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Naomi Tesema April 14, 2020

Mobile Phone Apps for HIV Prevention Among College-aged Black Women in Atlanta: Preferences and Prototype

by

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Abstract

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Mobile apps can facilitate the innovative delivery of accurate human immunodeficiency virus and sexually transmitted infections (HIV/ STI) - related information. Most of the current research specific to HIV prevention delivered via mobile application (app) has focused on the most at-risk male population, MSM, but few have focused on at-risk women. To date, there are no HIV prevention interventions delivered via mobile app focused on vulnerable cis-gender Black women. This study's purpose is to gather data necessary to assess the preferences of Black women who attend college in the metro-Atlanta area regarding a reproductive health app. It is hypothesized that this subset of Black women are willing to use a new app not just for HIV prevention, but also will use an app to meet other reproductive health needs. This study was guided by the Social Cognitive Theory (SCT) of Mass Communication, which postulates from the original SCT, four constructs (self-efficacy, the use of incentive motivation, social environment, and reciprocal determinism) that impact behavior, but adds that messaging to influence these behaviors can be effectively delivered through media or technological sources. Recruitment flyers directed eligible participants to a web-based survey. Additionally, separate focus group sessions asked Black, heterosexual women between the ages of 18-29 their perceptions of HIV content delivered via mobile app, healthcare, and healthcare delivery. Overall, 79.4% of respondents (27/34) reported willingness to use an app with PrEP content. Additionally, Black women who reported recent sexual activity reported being more likely to commit to boundaries with an app feature that provides them an at-home HIV testing kit than their non-sexually active counterparts. Focus Group discussions found that the target demographic found app content that was relevant, culturally competent, and easy to use as favorable. Black women in this sample are willing to use a new app for their reproductive health needs. Results were employed to develop a mobile app prototype and given the high levels of willingness to use them, more apps should be developed for this population.

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Acknowledgments

My first puberty lesson came when I was seven years old, from a little red book in the library. I was completely fascinated with the pictures and descriptions that claimed to unveil the secret inner workings of the female body. In middle school, what I was learning in my sex education classes inspired me to focus my final paper on teenage pregnancy in America. I spent countless hours reading up on related content, such as safe sex practices, reproductive anatomy, and even yeast infections, all while I was simultaneously undergoing puberty. My dedication to understanding reproductive health may sound unusual, but as a Black woman, it put me ahead of my peers. I grew up hearing black teenage girls are less knowledgeable about their bodies, thus have a higher risk of experiencing unintended pregnancies, and contracting a sexually transmitted infection, including HIV and AIDS. This has resulted in our demographic being labeled as vulnerable and high risk.

During my sophomore year of college, I came across a flyer recruiting black, college-aged women to participate in a study promoting PrEP education, a biomedical HIV prevention option. My subsequent participation in the study, led by Rasheeta Chandler, Ph.D., APRN-BC, FAANP, FAAN sparked an enthusiasm for conducting research focused on generating new knowledge and clinically relevant strategies for reducing HIV infection rates within ethnic minority communities. I found the research process thrilling, intellectually challenging, and stimulating a passion I never knew I had so deeply. I must thank my family, friends, mentors, program directors, and research staff at Emory University for their help and guidance.

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Dr. Chandler, you have inspired my interest in public health research and been a guiding force for me throughout my undergraduate career. You provided me with so much support and always offered encouragement every time we met. Your kindness and determination to expect the best for me have pushed me to pursue opportunities I could only dream of.

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Chapter 1: Introduction

The number and rate of annual new HIV diagnoses in the United States in recent years has declined according to the latest data[1]. Yet, African-American adults face a higher risk of exposure to HIV with each sexual encounter than other racial/ethnic groups The number of annual new HIV diagnoses among Black women has dropped significantly in the last 20 years. Despite this progress, a disproportionate number of new HIV infections in the United States (U.S.) occur in Black women[4]. Black women have a higher rate of HIV and STIs than any other female group in the United States[3]. In 2016, Black women accounted for 60% of newly diagnosed HIV infections among women in the United States. The rate of new HIV diagnoses per 100,000 was 15 times higher in Black women compared to White women and 5 times higher when compared to Hispanic women. Additionally, lifetime HIV incidence in Black women has remained disparate (1 in 48) compared to White women (1 in 880)[4]. Examining the intersection of dating and sexual health practices could pinpoint reasons as to why these disproportionate rates exist.

Georgia leads the nation in the number of new HIV infections, and metro Atlanta is third in HIV incidences among metropolitan areas in the U.S or Georgia, according to Dr. Wendy Armstrong, the medical director of the Infectious Disease Program at Grady Health System[2]. In the metro-Atlanta area, 70% of new diagnoses are among Black/ African American populations[2]. Youth are also at risk for HIV acquisition. Approximately 9,800 people aged 13-24 were diagnosed with HIV in 2010, representing 20% of newly diagnosed cases, with the highest rate occurring among those aged 20-24[11].

To understand the intersection of age, race, and gender concerning HIV prevention interventions, a voluntary, anonymous survey was administered to Black women enrolled in college in the metro-Atlanta area. This data collected is aimed to understand their perceptions regarding sexual health, and their willingness to use reproductive mobile health apps. In total, 65 responses were garnered, which were analyzed using descriptive statistics. To complement the quantitative data collection, four focus groups were conducted between February to April of 2019. Transcripts coded from these focus groups were qualitatively analyzed for frequent and substantial themes.

The primary hypothesis of this project is that Black women are invested in their healthcare and willing to use innovative technologies that will improve their access to care. In particular, they are willing to use apps for their reproductive health since these are easily accessible and a familiar medium for obtaining information. The quantitative and qualitative analysis of the data from this project will contribute to the literature on reproductive health using mobile technology.

Chapter 2: Literature Review

Defining HIV

Human immunodeficiency virus (HIV) is a retrovirus that harms the human immune system by destroying the white blood cells that fight infection[21]. The virus directly infects T helper cells via the use of receptors exclusive to T cells. Through a series of steps, viral DNA is injected into host DNA, which establishes lifelong infection[23]. Then, HIV is spread through certain body fluids that attack the body's immune system. Untreated, HIV reduces the number of CD4 cells (T cells) in the body, making the person more likely to get other infections. Infection with the virus results in progressive deterioration of the immune system, leading to immune deficiency[23].

HIV is most often transmitted through unprotected sex with a person who has HIV, including vaginal, anal, or oral sex. Additionally, the virus can be acquired via transfusion of contaminated blood, sharing of needles, syringes, surgical equipment, or other sharp instruments that have come into contact with contaminated blood[18]. It may also be transmitted between a mother and her child during pregnancy, childbirth, and breastfeeding. The first signs of HIV infections are typically flu-like symptoms, including swollen glands. More severe symptoms may not appear until months or years later[18].

Untreated, HIV reduces the number of T cells in the body, making it harder for the immune system to fight off infections (opportunistic infections) and diseases. Eventually, untreated HIV results in Acquired Immunodeficiency Syndrome (AIDS), when the T-cell count drops below 200. Unless the infected person is given antiretroviral therapy, an average of 10 years elapses between when a person is infected with HIV and the onset of AIDS[23].

Etiology

Since HIV was first identified in 1983, researchers have worked to pinpoint the origin of the virus. In 1999 an international team of researchers reported that they discovered the origins of HIV-1, the predominant strain of HIV in the developed world[29]. A subspecies of chimpanzees native to West Equatorial Africa was identified as the source of the virus[29]. Researchers believe that HIV-1 was introduced into the human population when hunters became exposed to infected blood[29]. Changes in migration, travel, housing, sexual practices, drug use, war, and economics have driven the transmission of HIV, affecting the entire world.

HIV enters the bloodstream and seeks out T-helper lymphocytes, white blood cells essential to the functioning of the immune system. One of the functions of these cells is to regulate the immune response in the event of an attack from disease-causing microbes such as bacteria or viruses[28]. When the virus infects the T-helper lymphocyte, the cell sends signals to other cells, which produce antibodies.

Primary HIV infection (acute HIV infection) is the first stage of HIV disease[27]. It begins with an initial infection and typically lasts one-two weeks. During this time the virus is establishing itself in the body but the body has not yet begun to produce antibodies[27]. Because of this, the infection cannot be discovered by any HIV tests. This period of acute infection is

characterized by a high viral load and a decline in CD4 cells[27]. Close to half of infected patients experience mononucleosis-like symptoms during primary infection, but the symptoms are not life-threatening and may be mistaken for a minor illness[27].

During primary infection, newly infected people can infect partners because they do not yet know they have HIV. The primary infection period ends when the body begins to produce HIV-specific antibodies[27]. The number of antibodies is still insufficient to be detected by HIV testing.

The window period is the period between initial infection with HIV and the point when the body produces detectable antibodies, which can vary from 2 to 12 weeks[27]. During this window period, a person is highly infectious, with a high viral load and a negative HIV antibody test[27]. This means the infected person could get a negative test result while having HIV. After the acute stage of HIV infection, people infected with HIV continue to look and feel well for long periods, sometimes for many years[27]. During this time, the virus is replicating and slowly destroying the immune system. This asymptomatic stage is sometimes referred to as clinical latency. Although a person looks and feels healthy, they can infect other people through unprotected anal, vaginal, or oral sex or through needle sharing[27]. The risk of infection increases with an unknown status.

HIV diagnoses and treatments are known to be influenced by both genetic and environmental factors. For instance, HIV symptoms may be exacerbated by socio-cultural factors such as homelessness, uninsured health care status, race, income level, and gender[24]. While some aspects of the etiology of the disease remain unknown, it is established that numerous genetic, behavioral, and environmental influences contribute to the disproportionately higher prevalence of HIV among marginalized identifying groups in the United States[5,6].

Treatment

No effective cure for HIV currently exists, but with proper medical care, HIV can be controlled. The discovery of combination antiretroviral drug therapies (ART) in 1996 resulted in a dramatic decrease in the number of deaths due to AIDS among people given the drug therapies [10]. ART prevents HIV from making copies of itself, which reduces the amount of HIV in the body, called the viral load. Having less virus in the body gives the immune system a chance to recover. Even though there is still some HIV in the body, the immune system is strong enough to fight off infections and certain HIV-related cancers [10]. ART adherence in HIV+ individuals can reduce the risk of HIV transmission to their sexual partners[10].

Preventative Efforts via PrEP

There's no vaccine to prevent HIV infection and no cure for AIDS. But, certain preventative measures can be employed to protect oneself [7]. Current US HIV prevention strategies for Black women include culturally tailored health messages and behavioral strategies that attempt to reduce stigma, promote HIV testing, facilitate linkage to HIV care and treatment, and increase the use of condoms[7]. A 2014 study conducted by Flash et al. found that for heterosexual women, barriers to condom use include fear of perceived unfaithfulness, financial barriers, personal perception of being low-risk, educational status, and desire to

conceive[7]. Women who were subjected to intimate partner violence or who experience high partner-related barriers to condom use are also more likely to engage in risky sexual behaviors[7]. Women who report not being able to negotiate condom use would benefit from additional prevention strategies that circumvent this.

The use of antiretroviral medications by at-risk persons is the most recent HIV prevention strategy known as pre-exposure prophylaxis (PrEP)[18]. A healthcare provider can prescribe PrEP for HIV prevention if a person is confirmed by testing to be HIV negative. PrEP is taken daily and does not prevent other STIs, so it is necessary for patients to still practice safe sexual behaviors.

Clinical trials of oral tenofovir for HIV prevention among women conducted by Minnis et al. have shown varying results: two trials demonstrated 49–68% efficacy, whereas two others did not demonstrate efficacy[18]. Further exploration will clarify the biomedical and behavioral correlates of PrEP effectiveness for at-risk women, and acceptability should be a key component of that investigation. Although studies have assessed PrEP acceptability among men who have sex with men, there is a critical need to understand PrEP acceptability and product preferences among US Black women, given the high HIV incidence in this population[18].

Prevalence of HIV in Black Women

Black women, as a subgroup, have experienced a sizable drop in new diagnoses over the years, decreasing by more than 40% between 2008 and 2015. Despite this progress, a disproportionate number of new HIV infections in the United States occur in Black women[5]. Black women have a higher rate of HIV and sexually transmitted infections (STIs) than any other female group in the U.S. Additionally, the CDC estimated that youths between the ages of 13-24 made up 21% of the new HIV diagnoses occurring in the United States in 2017[1]. Black women in college are at the intersection of racial and age groups that have heightened risks of contracting HIV. An epidemiological study conducted by Bradley et al. found that in 2016, an estimated 93% of HIV infections among Black women would not have occurred if the incidence rate for Black women were as low as the rate for White women[4]. This study used the population attributable proportion (PAP) disparity measure to describe the proportional decrease in HIV infection among Black and White women combined that would be realized if the group with the higher rates (Black women) had the same rate as did the group with the lower rate (White women)[4]. Estimates of the annual PAP disparity conducted by Bradley et al. measure during 2010–2016 suggest that eliminating black-white disparities in HIV incidence among women and adolescent females would have achieved a decrease in overall incidence among black and white women of 75% in 2010 and 70% in 2016[4]. This finding highlights the contribution of racial and ethnic disparities to overall HIV infection rates among women and adolescent females and underscores the importance of further reducing, or eliminating, these differences.

Various researchers stress that reduction of racial disparities among women is required to achieve broader HIV control goals [13,31]. A 2016 study conducted by Johnson et al. indicated that efforts to identify and address social and structural determinants associated with HIV-related disparities, such as increasing access to healthcare, eliminating HIV-related stigma, and spreading awareness of pre-exposure prophylaxis, are needed to decrease rates of new HIV infections among black women [13]. Interventions that consider social determinants of health are essential to health-related behavior change, like HIV prevention.

Black women living in the United States face inequalities in accessing care. Bradley et al. explain that "targeted measures that address reducing transmission through viral suppression and preventing acquisition through biomedical and behavioral interventions (e.g., pre-exposure prophylaxis [PrEP] and condom use; and providing adequate treatment once HIV infection is diagnosed) will play important roles in reducing disparities"[4]. These findings highlight the continued importance of racial/ethnic disparities as a key driver of the HIV epidemic in the USA and give further evidence to strengthen HIV prevention initiatives for black women. Bradley et al conclude, “this information lends support for strengthening HIV prevention and care efforts for heterosexual black females and males to continue progress toward closing the gap in racial disparities in HIV infection among women”[4].

Implications of Social Determinants on Black Women’s Perception of Sexual Health Care

Black women frequently experience discrimination, especially in the context of sexual health. Johnson et al. conducted a study on Black adolescent female’s experience when accessing reproductive health care. The study suggested that Black women are aware of race-based discrimination in healthcare settings[13].

Prather et al. studied how the legacy of medical experimentation and inadequate healthcare coupled with social determinants has exacerbated African American women's complex relationship with healthcare systems[24]. The social determinants of health associated with institutionalized and interpersonal racism, including poverty, unemployment, and residential segregation, may make African American women more vulnerable to disparate sexual and reproductive health outcomes. This study concluded that the development of innovative models and strategies to improve the health of African American women may be informed by an understanding of the historical and enduring legacy of racism in the United States[24]. Addressing sexual and reproductive health through a historical lens and ensuring the implementation of culturally appropriate programs, research, and treatment efforts are steps towards achieving health equity. Furthermore, it is necessary to develop interventions that address the intersection of the social determinants of health that contribute to sexual and reproductive health inequities.

The Intersection of Dating and Sexual Health

Various studies have empirically supported the assumption that heterosexual African-American women tend to prefer African-American male partners[17,22,30]. This assumption underlies The Male Marriage Pool Index, an interpretive perspective to consider racial disparities in HIV contraction first introduced by William Julius Wilson in 1987[22]. Wilson’s Male Marriage Pool Index suggests that the number of eligible, socially desirable African American men has decreased drastically, primarily due to diminished economic prospects, resulting in a shortage of marriageable African American men[17]. Since Wilson originally described the Male Marriage Pool Index, increasing racial disparities in incarceration and decreased life expectancy for young Black men have further exacerbated the trends he described[22].

Recent research by Wildeman et al. demonstrates that mass incarceration affects not only the health of those incarcerated but also the physical and behavioral health of their romantic partners[30]. Osler et al. cite data from the CDC that indicate higher incarceration rates

of Black males, leads to a more unbalanced sex ratio for African-Americans than for any other racial group (e.g., 90.5 Black males per 100 Black females as compared 96.4 White males per 100 White females)[22].

The reduced number of socially desirable African American male partners due to these social forces may have important effects on the transmission of STIs within the context of the African American community[17]. Partially due to racial segregation, African-American sexual networks are more racially homologous than White sexual networks[22]. The unbalanced sex ratio contributes to the formation of this sexual network structure and may provide African American men with considerable power in intimate relationships[22]. Specifically, African American men may be seen as a commodity in this social context. The Osler et al. study implies this view disadvantages African American women as they may have less leverage in advocating for monogamous sexual relationships and condom use, which subsequently impacts their sexual health outcomes[22].

Besides, Black men who have sex with men and women have a disproportionately higher risk of STI acquisition, and often transmit infections to African American women through sexual contact[22]. Black women are generally less likely to utilize health services and are disproportionately more likely to delay seeking health services when compared to White women, which further increases the potential consequences of STIs[22]. Since the rates of infection are based on diagnosed cases rather than actual prevalence, there is likely an underestimation of the true occurrence of STIs among Black women.

Researchers postulate that due to the unbalanced sex ratio, the potential for transmission of STIs within the Black community is high, even among individuals who would otherwise have a very low risk for contracting STIs, such as monogamous African American women[22]. Osler et al. suggest that Black women's preference for Black male partners may motivate them to consider male partners that are less socially desirable, such as older partners and those who have been incarcerated, due to the diminishing pool of eligible Black men[22]. Miller et al. conducted research that suggests older partners are more likely to have more sexual experiences and more likely to have hard multiple partners, increasing their likelihood of transmitting an STI to female partners[17]. The likelihood of partaking in risky sexual behaviors that promote the transmission of STIs and HIV is thus inextricably linked to dating behaviors. Given these findings, sexual behaviors that promote the transmission of HIV are thus inextricably linked to dating behaviors and could pinpoint the causal factors in HIV prevalence among Black women.

Atlanta: A Formidable Location for Targeted STI and HIV Interventions Targeting Black Women

Atlanta is an epicenter of the HIV epidemic in the United States. According to the CDC, some zip codes in the Atlanta area have rates of HIV/AIDS that are six- to eight times higher than the national average[2]. And by the time patients in Atlanta are diagnosed as HIV positive, about a quarter have AIDS, which means they have likely been living with the virus for eight to 10 years[2].

According to researchers, the reasons have more to do with poverty, lack of insurance, and stigma than with sexual practices. The high rates of HIV/AIDS are mostly, "confined to a

specific group—young, black men who have sex with men"[2]. In fact, AIDS is the leading cause of death for black men in Georgia between the ages of 35 and 44[2].

The reality is that advances in drug treatments and care that have transformed HIV into a manageable chronic disease for many have been out of reach for marginalized groups, including MSM and Black women. According to studies on MSM populations at Emory's Rollins School of Public Health, these men don't have more partners or indulge in riskier sexual behaviors than their white counterparts. Instead, they lack significant factors such as health insurance or transportation to doctor's appointments, which increases their risk[2].

While research surrounding HIV prevalence in MSM populations is more abundant than that conducted in African-American female populations, much of the social determinants are similar. Black women in Atlanta deserve special attention in HIV prevention efforts. The rate of Black women living with HIV/AIDS is 14.3 times that of white women; 54% of HIV cases among this population are through heterosexual contact, according to CDC estimations [5]. Curbing the HIV epidemic in this disenfranchised population will require more than developing better treatments and drugs. Instead, efforts to address things that keep people from getting the diagnosis and treatment they need such as barriers to care, stigma, and poverty are needed. Atlanta-based providers such as those in Emory University and various partners across the city have been making real progress in Atlanta[3]. Though there is still a long way to go, Atlanta's robust resources, significant presence in Black American history, and diverse population make it an excellent place to study targeted HIV prevention intervention for Black women.

Mobile Health Apps: Innovative Future Directions

Due to the increasing popularity of mobile devices, technology-delivered behavioral interventions are increasingly being studied to deliver information about the prevention of and care concerns related to HIV and other STIs across the globe[14,15,19]. In the U.S., almost 100% of young adults ages 18-34 report using the internet at least occasionally or report owning a smartphone[14].

Currently, there are several smartphone apps aimed to support those living with HIV/AIDS. Some of these apps include AIDSinfo HIV/AIDS Glossary, an app created by the U.S. Department of Health and Human Services. This app provides details about terminology relating to HIV/AIDS and can help providers, those living with HIV/AIDS, and their supporters understand complex health terms[16].

Additionally, an app called The Body allows readers to find recent news, information, and research findings straight to their phones for easy reading and sharing. Another app called Care4Today allows users to set up custom reminders to help manage their prescriptions through the day[16]. According to Nicole Scott of the National Library of Medicine, "these apps were developed to provide easy access to HIV-related information for a variety of audiences. Each app includes customizable features to meet individual needs." For example, the Drug Database app includes a feature that allows users to set HIV medication reminders, and all apps include a bookmark feature so users can easily access frequently referenced guideline sections, medications, or glossary terms, at any time. Many of these apps are free and available on iPhone and Android devices. This allows for information to be available to a broad audience, including people who need HIV information on the go. Many of the features can be accessed without an internet connection as well, allowing more people to access these features[16].

HealthMindr is an app developed by Dr. Patrick Sullivan, professor of Epidemiology at Emory University, to help men who have sex with men (MSM) maintain their sexual health. Users can order condoms and HIV test kits, receive information on PrEP, and find answers to questions regarding HIV[25]. Sullivan et al. utilized a pilot study to evaluate the usability and acceptability of a theory-based Android mobile phone app for HIV prevention among HIV-negative, mobile phone using MSM groups[25]. For four months, the participants used the app and ordered condoms, test kits, and features encouraging PrEP usage. They found that a theory-based mobile phone app was acceptable to MSM groups and was rated as having above-average usability. The team found that nearly 1 in 10 PrEP-eligible men started PrEP, with most attributing their decision to start PrEP because of the app[25]. Currently, a broader, randomized controlled study is underway to fully study the impact of the app on the uptake of prevention behaviors for MSM[25].

Given the pervasiveness of mobile phones and associated apps, it may be best to incorporate aspects of these previously developed Internet- and text message-based interventions for delivery via apps. Muessig et al. conducted a systematic review of smartphone intervention addressing the HIV continuum of care in 2015 and found that an app's effectiveness is dependent on their continual use, as many individuals download health-related apps and discontinue using them for a variety of reasons[20].

Therefore, it is important to understand health apps and their possible continued use across smartphone users and how they can best serve the target population. The use of mobile health apps can improve patient experiences, especially concerning accessing health information, facilitating convenient physician-patient communication, ensuring transparency in medical diagnoses, and improving short-term outcomes. The adoption of mobile health apps in health care settings is an innovative solution and can contribute to optimal health outcomes.

Theoretical Frameworks

The Theory of Gender and Power is a theoretical model that has been used to examine HIV-related exposures, risk factors, and effective preventive interventions for women[31]. This model describes three structures: (1) the sexual division of labor manifest as economic exposures such as poverty, poor access to health insurance, being uninsured or underinsured, and being unemployed or having a high demand, low control work environment; (2) the sexual division of power manifest as physical exposures, such as having a partner or partners at high risk of HIV acquisition, history of substance abuse, and limited perceived control; and (3) the structure of cathexis, which refers to social norms and affective attachments, manifest as social exposures such as the desire to conceive, and lack of knowledge of HIV prevention[31]. Three major social structures characterize the gendered relationships between men and women: the sexual division of labor, the sexual division of power, and the structure of cathexis (the process of allocating mental or emotional energy to a person, object, or idea)[31]. This theory helped provide a framework for focus group discussion implementation.

The social cognitive theory provides an agentic conceptual framework within which to analyze the determinants and psychosocial mechanisms through which symbolic communication influences human thought, affect and action[26]. Communications systems operate through two pathways. In the direct pathway, they promote changes by informing, enabling, motivating, and guiding participants[26]. In the socially mediated pathway, media

influences link participants to social networks and community settings that provide natural incentives and continued personalized guidance, for the desired change[26]. The social cognitive theory analyzes social diffusion of new styles of behavior in terms of the psychosocial factors governing their acquisition and adoption and the social networks through which they spread and are supported[26]. Structural interconnectedness provides potential diffusion paths; socio-cognitive factors largely determine what diffuses through those paths[26]. These theories informed how focus groups were carried out and how questions were dispersed in the online survey.

(Tadayon, 2012)[27]

Research Objectives and Hypothesis

This study considered how cultural and environmental influences affect Black women who attend college and their willingness to use mobile health apps to meet reproductive health needs. The data collected was used to develop a prototype of the HIV prevention mobile app for cis-gender Black women who attend college in the metro-Atlanta area.

To understand the sample's preferences for functionality, format, and design of a mobile HIV prevention app, and to examine their willingness to use an app for HIV prevention, this study had the following aims:

1. To qualitatively and quantitatively explore vulnerable heterosexual, college-aged Black women's insight into an HIV prevention mobile app and their willingness to use the app.
    a. R1: What are the likely app features to encourage mobile app usage?
    b. R2: What are preferences regarding functionality, format, and design of the mobile app?
    c. R3: What is their willingness to use the mobile app?

It is hypothesized that Black women are concerned about their sexual health and are willing to use mobile apps with an emphasis on sexual health to reduce their risks for HIV acquisition.

Chapter 3: Design and Methods

Sampling and Settings

Recruitment flyers targeted Black women who attended Emory University, Georgia Tech, Spelman College, and Georgia State University from September 2019 until February 2020, for a total of five months. The flyers were shared among groups on campus with heavy black women membership, social media, and word of mouth. The recruitment link guided users to a web-based survey demographic form which consisted of 10 questions. Willingness to use apps for information regarding HIV prevention was asked. Additionally, participants responded to items assessing recent sexual behaviors and substance use.

Four semi-structured focus groups (~7 participants per group) were conducted (n=23) at Emory University or a community site convenient to the participants (e.g. a private room in a community-based organization or Center for Black Women's Wellness conference room). The participants reflected the full sample. In total, 23 participants were divided into four in-person focus group discussions. These discussion groups were conducted from February-May 2019, with the presence of a group moderator and transcriber.

Survey

The survey began with questions screening for eligibility. Users were notified of their eligibility on the next screen, and those who met the requirements of the study were asked to proceed. If an individual did not meet the eligibility criteria, they were shown a screen notifying them of their ineligibility and directed out of the survey.

The following criteria needed to be met to be eligible for this study:

1. Identify as a Black or African-American woman
2. Be between the ages of 18-29
3. Own a smartphone
4. Be currently enrolled or have recently graduated from an undergraduate/graduate/professional program

After meeting eligibility criteria, participants were permitted to take a 47 question survey. The first 8 questions made up the eligibility screener. Users were asked for their demographic information, including race, age, sex, education status, and if they owned a smartphone. One question asked participants to rank ten sources of health information, 1 being the most frequently used, and 10 being the least frequently used. Four questions used a 7-point Likert Scale, with 1= Strongly Disagree, 2=Disagree, 3= Somewhat Disagree, 4=Neither Agree nor Disagree, 5=Somewhat Agree, 6= Agree, 7=Somewhat Disagree. These questions assessed willingness to use app features that included HIV test kits, GPS location, condom ordering services, and PrEP information. Additional questions included asking participants to rate their willingness to share medical test results with healthcare providers and current/past partners through the app; and preferences and attitudes towards PrEP. Recent sexual behaviors, recent substance use/abuse, HIV status, and mobile phone usage were asked using multiple-choice questions. For additional details on this web-based survey, see Appendix A, page 34.

Data Storage and Analysis

Qualtrics is a simple to use a web-based survey tool to conduct survey research, evaluations, and other data collection activities. Response data was collected via Qualtrics and exported to SPSS 23, a statistical tool commonly used in public health research.

Descriptive statistics of the study population were carried out using mean (standard deviation, ranges) for continuous variables and frequencies (percentages) for categorical variables. Due to the smaller sample size, the 7-point Likert scale was re-coded into a 3-point scale for statistical relevance. See Table 6 on page 18 for further details.

Differences in willingness to use apps for HIV prevention purposes by demographic variables, recent substance use, and categorical measures of recent sexual behaviors were assessed using chi-square tests of independence. Pearson's Chi-Square Tests were run in addition to Fisher Exact Tests due to many of the expected cell counts being below five. Pearson chi-square tests were used to determine statistically significant differences between Black women in relationships, those who have heard of PrEP, those who have been recently sexually active, and those who use dating apps regarding their willingness to use reproductive health apps. A 5% significance level was used for hypothesis testing and a p-value of ≤ 0.05 was considered statistically significant. IBM SPSS (version 23) was used for data management and statistical analysis. Focus Group data was coded and analyzed in MAXQDA version 2018 to assess for frequent and significant themes, patterns, and quotes.

Chapter 4: Quantitative Results

The following data displays the results of statistical tests run on quantitative independent variables. There were 65 eligible Black women in this study. Descriptive statistics were calculated for all variables.

Table 1: Population Demographics (N=65)

Characteristics	Frequency, n (%)
Race & Ethnicity*	
Black/ African-American	60(92.3)
Hispanic or Latino/Latina	7(10.8)
Asian	4(4.6)
Middle Eastern	1(1.5)
White/European	5(7.7)
Age	
18-25	64(98.5)
26-30	1(1.5)
Educational Status	
Enrolled or graduated	62(95.4)
Not enrolled/ not graduated	3(4.6)
Employment status	
Employed	28(43.1)
Unemployed	13(20)
Recent Sexual Behaviors	
Unprotected vaginal intercourse	11(16.9)
Unprotected oral intercourse	12(18.5)
HIV Status	
Negative	41(63.1)
Unanswered	24(36.9)
Heard of PrEP	
Yes	27(41.5)
No	14(21.5)
Recent Substance use	
Marijuana	11(16.9)

History of STI Chlamydia	2(3.1)

*Race and Ethnicity question allowed users to choose more than one race to include those of multicultural heritages

The vast majority of participants identified as Black (92.3%) and were currently enrolled or graduated from an educational program (95.4%). Variables seen in Table 1 include race, age, educational status, employment status, recent sexual behaviors (defined as having engaged in these activities in the past three months) HIV status, knowledge of PrEP, recent substance use (defined as within the past three months) and history of STIs. Regarding substance abuse, 9.2% of respondents said they never used any illegal substance. Of the substances listed, marijuana was the most common, with 16.9% of respondents saying they used it.

Table 2: Willingness to Use Reproductive Health Mobile App Features (N=34)

Characteristic	**Agree, n(%)**	**Neutral, n(%)**	**Disagree, n(%)**
I would order an HIV test kit through a mobile app	19(55.9)	7(20.6)	8(23.5)
I would order condoms through a mobile app	25(73.5)	4(11.8)	5(14.7)
I would utilize GPS mapping of HIV-testing/ PrEP clinics that prescribe for women through a mobile app.	25(73.5)	6(17.6)	3(8.8)
I would be willing to use an app with PrEP content.	27(79.4)	2(5.8)	5(14.7)
I would be willing to use an app to remind myself when to get tested for HIV.	26(76.5)	3(8.8)	4(11.8)

I would be willing to share medical test results with PRESENT sexual partner(s) via sharing features within a mobile app.	24(70.6)	0	3(8.8)
I would be willing to share medical test results with PAST sexual partners via sharing features within a mobile app.	16(47.1)	2(5.9)	6(17.6)
I would be willing to share medical test results with my healthcare provider via sharing features within a mobile app.	23(67.6)	1(2.9)	0
I would feel comfortable with my partner(s) having immediate access to my STI or HIV results within an app.	14(41.2)	4(11.8)	6(17.6)

Overall, a majority of those surveyed were willing to use a reproductive app with HIV prevention content. An app feature with PrEP content was most favorably viewed, with 79.4% of respondents saying they would be willing to use an app with PrEP content. The next most favorably viewed app feature was one with reminders for HIV testing, with 76.5% of respondents saying they would use an app with that feature. An app feature with sharing options had a wide range of willingness among survey respondents, depending on who the information would be sent to. 70.6% of those surveyed said they would be willing to share medical test results with present sexual partner(s), but only 47.1% of women would be willing to share medical test results with past partners. 41.2% of respondents would be willing to let their partner(s) have immediate access to STI or HIV results within the app, and 17.6% of respondents would NOT be willing to allow this feature. Additionally, 67.6% of women would be willing to share medical test results with their healthcare providers via sharing features in the mobile app.

Table 3: Health Services Used Most Frequently

Health Services	**Frequency, n(%)**
Primary care provider	22(33.8)
Gynecologist	6(9.2)

Student health services	9(13.8)
Urgent care	3(4.6)

*Note that 25 individuals did not respond to this question

Most individuals utilize a primary care provider (33.8%), and then student health services (13.8%). Urgent care was utilized least frequently in this group.

Table 4: Sources Ranked 1st for Healthcare Needs

Source	**Frequency, n(%)**
Family	4 (6.2)
Friends	2(3.1)
Healthcare Provider	18(27.7)
Instagram	1(1.5)
Google	14(21.5)
Snapchat	0 (0)
Health apps	2(3.1)
Facebook	1 (1.5)
Youtube	1(1.5)
Other Partners	6(9.2)

Most participants ranked healthcare providers as their first choice source for healthcare needs (27.7%), and 21.55 of participants ranked Google as their 1st choice source.

Table 5: History Use of Mobile Apps (N=65)

Respondents were asked about their current usage of mobile health apps related to health, sexuality, and dating.

Characteristic	Frequency, n(%)
Use of health-related app (period tracker, fertility calendar, etc.)	
Yes	17(26.2)
No	3(4.6)
Times a health-related app has been deleted and re-downloaded in the past 12 months	
	17(26.2)
0 times	2(3.1)
1 time	1(1.5)
2 or 3 times	
Use of dating apps to find romantic or sexual partners	
Yes	8(12.3)
No	12(18.5)

*Note that 45 responses are missing (69% of the sample)
Most participants already utilize health-related apps on their phone and keep them downloaded
(26.2% have not deleted and re-downloaded a health-related app in the past 12 months).

Missing Values

Web-based surveys are easy, cost-effective, and efficient tools to collect information, but there is an increased rate of attrition associated with their use[12]. In this survey, 65 respondents met the criteria and eligibility for the study. Analyzing respondent attrition showed that from an original sample size of 65, 30 individuals did not respond after question number 30 (46% of the sample population). Most of the questions that had more missing responses were near the end of the 47-question survey. Some of these questions included those regarding the use of mobile apps for health-related needs and the use of dating apps, which had the least number of responses (20 out of 65). No significant pattern based on demographics (race, age, educational status) was surmised between those who responded to all questions and those who did not, thus missing responses are thought to be random and representative of the sample as opposed to a specific group.

Pearson Chi-Square Tests

The project was initially designed to elicit Black women's perceptions and preferences through questions using a 7-point Likert Scale. However, preliminary data analysis determined that the smaller sample size hindered proper analysis on this scale, so the Likert scale was subsequently re-coded to a 3-point scale for statistical relevance. The table highlights the differences between the original and new scale:

Table 6: Recoded Variables

	Original Scale	**Recoded Scale**
1	Strongly Disagree	
2	Disagree	
3	Somewhat Disagree	Disagree (responses <4)
4	Neither Agree nor Disagree	Neither (=4)
5	Somewhat Agree	Agree (responses >4)
6	Agree	
7	Strongly Agree	

Exploratory analyses examining differences in willingness to use an app for HIV prevention by PrEP knowledge:

Question (Q) 19: Have you heard of PrEP, Truveda, or the blue pill before?
Q22g: I would be willing to use an app to remind myself when to get tested for HIV.
1= Disagree
0= Neither
2= Agree

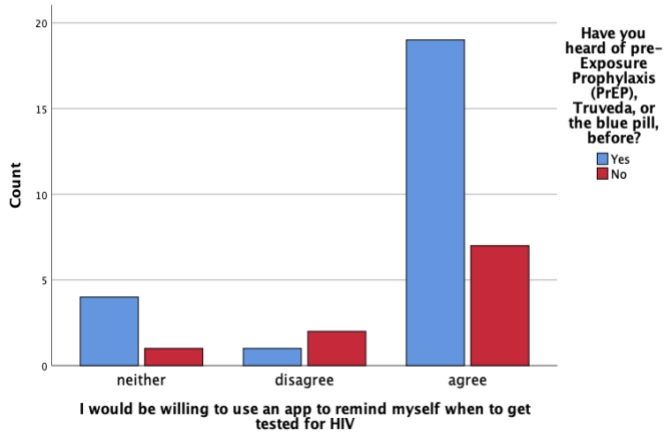


Figure 1: p=0.317; no significant difference between groups: those who have and have not heard of PrEP do not differ in willingness to use certain in-app HIV features.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	2.296[a]	2	.317	.[b]		
Likelihood Ratio	2.082	2	.353	.[b]		
Fisher's Exact Test	.[b]			.[b]		
Linear-by-Linear Association	.008[c]	1	.928	1.000	.549	.194
N of Valid Cases	34					

X^2 (2,N=34)=2.3, p=0.317. Those who have heard of PrEP and those who have not are equally likely to be willing to use an app to remind themselves of when to get tested for HIV. a. 4 cells (66.7%) have expected count less than 5. The minimum expected count is .88. b. It cannot be computed because unable to open a temporary file. The standardized statistic is -.90

Significant Findings

Q17: Have you engaged in heterosexual intercourse?
Q23e: This app feature would motivate me to commit to my boundaries when I am about to partake in sexual activity.

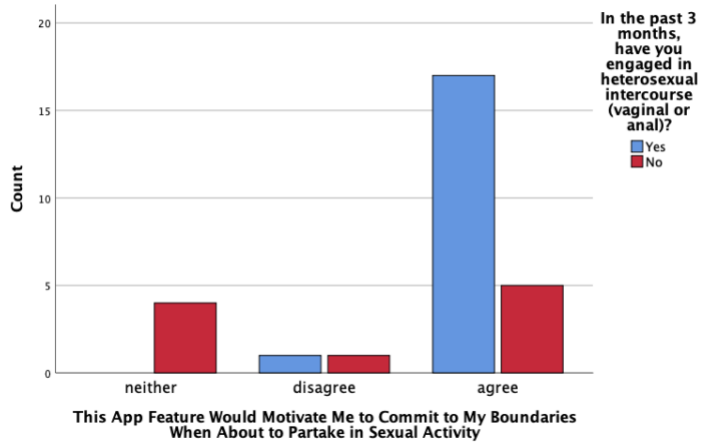


Figure 2: p=0.011; those who have engaged in heterosexual activity are more likely to commit to boundaries with an app feature that provides them an at-home HIV testing kit.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	8.994[a]	2	**.011**	.[b]		
Likelihood Ratio	10.144	2	.006	.[b]		
Fisher's Exact Test	.[b]			.[b]		
Linear-by-Linear Association	8.578[c]	1	.003	.005	.005	.004
N of Valid Cases	28					

X^2, (2, N=28)=9.0, p=0.011. Those who have engaged in heterosexual activity are more likely to commit to boundaries with an in-app feature that provides them an at-home HIV testing kit. a. 4 cells (66.7%) have expected count less than 5. The minimum expected count is .71. b. It cannot be computed because unable to open a temporary file. The standardized statistic is -2.929

Q44: In the past 12 months, have you used any dating apps (Tindr, Bumble) to find romantic or sexual partners?

Q24f: I feel comfortable with my partner attending medical appointments with me.

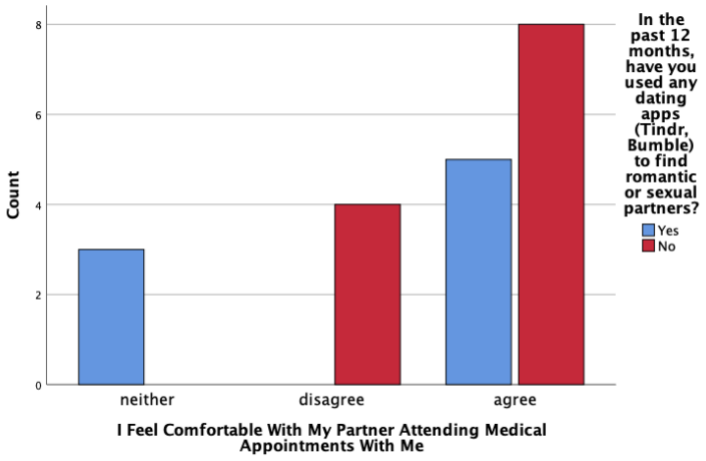


Figure 3: p=0.028; Those who have not used dating apps are more likely to feel comfortable with their partner(s) attending medical appointments with them, but also disagree with this statement. Those who recently did or currently do use dating apps feel neutral or agree with the statement

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	7.179[a]	2	**.028**	.[b]		
Likelihood Ratio	9.597	2	.008	.[b]		
Fisher's Exact Test	.[b]			.[b]		
Linear-by-Linear Association	1.439[c]	1	.230	.375	.187	.119
N of Valid Cases	20					

X^2, (2, N=20)=7.2, p=0.028. Those who have used dating apps are more likely to feel neutral in regards to having a partner attend medical appointments with them. a. 4 cells (66.7%) have expected count less than 5. The minimum expected count is 1.20. b. It cannot be computed because unable to open a temporary file. The standardized statistic is 1.200

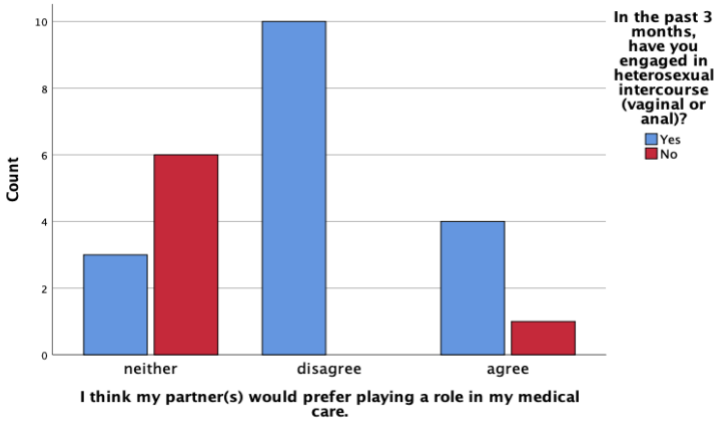


Figure 4: p= 0.005, there is a correlation between those who have engaged in heterosexual intercourse in the past 3 months and feeling that their partners would not prefer playing a role in their medical care.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	10.447[a]	2	**.005**	.[b]		
Likelihood Ratio	12.513	2	.002	.[b]		
Fisher's Exact Test	.[b]			.[b]		
Linear-by-Linear Association	5.112[c]	1	.024	.034	.020	.018
N of Valid Cases	24					

X^2, (2, N=24)=10.4, p=0.005. Those who have engaged in heterosexual intercourse in the past 3 months are more likely to think their partners would NOT prefer playing a role in their medical care. a. 4 cells (66.7%) have expected count less than 5. The minimum expected count is 1.46. b. It cannot be computed because unable to open a temporary file. The standardized statistic is -2.261

Chapter 5: Qualitative Results

Dr. Rasheeta Chandler served as the Principal Investigator for the study from which the focus group data was derived (Sub-award: Chandler, PI, Grant#: R25HD045810-14). Procedures for the focus group followed a systematic approach of a moderator who facilitated the group and a co-moderator who took notes and troubleshot session logistics (myself). A summary of the study was described, and questions from the focus group guide (found in Appendix B, page 49) were asked. The moderators encouraged conversational, group discussion about the use of and preferences for an HIV prevention app. Focus groups lasted around 90 minutes and participants received $30 for their time. Each focus group was digitally recorded and transcribed verbatim using thematic framework analysis[8]. I independently evaluated transcripts to extract themes using MAXQDA 2018. The themes generated include:

1. Black women's health concerns
2. Where to Obtain Health Information
3. PrEP Knowledge
4. Black women's Risk of Contracting HIV
5. Mobile App Usage

Table 7: Focus group guide preliminary template

Topic	Sample Focus Group Questions
1. HIV Prevention app usability	If a mobile app was created with HIV prevention content, how likely are you to use it- (range: very likely to not likely at all), Why? What about an app on this topic that would be most appealing? What are your thoughts about notifications to get tested for HIV via an app? Your thoughts on PrEP content including initiation and continued use?
2. Feature of an HIV prevention app	What features need to be included in the app to encourage use? ; Would social media components be important? What specifically? What reminders help encourage continued use of an app?
3. App content	What health topic would you use an app for?; What health topics should be included in a mobile app for you?
4. App commodities	What sexually related commodities would you feel comfortable ordering from the app? (e.g. HIV test kit, condoms, GPS mapping of HIV-testing/PrEP clinics who prescribe for women)

Age

Of the four focus groups conducted, women ranged between the ages of 21-36. One focus group (n=6) was conducted solely with women who were enrolled in college between the ages of 20-23, fitting the demographics of this study. Quotations for this study were only obtained from this focus group, as they reflect the target age group of college-aged women.

Black Women's Health Concerns

Most women cited their top areas of worry centering on reproductive health (fertility), weight and other health indicators related to weight management and obesity (blood pressure, dieting, diabetes, cholesterol), and mental health. The stigma surrounding mental health in the Black community was cited as something women wished to discuss more. Additional areas of concern were health issues that predominantly impact Black people, such as sickle-cell anemia, and chronic illness that runs in their families such as hypertension and diabetes. For many women, anxiety was a common concern that they did not attribute as a mental illness until recently or something they would consider taking medication for.

One woman stated, *"I think [mental health] is what we should explore because mental health can be attached to anything. It's really serious."*

Landi states, *"mental health doesn't necessarily mean you're crazy because I seek help for anxiety, depression, and bipolar, all of that".* Landi is illustrating how language surrounding mental illnesses are often centering the individual, highlighting their lack of control of their mental health as their problem, and out-of-control by calling it "crazy".

The links between race and illnesses were highlighted by several people. These include hypertension, diabetes, lupus, anemia, and chronic cardiac diseases. In terms of weight, one participant shared there are differences in upbringing and diet among the Black diaspora.

"In my family, we have a history of high blood pressure. But we don't eat the regular Black American foods… I just want to know what is contributing to that".

Generalizing certain chronic illnesses being common to Black women and listing causes being due to diet, culture, and upbringing fails to consider the diversity in dietary patterns and lifestyle practices across the Black population.

Conversations about the healthcare system and Black women quickly turned into one about experiences with healthcare providers. Many women in the groups wanted to receive information from certified healthcare providers, often citing doctors specifically. But, there is a need to receive this information in easy to understand terms.

One participant who works in the healthcare field stated that she has seen clients come in and listen to their healthcare provider telling them things, and instead of the clients asking questions and for further explanations, the clients take the medication and leave.

Nearly all participants commented on the nature of the physician-patient relationship, and how better communication, mainly by having physicians break down their patient's condition, could improve the dynamics. One participant thinks a visual presentation of conditions could help, or simply using layman's terms, and being more straightforward.

Jazmine shared how she had been having symptoms of PCOS for years, and it took a long time for her to get diagnosed. She had to advocate on her behalf, approaching doctors with information related to the symptoms she found online. She believes this is due to the racism in medical fields targeted towards Black women.

She shares, *" I feel like, as a black woman… if you're not a black woman physician, I don't trust you enough to figure it out, to be honest*".

The importance of receiving care from a healthcare provider who looked like you was emphasized for the relatability it provides. Shay shares that one male healthcare provider refused to see her unless her father came due to assuming she was too young.

She shares, *" I feel like a Black woman would be like, yeah, you look young for your age but so do I so let's just go and check out this..."*

The provider element was a significant theme that came up across all four focus group discussions, highlighting the importance of piecing together these shared experiences and creating a community that serves the needs of Black women.

Where Health Information is Obtained

How Black Women Want to Hear Their Information

The majority of women in this focus group wanted to obtain their health information from a doctor or a qualified healthcare provider. As avid phone users, being able to connect to qualified healthcare providers using mobile technology was favorably viewed. Some women stated information should be delivered more straightforwardly, and a direct text or phone-call would be useful. Most women are cognizant of racism in the healthcare system and one stated she makes an effort to Google her symptoms or find other sources before visiting her physician so that when she goes to her appointments, she is knowledgeable about potential diagnoses and options for treatment or intervention.

One woman said she was hesitant to get information from social media, citing the source's reputability as a concern. But the majority of women were open to using social media, search engines, and apps to get health information, as long as they are factual and backed by physicians.

Remarking on her affinity for Snapchat, Nikki shared,

"...using social media would help. I like Snapchat. I've found a lot of new information just exploring through that".

MODERATOR: *With Snapchat is it like quick, dirty information? Nothing too extensive?*

NIKKI: *They'll give you the basic thing in the snap and then you can read more. You can scroll to read more if you want to know more about it. I've learned a lot through that."*

When it comes to physicians, many women shared the importance of having a physician who looked like them providing them their information.

One college woman stated, *"I think that would be very, very helpful because I have no idea of any black women doctors in Atlanta. That would be very helpful."*

PrEP Knowledge

Most women stated that they had heard of PrEP through school newsletters, a video, advertisements, and even knowing people who take it. Some women cited apprehension in taking PrEP due to side effects, unknown effects, and an aversion to taking medicine in general. One woman said that if PrEP was offered for free, and was something all were encouraged to take to prevent getting it, she wouldn't have a problem taking it.

While most women were knowledgeable about PrEP, thoughts regarding taking the pill themselves were scattered.

Shay states, *But I feel like, as for me and my friend group, we wouldn't take [PrEP]. Because I think, as women, we take so many pills. You would be hesitant if it was just like you take contraception and you take the morning after pills and you have to take this pill. It just seems like a lot."*

One woman questioned the efficacy of promoting treatment interventions as opposed to preventative ones, saying, "*so we are going to promote this pill versus just telling you and educating you on it. So it's like, we're just going to give you another pill so you can spend more money to take this pill versus knowing the education piece. If we can promote everything else, we can promote… I promise you, you've seen breast cancer awareness all year round when they're collecting money for breast cancer. Why don't we see that for the education piece for HIV?"*

HIV Risk Assessment

Who Black Women Think is at Risk for HIV

When asked who they thought was at risk for HIV, participants cited a variety of demographic groups. Most women say that anyone sexually active is at risk of contracting HIV.

Jazmine cited how in research, Black women may be the most at risk because, *"racially, we tend to want men from our race or women from our race. But black men are more okay with dating women from other races. I feel like they tend to have more partners than we do. So, just in terms of partner contact."*

Other stated groups were homosexual, women, African-Americans, and younger people. Some participants who did state Black women explain that Black women are a highly-marginalized group that suffers generally in society, especially when it comes to health issues and access to food, contraceptives, and other necessities.

Are Black People at a Higher Risk?

Questions regarding HIV risk for Blacks specifically resulted in nearly every participant citing Black people. Most women know that the rate of HIV infection is high among African-Americans, citing stigma of HIV within the Black community which discourages open and frank conversations surrounding sex, lack of education, and the tendency of Blacks to not practice safe sex or wear condoms. However, only a few women stated African-American women specifically. Many assumed that the risk was equal for males and females within the community.

Mobile Phone Usage

Apps They Keep on Their Phone

Being on a college campus, every single one of the women had a smartphone and used social media apps such as Facebook, Instagram, and Snapchat. Apps that were deemed as important enough to keep on a phone were ones that provided transportation (Uber and Lyft), a calendar, health apps, a period calendar or a fertility tracker. Additionally, many women use popular social media apps such as Instagram, Facebook, and Snapchat. These apps have features that attract users to check them every day- notifications, opportunities to interact with friends, and space where one can learn something new or relevant. An app does not have to be one for your daily routine or your health to have staying power. Some women shared how they love downloading apps that are fun that they can use while on the bus, waiting for appointments, or are idly on their phones.

Apps for Health

The women were asked to comment on app features in a reproductive mobile health app targeting Black women. Several features were listed out and in some groups, videos demonstrating visual guides of what these app features would look like were shown.

Shay mentioned earlier summed up what health apps should address by saying*, "I think holistic wellness should be addressed. Like, "Are you drinking enough water? Are you doing what you should be doing? Are you predisposed for this, this or this?" If it gets your health history and it can give you a window into what could go wrong and what steps you can do to prevent early-onset diabetes or what have you. Just across the spectrum of health and wellness."*

HIV App Features Black Women in College Liked

A "Speak with a Specialist" or "Call a Physician" feature that allowed users to speak with a healthcare professional was favorably appraised by all women.

One woman stated, *"I thought it was a very good idea. One reason is because everybody can't get to a doctor. You can't always get a doctor on the phone when you call the clinic or the doctor's office. So I thought that was good."*

The ability to send information directly to your provider seems easier to do when typed out and takes away from the anxiety-provoking face to face conversations some have with their physicians. It makes it easier to list their concerns and talk about sensitive topics.

1. Transportation to appointments via codes or discounts for rideshare apps would make appointment adherence easier for patients to make.
2. News section: for up to date information concerning Black women, relevant

Information channeled to providers or institution, telehealth component so that when you provide information it goes to somewhere you want it to go

3. Holistic wellness: water intake, predisposing conditions, health history
4. Quick search option for common female health issues
5. Access/ resources to free resources (STI testing).

6. A place to put emergency contact so that information can be sent to an online portal or healthcare system.
7. Points rewards system- interact within an app or play games within app get points, 100,000 points gets you free plan B, a testing kit, etc birth control, free prescription, or even cash
8. Pronunciation guide for medical terms (chlamydia, gonorrhea, etc)
9. Period tracker- links to calendar or clue app
10. Password protected area for a journal or private searches
11. What's near me: location service for clinics, pharmacies, HIV test areas, fitness centers, that are of an easy geographical distance to access.
12. Chat room to speak with others who may share the same concerns you do. Journaling options for mental health, and app features that support mental health features.

Unfavorable HIV App Features

With much concern about privacy and linked accounts, many raised the point that being able to link an account via Facebook or Gmail might make signing up easier but could make it easier to get hacked and release private information tied to their accounts. Additionally, some app features could be seen as inappropriate, such as avatars.

One woman shared, *"a serious note, I think that personally for me, [avatars] are too childish. That would push me away because if we're talking about something serious, I don't want to make an avatar of myself and I don't want to be in a chatroom talking to a whole bunch of people that may potentially have something that I'm concerned about. Because to me, it tends to turn into something more fun than something more serious*."

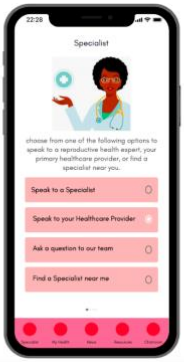
Cardi mentioned, *"I was just saying the security, because especially like with Facebook and your personal information, I just feel like that's way too personal or the opportunity that people could screenshot it and send it out. It's a little bit too much, especially… Like, I would be apprehensive about putting my status, if that was the case. Or even negative, positive, I just think it would kind of deter me away."*

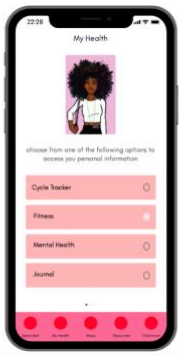
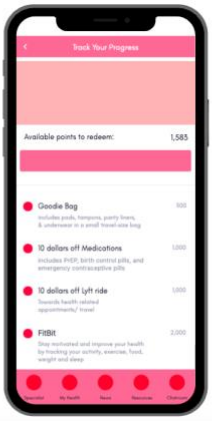
Overall, appropriateness of information and features along with security were the biggest concerns and reservations cited by the groups. Additionally, ads are not viewed as favorably and are distracting. Many women shared they would be turned off from using the app if they are bombarded with ads.

Chapter 6: The Synthesis of Study Results into a Viable Prototype

Black women in this sample are willing to use a new app for HIV prevention and general reproductive health. Given the high levels of willingness to use them, these types of apps should be developed, evaluated, and made available for this population. However, careful consideration of racial disparities, privacy, and monetization must be undertaken to ensure this app fully meets the needs of the target audience. A specific aim of this project is to initiate prototype development of the mobile app targeting vulnerable heterosexual Black women. Using the qualitative and quantitative data allowed me to create the following prototype using Pro.tio, shown below in Table 8.

Table 8: Prototype for Black women who attend college

Feature	Data	Prototype Feature
Speak with a specialist	67.6% of respondents are willing to share medical test results with their healthcare provider via sharing features One woman stated, *"I thought it was a very good idea. One reason is because everybody can't get to a doctor. You can't always get a doctor on the phone when you call the clinic or the doctor's office. So I thought that was good."*	
PrEP content	79.4% of survey respondents would be willing to use an app with PrEP content	

Holistic Wellness	*“I think holistic wellness should be addressed. Like, "Are you drinking enough water? Are you doing what you should be doing? Are you predisposed for this, this or this?" If it gets your health history and it can give you a window into what could go wrong and what steps you can do to prevent early-onset diabetes or what have you. Just across the spectrum of health and wellness.”* - Shay, college student	
Retention	Many women use popular social media apps such as Instagram, Facebook, and Snapchat. These apps have features that attract users to check them every day- notifications, opportunities to interact with friends, and space where one can learn something new or relevant. 26.2% of respondents indicated they have not deleted or re-downloaded a health-related app in the past 12 months	

Chapter 7: Discussion and Limitations

There is little information regarding mobile phone usage to meet reproductive health needs for Black women, especially highlighting HIV prevention[28]. This is the first study to examine preferences regarding the use of mobile apps for HIV prevention among a sample of college Black women who attend college. Overall, respondents reported a willingness to use an app with PrEP content and with reminders to seek HIV testing (79.4% and 76.5% rated agree to these statements, respectively). These findings are similar to those observed among a sample of dating app-using MSM in London, where 63.9% of respondents rated themselves as willing or very willing to use an app to remind them to be periodically tested for HIV[9]. This study takes more specific recommendations from Black women that are not found in MSM.

Additionally, an app feature that would permit the sharing of information ranged in willingness among survey respondents, depending on the information recipient. There were no significant differences in willingness to use a mobile app for HIV prevention based on previous PrEP knowledge. The lack of significance between these characteristics suggests that this type of app could be used by a wide range of college-aged Black women living in Atlanta. However, significant differences between those who have recently engaged in heterosexual activity & those who have not recently engaged in heterosexual activity exists. The difference lies in likeliness to commit to their sexual boundaries with an app feature that provides them with an at-home HIV testing kit. This may suggest a need for targeting prevention-related apps for Black college women so that they can manage their HIV-related risks as precisely as possible. For instance, if a user indicated that they are currently sexually active or thinking about being sexually active, a pop-up will be shown on the app directing them to a tool under "Resources" that allows them to keep up with HIV/STI testing and reflect on their boundaries, making it easier for users to create a plan for their sexual health and stick to it.

Most participants ranked healthcare providers as their preferred source for healthcare needs (27.7%), and 21.5% of participants ranked Google as their 1st choice source for receiving information. In focus group discussions, Black women spoke of the importance of receiving accurate and culturally informed information from providers who also identified as Black women. An HIV-prevention app geared towards this group should include resources that link users to providers whom they can relate to and who look like them.

The quantitative and qualitative results of this project provide insights into Black women's perception of their reproductive health care, risk of contracting HIV, and how to meet their sexual health needs. However, some reservations against using such a product were expressed due to potential breaches of privacy. The qualitative results provide some insight as to why a small percent of women would not feel comfortable sharing health information via the app platform with present and past partners (8.8% and 17.6%, respectively). Many questions were brought up into how this app could be linked to other email and social media accounts, potentially posting on their behalf to their accounts and exposing their usage of a reproductive mobile health app with an HIV focus. Additionally, how the information would be protected for those who did divulge an HIV positive status on the app. This was a shared sentiment among a sample of MSM studied in China, who suggested that the app not have logos that are gay-identified or HIV-identified, in case of unintentional disclosure of the user's sexual orientation or HIV status[32].

Given the favorable response towards mobile phone apps, a broader, theory-based mobile phone pilot study is warranted to study the impact of the app on the commitment to prevention behaviors for Black women. These findings also align with a pilot study of usability and accessibility of a Mobile Comprehensive HIV App among MSM groups, which called for a randomized controlled study of the impact of the app on uptake of prevention behaviors for MSM groups[25]. Additionally, it is plausible that app features desired by college-aged Black women in Atlanta overlap with the preferences of Black women of different age groups and from different geographical locations. This will allow for a broader audience and an acceptable app for Black women that takes into account their wants and needs.

Limitations

These findings are not without limitations. These findings are derived from data collected as part of a convenience sample of Black women from the metro-Atlanta area, who are college-aged students. So, these findings are likely not generalizable to broader populations of Black women of various age groups. These findings are also likely biased by some degree of self-selection, where those who are willing to engage with communication regarding HIV prevention via apps may have been more likely to participate.

Additionally, smaller sample sizes impeded the effectiveness of using Pearson Chi-Square tests. In hindsight, I would've used a 3-point scale instead of a 7-point one, but re-coding the variables proved to be a seamless job. The reduction of the scale was helpful but still did not help the lack of consistent results. Many respondents did not respond to all the questions, so some question sets have a smaller sample size than the original N=65. The attrition is described in further detail under chapter 4 in a paragraph entitled "Missing Values". The findings of Table 5 should be interpreted with caution as the questions from which this data was collected from had the highest rate of attrition (69%). Thus, the significance tests are somewhat limited due to the sample size. The onset of a global pandemic during the period of data analyzed did not allow for access to computational resources, thus Fisher's Exact Tests, which would be beneficial for cells that have 0 counts, were not conducted.

Qualitative data may also be limited by potential bias. I served as the sole investigator when analyzing and coding the qualitative data, which does not prevent researcher bias. Having a team of research members analyzing qualitative data can prevent this. I investigated the most frequently mentioned themes according to myself, but having others analyze the data could have led to a more comprehensive and descriptive framework.

Future research should use more nuanced measures of these behaviors to further our understanding of the behavioral risk profiles of MSM who are willing to use apps for HIV prevention.

Appendix

A) Qualtrics Survey

Reproductive Health Mobile App for College-Aged Black Women

Start of Block: Pre-Screen

Q1 How would you describe yourself? Check all that apply.

- ☐ Hispanic or Latino/Latina (1)
- ☐ Black or African American (2)
- ☐ Asian (3)
- ☐ Middle Eastern (4)
- ☐ Native American, Alaskan Native (5)
- ☐ Native Hawaiian or Other Pacific Islander (6)
- ☐ Indian (7)
- ☐ White (8)
- ☐ Other (9)

Q2 If you are Hispanic, what subgroup do you identify with? (examples: Puerto Rican, Mexican, Cuban, etc)

_____

Q3 How old are you?

- o 18-25 (1)
- o 26-30 (2)
- o 31-35 (3)
- o 36-40 (4)
- o 40+ (5)

Q4 What sex were you labeled at birth?

- o Male (1)
- o Female (2)
- o Intersex (3)

Q5 Do you own a smartphone?

- o Yes (1)
- o No (2)

Q6 Did you recently graduate from or are you currently enrolled in an undergraduate/graduate/professional program?

- o Yes (1)
- o No (2)

Q7 If yes, what is your current classification?

- o First-year (1)
- o Second-year (2)
- o Third-year (3)
- o Fourth year (4)
- o 5+ years (5)
- o Currently not enrolled (6)

Q8 If yes, full-time or part-time?

- o Full-time (1)
- o Part-time (2)
- o Currently not enrolled (3)

Page Break

End of Block: Pre-Screen

Start of Block: Consent

Q9 Based on your above answer choices, you are eligible to participate in this study. Your question responses are completely anonymous, will take less than 10 minutes, and will be used to determine what Black women want from mobile reproductive health apps. If you would like to participate, please click 'Continue.'

- o Continue (1)

End of Block: Consent

Start of Block: Survey

Q10 What is the highest level of schooling you have completed or degree you have been awarded?

- o None (1)
- o Elementary/Middle school (2)
- o High school (3)

- o Trade/Technical College (4)
- o College (5)
- o Graduate/professional degree (6)

Q11 Are you currently employed?

- o Yes (1)
- o No (2)
- o Don't know (3)

Q12 If yes, are you employed full-time or part-time?

- o Full-time (1)
- o Part-time (2)
- o Currently not employed (3)

Q13 What is your current marital status?

- o Married (1)
- o Not married but living with sexual partner (2)
- o Separated (3)
- o Divorced (4)
- o Widowed (5)
- o Never married/single (6)

Q14 Do you currently have health insurance?

- o Yes (1)
- o No (2)

Q15 What health services do you use most frequently?

- o Primary care provider (1)
- o Gynecologist (2)
- o Student health services (3)
- o Urgent care (4)
- o Unsure (5)

Q16 In the past year, what was your approximate total yearly household income?

- o $0-$9,999 (1)

- o $10,000-$19,999 (2)
- o $20,000-$29,999 (3)
- o $30,000-$39,999 (4)
- o $40,000-$49,999 (5)
- o $50,000 and Over (6)

Q17 In the past 3 months, have you engaged in heterosexual intercourse (vaginal or anal)?

- o Yes (1)
- o No (2)

Q18 Have you ever tested positive for HIV?

- o Yes (1)
- o No (2)

Q19 Post-exposure prophylaxis, sometimes referred to as prEP, is a medication that can be taken after a potential exposure to HIV by an HIV-negative person to protect against HIV.

Have you heard of pre-Exposure Prophylaxis (PrEP), Truveda, or the blue pill, before?

- o Yes (1)
- o No (2)

Q20 If yes, where? (i.e commercial)

_____

Q21 Where do you get your health information? Rank the following, 1 being what you most frequently utilize and 10 being what you least frequently utilize.

_____ Family (1)
_____ Friends (2)
_____ Healthcare Provider (3)
_____ Instagram (4)
_____ Google or other search engines (5)
_____ Snapchat (6)
_____ Health apps (7)
_____ Facebook (8)
_____ Youtube (9)
_____ Other Partners (10)

Page Break

Q22 The following questions are regarding a reproductive health mobile app and HIV features associated with it. Answer the following:

	Strongly Disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
I have previously tested for HIV at least once as part of my routine health care. (1)	o	o	o	o	o	o	o
I would order an HIV test kit through a mobile app. (2)	o	o	o	o	o	o	o
I would order condoms through a mobile app. (3)	o	o	o	o	o	o	o
I would utilize GPS mapping of HIV-testing/ PrEP clinics who prescribe for women through a mobile app. (4)	o	o	o	o	o	o	o
I would be willing to use an app with PrEP content. (5)	o	o	o	o	o	o	o

If I had access to an HIV test kit via mobile app, it would increase how frequently I test for HIV. (6)	o	o	o	o	o	o	o
I would be willing to use an app to remind myself when to get tested for HIV. (7)	o	o	o	o	o	o	o

Page Break

Q23 The following questions are regarding an app feature that allows you to order an HIV test kit and utilize it within a mobile app platform, to test in the privacy of your own home. Answer the following:

	Strongly Disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
This app feature would influence my sexual behavior such that I would partake in sexual activity MORE than usual. (1)	o	o	o	o	o	o	o
This app feature would influence my sexual behavior such that I would partake in sexual activity LESS than usual. (2)	o	o	o	o	o	o	o

Installing this app feature into my phone would make me think about my sexual activity MORE than I typically do. (3)	o	o	o	o	o	o	o
This app feature would help me identify my boundaries for sexual activity. (4)	o	o	o	o	o	o	o
This app feature would motivate me to commit to my boundaries when I am about to partake in sexual activity. (5)	o	o	o	o	o	o	o

Page Break

Q24 The following questions are statements assessing your preferences when it comes to sharing medical test results (STI, HIV, pregnancy, etc) with healthcare providers and current or potential partners. Answer the following:

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)

I would be willing to share medical test results with PRESENT sexual partner(s) via sharing features within a mobile app. (1)	o	o	o	o	o	o	o
I would be willing to share medical test results with PAST sexual partners via sharing features within a mobile app. (2)	o	o	o	o	o	o	o
I would be willing to share medical test results with my healthcare provider via sharing features within a mobile app. (3)	o	o	o	o	o	o	o
My partner is aware of my HIV status. (4)	o	o	o	o	o	o	o

I feel comfortable with my partner attending STI/HIV testing appointments with me. (5)	o	o	o	o	o	o	o
I feel comfortable with my partner attending medical appointments with me. (6)	o	o	o	o	o	o	o
My partner(s) and I have discussed what we would do if one of us contracted HIV. (7)	o	o	o	o	o	o	o
My partner(s) and I have discussed what we would do if one of us contracted an STI. (8)	o	o	o	o	o	o	o

My partner(s) financially supports my medical visits. (9)	o	o	o	o	o	o	o
I think my partner(s) would prefer playing a role in my medical care. (10)	o	o	o	o	o	o	o
My partner(s) has/have previously tested for HIV at least once as part of their routine health care. (11)	o	o	o	o	o	o	o
I would feel comfortable with my partner(s) having immediate access to my STI or HIV results within an app. (12)	o	o	o	o	o	o	o

Page Break

Q25 The following questions are statements assessing your preferences and attitudes towards PrEP, a medication that can be taken after a potential exposure to HIV by an HIV-negative person to protect against HIV. Answer the following:

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
If PrEP were available, I would NOT use it because I do not believe I am at risk for getting HIV. (1)	o	o	o	o	o	o	o
If PrEP were available, I would NOT use it because I would be concerned about the side effects. (2)	o	o	o	o	o	o	o
If PrEP were available, I would NOT use it because I would be afraid to ask my doctor for it. (3)	o	o	o	o	o	o	o

If PrEP were available, I would NOT use it because I would not remember to take it. (4)	o	o	o	o	o	o	o
If PrEP were available, I would NOT use it because I would feel judged for using it. (5)	o	o	o	o	o	o	o
If PrEP were available, I believe that I would have sex without a condom MORE frequently. (6)	o	o	o	o	o	o	o

Page Break

Q26 In the past 3 months, with how many partners did you have PROTECTED vaginal sex with?

- o 0 (1)
- o 1-2 (2)
- o 3-4 (3)
- o 4-5 (4)
- o 5+ (5)

Q27 In the past 3 months, with how many partners did you have UNPROTECTED vaginal sex with?

- o 0 (1)
- o 1-2 (2)
- o 3-4 (3)
- o 4-5 (4)
- o 5+ (5)

Q28 In the past 3 months, with how many partners did you have PROTECTED oral sex with?

- o 0 (1)
- o 1-2 (2)
- o 3-4 (3)
- o 4-5 (4)
- o 5+ (5)

Q29 In the past 3 months, with how many partners did you have UNPROTECTED oral sex with?

- o 0 (1)
- o 1-2 (2)
- o 3-4 (3)
- o 4-5 (4)
- o 5+ (5)

Q30 In the past 3 months, with how many partners did you have PROTECTED anal sex with?

- o 0 (1)
- o 1-2 (2)
- o 3-4 (3)
- o 4-5 (4)
- o 5+ (5)

Q31 In the past 3 months, with how many partners did you have UNPROTECTED anal sex with?

- o 0 (1)
- o 1-2 (2)
- o 3-4 (3)
- o 4-5 (4)

- 5+ (5)

Q32 In the past 3 months, have you used any of the following? Check all that apply.

- Acid/ LSD _Alcohol (>5 drinks or more) (1)
- Cocaine/crack cocaine (2)
- Ecstasy/MDMA (3)
- GHB/GBL (4)
- Heroine (5)
- Ketamine (6)
- Marijuana (7)
- Methamphetamine (8)
- Have not used any of the above (9)

Q33 In the past 12 months, were you diagnosed or treated for any of the following?

- Gonorrhea (1)
- Chlamydia (2)
- Syphilis (3)
- Have not been diagnosed or treated for any of the above (4)

Q34 How long has it been since your last HIV test?

- Less than 3 months (1)
- 3-6 months (2)
- 6-12 months (3)
- More than 12 months (4)
- I have never been tested for HIV (5)

Q35 How frequently do you test for HIV?

- Every 3 months (1)
- Every 6 months (2)
- Once a year (3)
- After a new sexual partner (4)

Q36 How long has it been since you last saw or talked to a doctor or other healthcare professional about your own health?

- o 6 months or less (1)
- o More than 6 months, but not more than 1 year ago (2)
- o More than 1 year, but not more than 2 years ago (3)
- o More than 2 years, but not more than 5 years ago (4)
- o More than 5 years ago (5)

Q37 In the last six months, have you sought out mental health services?

- o Yes (1)
- o No (2)

Q38 If yes, why? Briefly explain below.

_____

Q39 What types of health services would you seek out digitally (text, voice, video, mobile app)? Check all that apply.

- ▢ Mental health counseling (1)
- ▢ Diagnosis and treatment of common ailments (2)
- ▢ Follow-up checkups with primary care physicians (3)
- ▢ Urgent care services (4)

Q40 Have you ever been denied healthcare on the basis of your race or gender?

- o Yes (1)
- o No (2)

Q41 Have you ever been afraid to seek healthcare services because of your race or gender?

- o Yes (1)
- o No (2)

Q42 In the past 12 months, have you used a health-related app (period tracker, fertility calendar, etc.)?

- o Yes (1)
- o No (2)

Q43 In the past 12 months, how many times have you deleted and re-downloaded a health-related app (Period tracker, fertility calendar etc.)?

- o 0 times (1)

- o 1 time (2)
- o 2 or 3 times (3)
- o 4 or 5 times (4)
- o 6 or 7 times (5)
- o 8 or more times (6)

Q44 In the past 12 months, have you used any dating apps (Tindr, Bumble) to find romantic or sexual partners?

- o Yes (1)
- o No (2)

Q45 Have any of your healthcare providers discussed HIV prevention with you?

- o Yes (1)
- o No (2)

Q46 Have any of your healthcare providers discussed PrEP treatment with you?

- o Yes (1)
- o No (2

Q47 Please describe what your experience with healthcare providers regarding HIV prevention and PrEP treatment have been below:

_____

B) Focus Group Guide

Mobile HIV Prevention App for Black Women: Preferences and Prototype
Focus Group Guide

Introduction:
Thank you for coming to talk with us today. We appreciate you taking time from your day to help us learn more about keeping young women your age healthy.

My name is XXXX and this is (name of Research Assistant [RA]). We will be working together to help the group go smoothly.

This meeting will last around 1 hour and 30 minutes. We have some drinks and snacks here for you. Bathrooms are located….

We ask that you please turn off your cell phones so you don't get interrupted while we're talking. If you can't turn off your phone for safety reasons, please put it on vibrate only.

Group Guidelines:

Before we start, we need to agree on some guidelines to make sure that everyone feels comfortable.

We'll be talking about private information in this group, and it's important that you all feel that what you share will not be shared with others. So, please don't share what's been said here with people who are not in the group.

It's important that we show respect for each other in the group. We will sometimes disagree with each other and that's normal. We'll ask that you listen to others, even if you disagree. We will also want to hear your views. Also, please try not to speak when someone else is talking. We want to hear from everyone in the group: you all have something important to add.

We'll ask that you be as open and honest as you can in the group. We can learn from each other, and everyone has something valuable to share. Also, keep your mind open to other points of views. There are no right or wrong answers to these questions.

You may ask questions. We will try to answer any questions when they are asked, but we may need to wait until the end of group if the answer is complicated or doesn't have to do with the goals of the group.

All group sessions will be digitally recorded.

Your privacy and confidentiality will be protected at all times. Only the research team, including the transcribers, which are people who translate the audio tapings into a written document, will listen to the tapes.

Participants may choose to use their first name only or an alias (alternative) name. Please do not use last names of yourselves or others (including people in your lives). Do you have questions about the taping?

Can we all agree to these guidelines?

Because we appreciate you taking the time to help us learn more about what young women your age think, and because we understand you may have expenses as a result of attending, we will be paying each of you $30.00 for being a part of this group. PAYMENT will be provided at the end of the session and each of you will need to sign a receipt.

Preliminary Question:

Let's go around the group and introduce ourselves. Please use a first name or alias only.

My name is Rasheeta Chandler and I work at the Emory University, School of Nursing as a researcher & instructor. Now I will let (RA name here) introduce themselves.

As we mentioned earlier, we will be working together to help the group go smoothly. (RA name here) will also be taking notes so we don't miss any important information.

PURPOSE AND GOALS:

There are two main goals for tonight's group:
1) To learn what all of you think about having an/a HIV prevention/Reproductive health promotion mobile application focused on the needs of Black women; and 2) To learn what mobile app features would encourage continued use of the mobile app.

Some of the things that we're going to be talking about, like sex, can be embarrassing or difficult to talk about. We understand this, and we will help each other to be more comfortable. One more thing about talking about sex—it is very important for group members to feel that their behavior or choices are not being judged. There is a wide range of sexual behaviors. We're all responsible for making our own choices; in this group, we will also be accepting of others' choices. You have the opportunity to learn a lot from each other - as long as members feel comfortable sharing.

General health Questions:

- Name for me your top three health concerns?
- How would you like to learn about your health concerns? (e.g. family, healthcare provider, social media, mobile app—secure)

Transition:

When we asked you to join our group, you all told us that you have been involved in a dating relationship, and you have experienced vaginal or anal sex (a males' penis in your vagina or in your rectum or buttocks). Sometimes it is easy to not have sex with someone, but sometimes it can be difficult to say no. We'd like to hear from you.

Safe Sex/HIV prevention Information Needs of Black Women:

What type of information do you think women like you need to protect them from acquiring STIs/HIV/ or experiencing an unintended Pregnancy?

When I say "safe sex" what comes to mind?

- Who do you think is most at risk for HIV?
- Give your thoughts about HIV and how it impacts black women.
- What have you heard about Pre-Exposure Prophylaxis (PrEP)?

- Who do you think PrEP is for?

- What have you seen or heard about PrEP in media messages?

HIV prevention information delivery preference(s) per Black women:

Transition:
That discussion was very helpful. It sounds like there are some real challenges facing young women who want to practice safe sex or reduce their risk of acquiring HIV. When talking with young women, we have found that some young women feel that certain things in their lives has an impact on their decision to have sex/safe sex.

Introductory questions:

- How would you like to hear information about health topics important to Black women, including HIV?

- If you were to receive health related information on your phone, how would you prefer to receive it— e.g. through a mobile app, search the web, through a social media option?

- Tell me anything more that you feel could help us address your preventive healthcare needs.

Now, we're going to discuss the needs of you and your friends regarding health applications (apps).

Why would you start using a health app?

Why would you use a health app of a long period of time?
o Can you provide examples of health apps that you have used for a few weeks or a month?

Why did you use the ___ app for <specify period of time>
o Can you provide examples of health apps that you have used for about 2 months

Why did you use the ___ app for <specify period of time>
o Can you provide examples of health apps that you have used for 3 months or longer

Why did you use the ___ app for <specify period of time>

- What mobile apps do you use most on your smart phone?

- What are three apps that you continue to use since you've had a smart phone, and you continue to download even when you change devices?

- What features in that app do you remember most (e.g., the song/jingle, the acting)?

- What features encourage you to use mobile applications on your cell phone?

What concerns may you have about using health apps?

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