+") AND (black* OR African-american* OR MH "African Americans") AND (student* OR MH "Students")
EmBase (retrieved 38 articles) – Searched on May 20, 2023	('attitude to health'/exp or perception* OR utiliz* OR use OR knowledge* OR aware* OR attitude* OR opinion* OR Accept* OR Attitude* OR Feel* OR Uptake OR Understand* OR comprehen*) AND (hiv OR antiretroviral OR anti-hiv) AND (prep OR "pre-exposure prophylaxis") AND (black* OR African-american* OR 'african american'/exp) AND (student* OR 'student'/exp)
PsychInfo (ProQuest) (retrieved 10 articles) – Search	('attitude to health'/exp or perception* OR utiliz* OR use OR knowledge* OR aware* OR attitude* OR opinion* OR Accept* OR Attitude* OR Feel* OR Uptake OR Understand* OR comprehen*) AND (hiv OR antiretroviral OR anti-hiv) AND (prep OR "pre-exposure

conducted on May 20, 2023	prophylaxis") AND (black* OR African-american* OR 'african american'/exp) AND (student* OR 'student'/exp)
Web of Sciences retrieved 5 articles – Searched on May 20, 2023	(perception* OR utiliz* OR use OR knowledge* OR awareness OR attitude* OR opinion* OR Acceptability OR Attitude OR Feeling OR Uptake OR Use OR Understanding OR "Attitude to Health"[Mesh]) AND (hiv-prep OR "HIV pre-exposure prophylaxis" OR "pre-exposure antiretroviral prophylaxis" OR "pre-exposure chemoprophylaxis" OR "anti-HIV prophylaxis") AND (black* OR African-american* OR "Black or African American"[Mesh]) AND (student* OR "Students"[Mesh])
EBSCOhost retrieved 6 articles – Searched on May 20, 2023	(perception* OR utiliz* OR use OR knowledge* OR aware* OR attitude* OR opinion* OR Accept* OR Attitude* OR Feel* OR Uptake OR Understand* OR comprehen* OR "Attitude to Health"[Mesh]) AND (hiv OR antiretroviral OR anti-hiv) AND (prep OR "pre-exposure prophylaxis") AND (black* OR African-american* OR "Black or African American"[Mesh]) AND (student* OR "Students"[Mesh])
Science.gov retrieved 17 articles – Searched on May 20, 2023	(perception* OR utiliz* OR use OR knowledge* OR awareness OR attitude* OR opinion* OR Acceptability OR Attitude OR Feeling OR Uptake OR Use OR Understanding OR "Attitude to Health"[Mesh]) AND (hiv-prep OR "HIV pre-exposure prophylaxis" OR "pre-exposure antiretroviral prophylaxis" OR "pre-exposure chemoprophylaxis" OR "anti-HIV prophylaxis") AND (black* OR African-american* OR "Black or African American"[Mesh]) AND (student* OR "Students"[Mesh])
Scopus retrieved 12 articles – Searched on May 20, 2023	hiv AND pre-exposure AND prophylaxis AND black AND students

Initially, 113 articles were imported from the databases and saved in an EndNote library. Subsequently, the articles were exported into a COVIDENCE software, where 51 duplicate articles were automatically removed, leaving a total of 62 articles that were screened for inclusion. At this juncture, only the title and abstracts were screened using the eligibility

criteria, and conflicts regarding 13 articles were resolved amicably by two reviewers. Overall, 52 articles were considered irrelevant based on exclusion criteria, leaving 10 articles for full-text assessment. Finally, four articles met all inclusion criteria and were summarized in Table 3. From this, the findings were synthesized in the results and in Table 4.

Table 3. Summary of Studies in Knowledge, Attitudes, and Utilization of HIV PrEP among Black College Students in the U.S. (N=4)

Study	Participants	Design/Protocol	Findings	Strengths/Limitations
<p>Arnold et al. (2018) Preliminary investigation evaluating college students' willingness and need to take pre-exposure prophylaxis (PrEP) for HIV</p>	<p>N=147 Black college students (M_{age}=21.6, Undergraduate Black/African American (89%) Inclusion criteria Black students recruited from undergraduate introductory courses</p>	<ul style="list-style-type: none"> • Descriptive correlational cross-sectional quantitative survey with 1 group <p>Primary outcome To evaluate the attitudes, willingness, and need to take PrEP among college students at a HBCU in the southern United States</p>	<ul style="list-style-type: none"> • Only 10% of the participants had previous knowledge of HIV PrEP. • 53% were willing to initiate PrEP • 88% would initiate PrEP if their chance of contracting HIV were lowered. • 85% would consider PrEP if their partner were HIV positive. • 87% would consider PrEP if they considered themselves to be at high risk (self-perceived) for HIV infection. • 28% failed to report their HIV status. • No reported current use of HIV PrEP • Barriers associated with HIV PrEP by the participants include side effects, cost and drug interactions 	<p>Strengths</p> <ul style="list-style-type: none"> • Large sample size (N=147) • Generalizable. <p>Limitations</p> <ul style="list-style-type: none"> • Lack of longitudinal data collection • Social desirability and recall bias. • Lack of construct validity reporting of the newly created tool utilized in this study for the first time

<p>Chandler et al. (2020)</p> <p>The pre-exposure prophylaxis (PrEP) consciousness of Black college women and the perceived hesitancy of public health institutions to curtail HIV in Black women</p>	<p><i>N</i>=43 Black college students (<i>M</i>_{age}=20, Undergraduate Black/African American 100%)</p> <p>Inclusion criteria Black college women in Atlanta, Georgia</p>	<ul style="list-style-type: none"> • Mixed methods quasi-experimental design • 1. pre-test of recruited participants • 2. pilot PrEP education intervention • 3. Post-test after 2 weeks of PrEP education • 4. Focus group discussion one week (1wk) after post-test <p>Primary outcome To determine Black college women's perceptions and attitudes towards HIV PrEP, and preferences for PrEP education</p>	<ul style="list-style-type: none"> • 33% had previous knowledge of HIV PrEP • The likelihood of PrEP knowledge increased if participants were on contraceptive. • Prior to the PrEP educational intervention 72% were apprehensive about PrEP. • Participants believed PrEP is mostly for sexual and gender minorities because they were mostly depicted in commercials. • PrEP utilization was unaffected by use of contraceptives by the participants. • Participants were worried about side effects of pills in general including contraceptives. • Post-intervention, 70% of in person and 63% of online participants would consider PrEP if provided with PrEP education, informed by trusted sources 	<p>Strengths</p> <ul style="list-style-type: none"> • The focused discussion (qualitative design) provided depth and context in the survey earlier conducted. • The longitudinal design complemented the scientific rigor. • Randomization to in-person or online groups enhances the quality of evidence. <p>Limitations</p> <ul style="list-style-type: none"> • Generalizability limited to female Black college students. • Small sample size (<i>N</i>=43) • Social desirability bias
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			<p>such as college health care team.</p> <ul style="list-style-type: none"> • Post-intervention, 67% valued educational intervention. • 100% in the in-person delivery considered educational intervention excellent compared to 91% of online delivery. • 100% believed their HIV status was negative (self-perceive HIV risk claim). • 70% had never tested for HIV. • 67% had never discussed HIV with their partners. • 56% were unaware of their partners HIV status. 	
<p>Marshall et al. (2020) Current HIV testing & risk behaviors among students at historically Black Colleges & Universities in a southern State</p>	<p><i>N</i>=615, 4 campus HBCU study. Inclusion criteria Students in 4 HBCUs campuses. 88% in this study were between 18 – 24 years. Undergraduate</p>	<ul style="list-style-type: none"> • Descriptive quasi-experimental quantitative study Primary outcome To assess current sexual risk behaviors that may put HBCU students at risk for HIV acquisition, and to assess their current knowledge about PrEP 	<ul style="list-style-type: none"> • Only 14% of participants had previous knowledge of HIV PrEP • Out of this 14%, the majority did not know how to access HIV PrEP • Factors identified as responsible for slow HIV PrEP utilization were 	<p>Strengths</p> <ul style="list-style-type: none"> • Recruitment from 4 HBCUs campuses enhances the scientific rigor and generalizability. <p>Limitations</p> <ul style="list-style-type: none"> • Lack of longitudinal data collection • Social desirability and recall bias

	Black/African Americans made up 95% of participants.		<p>costs, absence of need due to self-perceived HIV risk, increasing STI among PrEP using sexual and gender minority groups, and HIV stigma.</p> <ul style="list-style-type: none"> • 86% were sexually active, out of which 42% had never tested for HIV. • 52% reported discussing their HIV test results with their partners. • 44% of the participants reported having 2 to 5 sexual partners. • 46% reported inconsistent condom use for vaginal and anal sex. 	
Okeke et al. (2021) Awareness and acceptability of HIV pre-exposure prophylaxis (PrEP) among students at two historically Black universities (HBCU)	<p><i>N</i>=210 Black college students (<i>M</i>_{age}=19.8, Graduate students=2%, undergraduates=98%) Inclusion criteria Students at two Historically Black Colleges</p>	<ul style="list-style-type: none"> • Cross-sectional descriptive correlational quantitative survey with 1 group <p>Primary outcome To explore awareness and acceptability of PrEP among college students in two HBCUs in North Carolina</p>	<ul style="list-style-type: none"> • 52% had knowledge of HIV PrEP), out of which 24% became aware of PrEP from student health clinic. • Persons would have a favorable attitude to PrEP if they believed they had a high HIV risk. • Although 58% would consider taking PrEP, only 3% of 	<p>Strength</p> <ul style="list-style-type: none"> • Authors claim the study is novel regarding acceptability of injectable PrEP in young adults. <p>Limitations</p> <ul style="list-style-type: none"> • Small sample size (<i>N</i>=60) • Social desirability bias. • Generalizability to Black college students. • Absence of qualitative component to provide context and

	and Universities (HBCU) in the Southern United States.		<p>participants were currently on PrEP.</p> <ul style="list-style-type: none"> • Socio-demographics (age, gender, sexual orientation, year of study, self-perceived risk) were not significantly associated with HIV PrEP knowledge. • 73% claimed they had no self-perceived HIV risk, while 9% believed they were at risk for HIV. <p>Students find HIV PrEP acceptable 38% injectable vs 29% once daily pill.</p>	depth to quantitative findings.
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Results

Black College Students Knowledge, Beliefs, and Behavior Regarding HIV PrEP

Knowledge regarding the existence of HIV PrEP is on average 27% (i.e., 10%, 14%, 33%, 52%) across the four studies included in this review (see summary Table 2), indicating that majority of Black college students are unaware of this crucial prevention resource [18, 19, 21, 22]. Irrespective of knowledge or lack thereof of HIV PrEP, there is a generally low self-perceived HIV risk even in participants who are unaware of their HIV status, contributing to the generally low interest and utilization of HIV PrEP, particularly in the absence of educational intervention [18]. PrEP belief was characterized by apprehension in 72% of the participants in one study. Subsequently, HIV PrEP interest improved drastically (up to 70%)

following a PrEP educational intervention [23]. Although, the likelihood of PrEP knowledge increased if participants were using contraceptives, there was no association between use of contraception, HIV PrEP attitudes, and utilization [19]. Curiously, similar studies [10, 24] involving college students in general suggests that the belief in risk for sexually transmitted infections and pregnancy outweigh any potential risk for HIV, even in the presence of recent risky sexual history, such as multiple sexual relationships or condomless casual sex [24]. In fact, the majority of students believed they had a HIV negative status, in the absence of ever testing for HIV [18, 22]. Findings suggest that many students, who had no previous knowledge regarding HIV PrEP and had never been tested for HIV, were sexually active with multiple partners [18, 21]. Overall, knowledge of HIV PrEP appears to be negatively associated with

stereotypes (such as promiscuity, sex work, injection drug use), raising issues about the role of educational interventions on PrEP initiation and HIV prevention among this un-engaged at-risk population [19].

Beliefs and Behaviors of Black College Students Observed through their Interactions and Relationships

Evidence of HIV PrEP beliefs and behaviors are limited as a result of the prevailing low knowledge of PrEP in this demographic. Yet, HIV-related beliefs and behaviors of Black college students regarding their interactions and relationships are generally characterized by non-disclosure, avoidance, and indifference. For example, 67% of Black college women had never discussed HIV with their sexual partners; in fact, 56% of the participants were unaware of

their partners HIV status in the same study [19]. Similarly, in another study, 48% had never discussed their HIV test results with their partners [22]. Although, 4% of Black college students in yet another study willingly disclosed that they are HIV positive, 28% failed to report their HIV status when asked [18], indicating that HIV and HIV PrEP related open discussions were still very poor in some studies, and unaccounted for in others. Many Black college students in one study wrongly attributed the need for HIV PrEP to sexual and gender minority groups, while the beliefs of as much as 72% were characterized by fear and hesitancy towards HIV PrEP [19]. In contrast, a favorable belief about HIV PrEP is positively associated with high self-perceived HIV risk in this demographic [21].

Table 4. Summary of Findings Regarding Knowledge, Attitudes, and Utilization

Knowledge	Attitudes	Utilization
<i>Defined as awareness of the existence of HIV PrEP by Black college students</i>	<i>Defined as underlying beliefs and behavior of Black college students toward HIV and HIV PrEP</i>	<i>Defined as the use of HIV PrEP</i>
<p>Pervasive lack of knowledge of the existence of PrEP</p> <p>Majority of Black college students having knowledge of PrEP were unaware of locations to access it.</p> <p>The source of information for majority of the Black college students having knowledge of PrEP was social media</p>	<p>High rate of sexual activity</p> <p>Very low rate of HIV testing</p> <p>Low self-perceived HIV risk belief</p> <p>High prevalence of hesitancy about</p> <p>HIV status disclosure common within partners</p>	<p>Hesitancy to initiate PrEP due to fear of side-effects, stigma etc. common in this demographic.</p> <p>Under-utilization of PrEP common in this demographic</p> <p>Willingness for PrEP acceptance increases with PrEP education.</p> <p>PrEP utilization unaffected by number of sexual partners or use of contraception</p>

HIV PrEP Utilization Behavior among Black College Students

HIV PrEP is grossly under-utilized among Black college students, as indicated by only 3% of participants in one study who were currently on HIV PrEP [21]. Many Black college students across studies were sexually active, inconsistent in condom use, claimed HIV

negative status (with no tests done), refrained from discussing HIV status, and were unaware of their partners' HIV status (see summary Table 3 and 4). As such, the willingness to initiate HIV PrEP increased only as beliefs about the efficacy of HIV PrEP medications increased, or if they thought any of their partners in the last six months had contracted HIV [18], or as self-perceived HIV risk

increased, or as PrEP education intervention were provided [19, 21]. PrEP utilization was not associated with use of contraceptives by the female participants, or by the number of sexual partners. Barriers associated with HIV PrEP utilization identified by the participants include: side effects, cost, drug interactions, self-perceived absence of need due to self-perceived HIV risk, increasing STI among PrEP using sexual and gender minority groups, and HIV stigma [18, 22].

Discussion

Currently, HIV PrEP knowledge is low, attitudes are sub-optimal, and utilization in Black college students is poor and likely driven by multiple determinants. Firstly, the low HIV PrEP knowledge among Black college students is consistent with findings involving Black adults in the general U.S population [25, 26]. While studies explored for this review have recommended culturally sensitive interventions such as use of trusted sources such as college health nurses to interface with this demographic about PrEP and mitigate possible medical mistrust, other studies involving Black adults have recommended an integration of PrEP into gender affirming care [19, 27]. Similarly, other studies amongst Blacks have advocated for the dismantling of perceived barriers to PrEP such as self-perceived HIV risk, HIV stigma, and fear of HIV disclosure which are correlates of low HIV PrEP knowledge [28]. Regarding knowledge of locations to access HIV PrEP, in one study, out of the few students (24%) who knew about HIV PrEP, 52% were unaware of the locations to access PrEP [22]. In yet another study, a substantial number of students (24%) first knew of HIV PrEP from the campus health services [21]. Overall, the well documented role of PrEP educational intervention in the few studies conducted among Black college students indicate that PrEP education fostered a significant positive attitude towards HIV PrEP [18-20]. For example, a study that found a very low knowledge regarding HIV PrEP (10%)

observed that 88% were sexually active, and with PrEP literacy the number of students willing to initiate PrEP jumped from only 53% to 88% [18]. Hence, this study advocates for college HIV PrEP educational intervention that will play a critical role in forging sexual health knowledge and behaviors of Black college students. Colleges are well positioned to provide consistent messaging on the harmful effects of risky sexual behaviors, while supporting students to adopt risk reduction behaviors, such as HIV testing and HIV PrEP initiation [14]. Both mixed race and historically Black colleges and universities (HBCUs), are inherently capable of reaching millions of enrolled Black students daily, and could play a key role in HIV prevention, if the opportunity is harnessed. College health centers should be encouraged to embrace providing information about PrEP, connecting students with PrEP using CDC's PrEP locator, and PrEP monitoring services that provide reminders to encourage adherence.

Secondly, negative attitudes toward HIV PrEP by Black college students are driven by fear of PrEP side-effects, hesitancy to discuss or disclose HIV and HIV PrEP related matters, concerns about cost, stigma, and the commercials associating PrEP with sexual and gender minorities [18, 19]. As a result, behaviors of Black college students are characterized by low self-perceived HIV risk, and low HIV testing also seen in other subgroups of the Black demographics [24, 29, 30]. Specifically, hesitancy at HIV status disclosure and HIV PrEP discussion with sexual partners emerged as a significant finding [20]. This is consistent with empirical findings of general patient aversion to the disclosure of levels of sexual risk behavior in HIV care [31-34]. Also, resistance to PrEP discussion may be driven by overall societal stigma negatively associated with living with HIV [35], which may be exacerbated by significant HIV PrEP coverage inequity in the Black demographic. Emphasis must also be placed on increasing

linkage to HIV preventive care or treatment for spouses or sexual partners of interested students who might be at high risk for HIV infection. That way, it would be easier for students to encourage their partners to seek and speak openly about their own sexual health.

Lastly, the gross under-utilization of HIV PrEP seen in Black college students in the studies reviewed is consistent with findings for Black America in general [36, 37]. In fact, Chan, Chappel [38], suggests that people with indications for PrEP in the U.S. alone may be up to 1.1 million. Hence, under-utilization of PrEP by Black college students is not a peculiar phenomenon. However, some studies have recommended school health centers provide access to PrEP and channel HIV prevention effort towards heterosexual males and females which may be effective in correcting the false narrative associating PrEP utilization with sexual and gender minority groups [24, 30, 39]. This is critical for Black college students as well, considering the high rate of new HIV infection reported among Blacks in general and specifically in young adults aged 13 to 34 years [5].

Implications for Research

Considering the diverse socio-cultural norms and sexual attitudes that exist within the Black population, there are growing calls for studies that focuses on diverse Black groups that encourage cultural sensitivity [23, 40]. These calls are also rooted in the current health disparity status of Blacks such as: i) disproportionately affected by HIV; ii) lowest in HIV PrEP coverage and utilization; and iii) under-represented in research. Black peoples experience and HIV prevention interventions cannot be generalized from research focusing on Caucasian or other racial groups. Further research should aim to conceptualize PrEP

Implications for Practice and Policy

There was no significant association between the belief of Black college students about HIV PrEP, and HIV status disclosure or

efficacy clinical trials with a longitudinal design in which Black college students are supported to initiate PrEP on the spot, rather than cross-sectional design. Also, because research offers a formidable means of increasing HIV prevention knowledge, and improving sexual health behaviors, further research should consider focusing on other subgroups of Black America such as Afro-Caribbeans, and African immigrants so as to understand how socio-ecological factors may influence health seeking behaviors in these Black subgroups. Given that 88% of black immigrants are African born or Caribbean born [41], Black college student subgroups – African Americans, Afro-Caribbeans, and African students – have not been specifically studied. There is a need to understand how socio-demographic influences such as race/ethnicity, parental nativity, and cultural resistance to PrEP impacts their knowledge, perception, and utilization of HIV PrEP. There is an ongoing HIV epidemic among today's youth in the U.S. [5]. Yet, the majority of HIV prevention studies have either limited their study sample to sexual and gender minorities, or to Black women [42, 43]. Similarly, studies regarding HIV PrEP among Black college students have focused on HBCUs. Future research should diversify the location of enrolling Black college students to include Blacks in mixed race colleges, and not just HBCUs. Researchers should endeavor to consider the psychometrics that accurately reflect the dispersion of Black communities beyond the southern U.S. Overall, in order to fully understand the ramifications of biopsychosocial and structural factors undermining HIV prevention in this demographic, a study on the relationship between sociodemographic correlates on HIV PrEP knowledge, attitudes, and utilization is highly desirable.

discussion of HIV PrEP with parents, or sexual partners, which is consistent with the low HIV PrEP knowledge evident in this demographic [2, 44, 45]. Hence, HIV PrEP is currently

under-utilized in this demographic. Sources of information regarding HIV PrEP in media commercials mainly associate PrEP with sexual and gender minorities at the expense of heterosexual individuals, indicating the need for more targeted HIV educational campaigns [18, 21]. Trusting relationships lacking in communities, but positively forged through targeted HIV prevention educational intervention, could significantly inform PrEP belief, if harnessed. Hence, a significant way of reducing potentially new HIV transmissions would be empowering college health clinical staff with PrEP initiation protocols and capacity, increasing PrEP literacy messaging, and increasing PrEP coverage in this demographic. Routine evaluation of the knowledge and understanding of the ending the HIV-epidemic (EHE) goals of the federal government by HIV program staff and community members should become a consistent policy. Also, current mechanisms for achieving HIV prevention among youths in general and Black youth in particular should be re-assessed in order to ensure effectiveness of program strategies. Effort should be made to highlight existing HIV specialization pathways for nurse practitioners and other care providers who may be interested in HIV/AIDS care including the HIV/AIDS certified registered nurse program (ACRN). Nurses who are ACRN certified should be empowered with requisite institutional approvals and resources to advance or implement the integration of HIV PrEP and

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post-exposure prophylaxis (PEP) into comprehensive college health services across college campuses in America.

Conclusion

Amongst Black college students, the level of HIV PrEP knowledge is low (~27% on average), attitudes are characterized by fear of PrEP and non-disclosure of HIV status, and under-utilization ($\leq 3\%$ on average) of HIV PrEP is pervasive. Sexual activity is high, self-perceived HIV risk is low, HIV testing is low, but negative status claims are high. Some sources of information regarding HIV PrEP emanates from potentially inaccurate outlets, for example social media. Hence, HIV PrEP educational interventions, research, and practice and policy adjustments are needed in improving knowledge, attitudes, utilization, beliefs, and behaviors towards PrEP.

Conflict of Interests

The author(s) declare that they have no competing interests.

Funding

No specific funding was provided for this study.

Acknowledgements

The authors acknowledge the authors of the original four articles that were screened and included in this systematic literature review.

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