HHS Public Access

Author manuscript

Womens Health Issues. Author manuscript; available in PMC 2024 September 01.

Published in final edited form as:

Womens Health Issues. 2023 ; 33(5): 541–550. doi:10.1016/j.whi.2023.05.009.

Intention to initiate HIV pre-exposure prophylaxis among cisgender women in a high HIV prevalence U.S. city

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Abstract

Objective: We aimed to identify the individual, interpersonal, community, health-system, and structural factors that influence HIV pre-exposure prophylaxis (PrEP) initiation among cisgender women seeking sexual and reproductive health care in a high HIV prevalence community to inform future clinic-based PrEP interventions.

Methods: We collected anonymous, tablet-based questionnaires from a convenience sample of cisgender women in family planning and sexual health clinics in the District of Columbia. The survey utilized the lens of the socio-ecological model to measure individual, interpersonal, community, institutional, and structural factors surrounding intention to initiate PrEP. The survey queried demographics, behavioral exposure to HIV, perceived risk of HIV acquisition, a priori awareness of PrEP, intention to initiate PrEP, and factors influencing intention to initiate PrEP.

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Authors contributions: RKS conceptualized the study, supervised the study, study analysis, and was the primary contributor on all drafts of the manuscript. SJH designed the survey tool and actively participated in the analysis and writing. PM supervised data collection. AW, JH, and DB recruited survey participants. All additional authors were involved throughout the study and reviewed/approved the manuscript prior to submission.

Conflicts of Interest: RKS receives investigator-sponsored research funding (managed by MHRI) from Viiv Healthcare and Gilead Sciences.

Ethics Approval: IRB approval was obtained from both study locations prior to study initiation: IRB#s 2017–0870 and 2017–25.

Consent to participate: All participants signed informed consent prior to initiating the survey

Results: 1437 cisgender women completed the survey. By socio-ecological level, intention to initiate PrEP was associated with positive attitudes towards PrEP (OR 1.56, 95% CI 1.13, 2.15) and higher self-efficacy (OR 1.32, 95% CI 1.02, 1.72) on the individual level, perceived future utilization of PrEP among peers and low fear of shame/stigma (OR 1.65, 95% CI 1.33, 2.04) on the community level, and having discussed PrEP with a provider (OR 2.39, 95% CI 1.20, 4.75) on the institutional level.

Conclusion: Our findings highlight the importance of multi-level clinic-based interventions for cisgender women which promote sex-positive and preventive PrEP messaging, peer navigation to destigmatize PrEP, and education and support for women's health medical providers in the provision of PrEP services for cisgender women.

Keywords

Pre-Exposure Prophylaxis; Female; HIV infections; Surveys and Questionnaires; Socio-ecological Model; Reasoned Action Approach

Introduction

Despite the demonstrated safety and efficacy of daily oral pre-exposure prophylaxis (PrEP) with tenofovir disoproxil fumarate/emtricitabine (TDF/FTC)(Baeten et al., 2012; Murnane et al., 2013; Thigpen et al., 2012), there remains a substantial unmet need for HIV prevention among cisgender women and low engagement and retention in the PrEP cascade (*AIDSVu*, n.d.; Bush et al., 2015, 2016; Marcus et al., 2016; Siegler et al., 2018; Smith et al., 2018; Wu et al., 2017). Current literature suggests multiple patient, provider, and system level barriers to equitable and successful provision and utilization of PrEP. Patient-level barriers include lack of awareness of PrEP (Auerbach et al., 2015; Bogorodskaya et al., 2020; E. Bradley et al., 2019; Collier et al., 2017; Flash et al., 2017; Goparaju et al., 2015; Hill et al., 2020), low perceived risk of HIV acquisition (Auerbach et al., 2015; Bogorodskaya et al., 2020; E. Bradley et al., 2019; Collier et al., 2017; Flash et al., 2017; Goparaju et al., 2015; Hill et al., 2020; Hirschhorn et al., 2020; Hull, 2012; Koren et al., 2018; Kwakwa et al., 2016; Nydegger et al., 2020; Ojikutu et al., 2018), mistrust in the medical establishment (Dale, 2020; D'Angelo et al., 2021; Ojikutu et al., 2020; Tekeste et al., 2019), concern for side effects (Amico et al., 2019; Blumenthal et al., 2021; Goparaju et al., 2015; Hill et al., 2020; JD Auerbach, 2015; Koren et al., 2018), and stigma (Auerbach et al., 2015; E. Bradley et al., 2019; Calabrese et al., 2018; Felsher et al., 2020; Goparaju et al., 2017; Pinto et al., 2018; Rubtsova et al., 2014; Smith et al., 2012). Additionally low provider knowledge and comfort prescribing PrEP (Aaron et al., 2018; Blackstock et al., 2017; E. Bradley et al., 2019; Castel et al., 2015; Krakower & Mayer, 2016; Petroll et al., 2017; Pinto et al., 2018), racial biases around PrEP prescribing (Hull et al., 2021), and issues of accessibility and availability of PrEP services (Aaron et al., 2018; Bradley & Hoover, 2019; Siegler et al., 2018) serve as significant barriers to PrEP use for cisgender women.

The District of Columbia (DC) is a CDC-designated HIV "hotspot" with a population HIV prevalence of 1.7%; HIV prevalence is 1.2 % among all cisgender women and 1.7% among Black cisgender women (Bowser et al., 2022). The DC Department of Health (DC Health) estimates that fewer than 10% of residents with risk factors for HIV acquisition

utilize PrEP, illustrating significant local unmet need (Bowser et al., 2022). In response to this underutilization of PrEP among cisgender women in the District of Columbia, we designed this study using both the Socio-Ecological Model (SEM)(Bronfenbrenner, 1979) and the Reasoned Action Approach (RAA)(Ajzen, 2011; Ajzen et al., 2012; Fishbein & Ajzen, 2011) as theoretical frameworks to understand intention to initiate PrEP among cisgender women in the high prevalence area of the District of Columbia. We conducted surveys among cisgender women seeking care at a family planning clinic within a large tertiary care medical center and a government-sponsored sexual health clinic, both of which offer universal PrEP screening and same-day PrEP initiation but evidenced low levels of PrEP uptake among cisgender women. Both sites serve predominantly Black, underserved patient populations. Our primary objective was to identify the individual, interpersonal, community, health-system, and structural factors that influence PrEP initiation in order to build interventions to improve engagement and retention in the PrEP cascade for cisgender women.

Methods and Measures

Study Design

We collected anonymous, tablet-based questionnaires from a convenience sample of cisgender women ≥ 18 years of age seeking care at a Department of Health-run sexual health clinic or a family planning and preventive care clinic within a tertiary care medical center in the District of Columbia. We included participants at all stages of the PrEP cascade in order to capture associations between RAA global measures/SEM factors and behavioral intention. We obtained IRB approval from both sites prior to data collection (IRB#s 2017–0870 and 2017–25). We collected questionnaires in the family planning clinic as part of a small-scale implementation and feasibility study from September 2017 to March 2018 and at both sites from July 2018 until March 2020.

In both waiting rooms, informational videos played on a loop and included the five-minute video “What is PrEP?” (www.whatisprep.org) along with other videos reviewing sexual health, contraception, and HIV prevention. The widely circulated, gender-inclusive video describes what oral PrEP is, how it works, how it is used, and PrEP eligibility criteria (Amico, et al. 2014). Study coordinators approached all women by describing the purpose of the study (script available upon request) in the waiting rooms of the two sites and all English-speaking women age 18 and older were invited to participate. The questionnaire screened sex assigned at birth and gender identity. Participants watched the “What is PrEP?” video on the waiting room television or on a tablet, then completed the informed consent and questionnaire on a tablet in an exam room while waiting for their medical provider. The questionnaire queried demographics, behavioral exposure to HIV, perceived risk of HIV acquisition, a priori awareness of PrEP, intention to initiate PrEP, prior receipt of a prescription for PrEP, and multi-level factors influencing intention to initiate PrEP. The questionnaire took approximately 25 minutes to complete and participants were compensated with a $5 gift card upon completion.

Universal PrEP screening and education by providers were standard of care in both clinics; patients who voiced interest in PrEP received counseling and laboratory screening by

their medical provider, and depending on site protocol, were given a one-week supply or prescription for one month of oral TDF/FTC and scheduled for clinical follow-up.

Theoretical Frameworks

The Socio-Ecological Model (SEM) posits that an individual's decisions and behaviors result from reciprocal interactions within and between individuals and their social, cultural, and structural environments (Bronfenbrenner, 1979). Specifically, the SEM highlights that although health decisions or behaviors occur at the individual level, they are influenced by individual (i.e., psychological), interpersonal (e.g., relationship power, relationship commitment), community (i.e., cultural norms, stigma), institutional (e.g., equitable provision of care, appropriate services), and structural factors (e.g., public policy, infrastructure) (Kaufman et al., 2014).

We supplement the SEM perspective with the Reasoned Action Approach (RAA), an individual level theory of behavior change and prediction, which is the latest iteration in the Theory of Reasoned Action framework (Yzer 2017). The RAA posits a limited number of psychosocial variables that shape behavioral intentions, which in turn affect behavior (Fishbein & Ajzen, 2011). The RAA posits that the primary predictor of behavior is intention. That is, people will act upon their intentions to the extent that they feel they have the ability, that it is under their control, and that environmental barriers are not excessive. Intentions are determined by attitudes toward performing the behavior, normative pressure and perceptions of behavioral control, or self-efficacy over performing the behavior. Attitudes refer to a sense of favorability with regard to the behavior. Normative perceptions refer to the perception that the behavior is acceptable to important social referents (i.e., injunctive norms) and that similar others engage in the behavior (i.e., descriptive norms). Perceptions of behavioral control (PBC) refer to perceptions of self-efficacy with regard to the behavior. These proximal determinants of behavioral intentions are determined by underlying beliefs. Attitudes are determined by outcome expectations (i.e., performing the behavior will result in specific desirable and undesirable outcomes); normative perceptions are determined by beliefs about whether particular normative referents would approve and the motivation to comply with those referents. PBC is determined by perceptions of ones' ability to overcome specific barriers that are likely to be present (Fishbein & Ajzen, 2011).

The relative importance of these factors will vary by population and behavior. Other sociodemographic variables, such as perceived risk, relationship status, and education, are considered "background variables," which are likely to impact behavior indirectly by shaping the beliefs people endorse. The RAA provides an account of the individual-level factors in health behavior and also acknowledges the critical importance of social and structural factors in health by highlighting how actual control may moderate the ability to act on intentions and also impact the beliefs people endorse. This model has been extensively applied across a wide array of behavioral contexts and populations, cross-sectionally and prospectively—including in HIV prevention (Albarracín et al., 2001; Armitage & Conner, 2001; Chittamuru et al., 2020; Godin & Kok, 1996; McEachan et al., 2016; Teitelman et al., 2020).

Measures

We assessed factors identified in our qualitative pilot research (Hull et al., 2017) and others' formative research (Auerbach et al., 2015; Goparaju et al., 2017; Wingood et al., 2013) using closed-ended questions.

Individual factors included age, behavioral exposures to HIV — injection drug use, multiple sexual partners, non-monogamous sexual partners, transactional sex practices, inconsistent condom use, and history of recent history of sexually transmitted infections (STIs) — perceived risk of HIV acquisition, prior awareness of PrEP, salient outcome expectations (i.e., attitudes) relevant to PrEP (i.e., effectiveness, side effects, cost), and perceived self-efficacy. *Interpersonal* factors included relationship status and both the perceived support from important individuals in their networks and their motivation to comply with those individuals (injunctive norms), such as their doctor, main sexual partner, best friend, and sister. *Community* factors included perceived likelihood of peers to use PrEP (i.e., descriptive norms) and anticipated stigma. *Institutional* factors (i.e., health system) included education and counseling about PrEP from a medical provider or prescription of PrEP by a medical provider. *Structural* factors included racial group, educational and income levels, employment status, medical insurance status, transportation, and length of time to travel to the clinic site. Of note, transportation and duration of travel were not included in the pilot questionnaire and were added to the revised questionnaire in July 2018.

We measured behavioral intention to initiate PrEP by asking: "Which statement best reflects your thinking?" with response choices of "I have no intention of using PrEP for HIV prevention in the next 12 months," "I am considering taking PrEP for HIV prevention in the next 12 months, but I'm not ready to take action," "I am committed to taking PrEP for HIV prevention in the next 12 months," and "I am ready to start PrEP as soon as possible." We then collapsed responses into a dichotomous variable reflecting intention (i.e., "committed" and "ready to start" vs. "no intention" and "considering"). Theoretical constructs were assessed using 5-point Likert scales (strongly disagree to strongly agree), except for injunctive normative beliefs, which were calculated by multiplying beliefs about whether specific important individuals (i.e., normative referents identified through our previous research; [Hull et al. 2022]) would support PrEP uptake (definitively would not support to definitely would support, range −2 to 2) by reported rating of the motivation to comply with that referent (Bleakley & Hennessey, 2012, Bleakley & Hull, *in press*). To assess motivation to comply, we asked respondents how important each referent's opinion was in her decision whether to use PrEP (i.e., not important at all to extremely important, range 1–5); the range for the normative belief variables is ±10.

Data Analysis

We used descriptive statistics to characterize the study sample, including age, racial group, marital status, education level, employment status, income level, and insurance type. To determine association of potential facilitators and barriers by socio-ecological level with intention to initiate PrEP, we divided the study sample based on the dichotomous PrEP intention status and tested associations with individual, interpersonal, community, institutional, and structural factors using Fisher's exact test, Mann-Whitney U test, and

Student's t-test, when appropriate. We used Cochran-Armitage trend test to detect the trends in intention with increases in education and income levels. Lastly, we performed a binomial logistic regression analysis of RAA measures (attitudes, injunctive norms, descriptive norms, and self-efficacy) on intention to initiate PrEP, adjusting for significant socio-demographics, risk behaviors, and psychosocial factors identified from the bivariate analysis. We estimated an adjusted odds ratio with 95% confidence interval for each potential factor. The significance level was set at 0.05 throughout the study. All statistical analyses were conducted using SAS 9.4 (SAS Institute Inc., Cary, NC).

Results

A total of 1480 participants completed the questionnaire. We excluded 43 respondents (10 who reported HIV positive status and 33 who did not respond regarding their intention to start PrEP); a total of 1437 total questionnaire responses were included in the final analysis (Table 1).

The mean age of the study population was 28.8 years; the majority of participants were Black (74.8%), single or never married (80.9%), with annual household incomes of less than $30,000 (59.8%). Table 1 reports the sample's sociodemographic characteristics. The majority of participants reported >1 sexual partner in the past 12 months (50.9%) and inconsistent condom use (71.0%), in addition to living in a high HIV prevalence area. The median number of risk factors for HIV acquisition was 2. Mean perceived risk of HIV was "low." Sixty-one percent (n=541) of respondents reported being previously unaware of PrEP. Those who were aware of PrEP had most commonly heard of it from their health care provider (27.4%, n=148); among them, 81.1% (n=120) reported a discussion about PrEP with their healthcare provider and 22.3% (n=33) reported receiving a prescription for oral PrEP. Cisgender women ranked the importance of their medical provider's support most highly, followed by that of their partner. Among all respondents (N=1437),10.3% (n=148: n=72 "committed to starting PrEP," n=76 "ready to start taking PrEP") expressed intention to initiate PrEP in the next 12 months; 89.7% (n=638: n=72 "no intention to start PrEP," n=566 "considering starting PrEP") did not express readiness. Among the 33 women who reported previous prescription of oral PrEP, the majority (n=20, 74.1%) reported positive intention.

Table 2 reports the results of the multivariable logistic regression to understand the association of intention to initiate PrEP with significant bivariate barriers and facilitators of PrEP intention. To assess multi-collinearity, we estimated the variance inflation factor (VIF) of the explanatory variables in the model and found that the highest VIF = 1.45, indicating that multi-collinearity is not a cause for concern (Senaviratna & Cooray, 2019).

We present our findings by socio-ecological level:

Individual

At the individual level, behavioral exposure such as injection drug use (IDU), transactional sex, casual sex partner(s), and >2 sex partners demonstrated independent bivariate associations with intention to initiate PrEP. Only IDU (aOR 2.23, 95% CI 1.004, 4.95)

and transactional sex (aOR 2.59, 95% CI 1.03, 6.48) were significantly correlated with intentions in the multivariable logistic regression model, after controlling for other variables in the model. There were no significant differences by intention in perceived risk of HIV acquisition, prior awareness of PrEP, or knowledge of where to "start the process" in the bivariate analysis. Although attitudes towards PrEP were favorable in both groups, more favorable attitudes towards PrEP were associated with intention to initiate PrEP in both the bivariate and multivariable analysis (aOR 1.56, 95% CI 1.13, 2.15). In the bivariate analysis, beliefs about PrEP safety and efficacy and the belief that "using daily PrEP to prevent HIV would make (cisgender women) feel in control of (their) health" were significantly correlated with intention (Table 1). Self-efficacy was similarly high in both cisgender women with and without intention to initiate PrEP. Still, higher self-efficacy, namely beliefs that cisgender women could be adherent despite side effects or lack of partner support, was associated with intention to initiate PrEP in both bivariate and multivariable analyses (aOR 1.32, 95% CI 1.02, 1.72).

Interpersonal

There was no significant bivariate association between relationship status and intention to initiate PrEP. The perceived support of important individuals with whom they are motivated to comply (injunctive norms), such as main sexual partner, best friend, and sister, were significant in the bivariate analyses. These injunctive normative beliefs were not significant in the multivariable analyses.

Community

Descriptive norms, specifically perceived likelihood of peers to use PrEP and anticipation of being shamed for taking PrEP, were significantly associated with intention to initiate PrEP (positively and negatively, respectively) in both the bivariate and multi-variable analysis (aOR 1.65, 95% CI 1.33, 2.04).

Institutional

Having heard about PrEP from a medical provider was not significantly associated with intentions in the multivariable analysis. Prior discussion with a health care provider about PrEP was significantly associated with intention to initiate PrEP (aOR 2.39, 95% CI 1.20, 4.75) in the multivariable analysis.

Structural

There were significant differences by racial group ($p<0.01$) such that Black women reported higher intentions to initiate PrEP in the bivariate analysis (n=122, 84.1% vs. n=928, 73.8%, $p<0.01$); however, these differences were not significant in the multi-variable logistic regression. There were no significant differences in intentions by employment or health insurance status. There were significant associations between intentions and both educational ($p<0.01$) and income levels ($p<0.01$). Specifically, cisgender women with household incomes greater than $50,000 were less likely to intend to initiate PrEP. Trend tests indicated that educational and income levels were both inversely associated with

intention to initiate PrEP. We did not find associations between mode of transportation or duration of travel to the clinic site and intention to initiate PrEP.

Discussion

Findings in the context of the published literature.

We applied theory to guide the identification of multi-level factors shaping PrEP intentions among cisgender women and found that intention to initiate PrEP was associated with individual, community, and institutional-level socio-ecological factors among our sample of cisgender women seeking reproductive/sexual health care in an urban, high HIV prevalence US setting. Previous research has identified persistent low awareness as a barrier to equitable PrEP diffusion (Aaron et al., 2018; Auerbach, 2015; E. Bradley et al., 2019; Collier et al., 2017; Hill et al., 2020; Hull, 2012; Koren et al., 2018; Kwakwa et al., 2016; Ojikutu et al., 2018; Patel et al., 2019; Wingood et al., 2013). Consistent with this, the majority of cisgender women in this study were unaware of PrEP prior to their participation in this research. This is especially notable given that this research was conducted in a HIV hotspot among a sample of a population that experiences disparately high HIV incidence (Bowser et al., 2022); 9 out of 10 cisgender women who were diagnosed with HIV in the District of Columbia in 2020 were Black, despite Black women representing fewer than half of women in the District. Prior awareness of PrEP was not, however, associated with intention to initiate. Additionally, neither individual perceived risk nor the majority of HIV exposure behaviors that we measured were associated with intention to initiate PrEP. IDU and transactional sex, notably the highest risk behaviors, were the only behavioral exposures associated with intention to initiate PrEP among a minority of study participants. Conversely, on the individual level, both positive, preventive, and empowering perceptions of PrEP (i.e., attitudes) and greater perceived self-efficacy to take daily oral PrEP, even in the face of individual and interpersonal barriers, were associated with intention to initiate PrEP. Although assessed interpersonal level factors were not significant, on the community level, cisgender women who perceived higher acceptance of PrEP (i.e., higher likelihood of PrEP use among peers and lower concern for shame/stigma related to PrEP) were more likely to intend to initiate PrEP. On the level of the institution, our findings corroborate earlier publications reporting the importance of the role of the medical provider in cisgender women's intention to initiate PrEP (Aaron et al., 2018; Flash et al., 2017; Goparaju et al., 2017; Wingood et al., 2013). Finally, on the structural level, we did not find lower socioeconomic status nor insurance status to be barriers to intention to initiate PrEP; rather, we found that cisgender women with lower educational and income levels were more likely to intend to initiate PrEP.

Implications for Practice.

Given our findings, we integrate widely accepted psychosocial behavior change theorizing into an ecological model to gain insight into potential avenues for intervention to promote PrEP use in a population that is systematically underserved by PrEP (Siegler et al., 2018). Given significant findings on multiple socio-ecological levels, we accordingly advocate for multi-level interventions to improve engagement and retention in the PrEP cascade among cisgender women. On the individual and community level, our findings echo those

of Teitelman et. al. (2020) and indicate the importance of interventions not only focused on increasing awareness of PrEP among cisgender women, but specifically on messaging that emphasizes positive and preventive messaging around PrEP and both normalizes PrEP use and destigmatizes PrEP use for cisgender women. Although there is scant research on PrEP messaging among cisgender women, research among men who have sex with men (MSM) and transgender women empirically supports sex positive, preventive social marketing campaigns (Phillips et al., 2020). Additionally, as prior awareness of PrEP was not associated with intention to initiate PrEP, we hypothesize that raising awareness alone will not be sufficient to increase engagement in the PrEP cascade among this population. Beyond messaging, we advocate for integrated peer navigation as part of a multi-disciplinary approach to further address stigma by normalizing PrEP use and to bolster self-efficacy through PrEP counseling and peer support (Hull et al., 2022; Teitelman et al., 2021).

On the institutional level, our findings underscore the critically underutilized role of medical providers in HIV prevention and PrEP education, promotion, and provision for cisgender women (Aaron et al., 2018; Krakower & Mayer, 2016). As in the published literature, cisgender women identify provider support as both influential and logistically key to PrEP initiation (Aaron et al., 2018; Flash et al., 2017; Goparaju et al., 2017; Hull et al, 2022; Roth et al., 2019; Scott et al., 2020; Wingood et al., 2013). Notably, however, having been introduced to PrEP by a medical provider was not significantly associated with intention to initiate PrEP, yet *discussion* of PrEP with a provider was significantly associated. This finding highlights the critical importance for cisgender women of shared decision-making about PrEP with healthcare providers. It is insufficient that providers simply make women aware of PrEP (e.g., with posters, flyers, and pamphlets); raising awareness is necessary, but inadequate to increase utilization. Evidence from this study suggests that the *discussion* about PrEP, likely in relation to one's own sexual health situation, carries a great deal of influence in cisgender women's decision to use PrEP. Provider knowledge of and comfort with prescribing PrEP continues to lag across specialties (Blackstock et al., 2017; E. Bradley et al., 2019; Castel et al., 2015; Petroll et al., 2017), as echoed in a national survey of family planning providers (Seidman et al., 2016).

Despite the synergy of offering integrated PrEP services to reproductive-age cisgender women as part of sexual and reproductive health care services (Aaron et al., 2018; E. L. P. Bradley & Hoover, 2019; Seidman et al., 2018), most sexual and reproductive health clinics do not routinely counsel or offer PrEP (Sales et al., 2019). In addition to the barrier of low provider knowledge of PrEP, providers' implicit and explicit biases disadvantage cisgender women, as well as people of color and those who use substances or have low incomes, in the equitable provision of PrEP (Adams & Balderson, 2016; Calabrese et al., 2014). Research among providers in U.S. HIV hotspots demonstrated implicit racial biases in the prescription of PrEP to cisgender women; specifically, in clinical vignettes providers were less likely to prescribe PrEP to Black cisgender compared to White women due to concerns for low adherence (Hull et al., 2021). Given the importance of providers in PrEP initiation indicated by cisgender women and recognizing continued provider-level barriers, the authors suggest that clinical interventions to improve engagement in the PrEP cascade should widen their focus to include providers, including tailored educational interventions and toolkits to address knowledge deficits and enable equitable provision of PrEP. Lastly, we did not find

the structural barriers we anticipated, perhaps because of the availability and accessibility of PrEP in the select clinical settings where the research took place. In settings with less PrEP accessibility, trained peer navigators could address structural barriers in addition to social barriers.

Limitations.

Our questionnaire focused on intention to initiate rather than initiation and as questionnaires were anonymous, we are unable to correlate the socio-ecological factors associated with PrEP intention with actual PrEP uptake. This said, behavioral intention has been demonstrated to significantly correlate with behaviors in a wide range of behavioral domains (Sheeran, 2002). We acknowledge, however, that interpersonal and structural factors, which were not significant factors in intention to initiate PrEP, may become more pertinent in the actualization of PrEP initiation (i.e., moderate the intention-behavior relationship). This study was conducted in an HIV hotspot with Medicaid expansion, which facilitates the availability of free, same-day PrEP prescription. The results of this study are therefore limited in the extent to which they may be generalizable to settings with low access and availability of PrEP and where insurance coverage is relatively low. We anticipate that in settings with less PrEP accessibility, the determinants of intentions may vary. We also note that we did not adjust for multiple comparisons in the analysis.

Conclusions

The results of this study support the importance of multi-level clinic-based interventions for cisgender women that center on sex-positive and preventive messaging around PrEP, include peer navigation in the destigmatization of PrEP, and provide education and support to women's health providers to aid in the provision of PrEP.

Role of the Funding Source:

Data reported in this publication was supported by the National Center for Advancing Translational Sciences of the National Institutes of Health under Award Number UL1TR001409, National Institute on Drug Abuse under Award Number 1K01DA050496–01A1a, and an Investigator Sponsored Research Award from Gilead Sciences (ISR-17–10227). The funders had no role in the study design, collection, analysis, or interpretation of data, in the writing of the report or the decision to submit the article for publication. Drs. Rachel Scott, Shawnika Hull, and Jim Huang had full access to all the data and take responsibility for the integrity of the data and accuracy of the analysis.

The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

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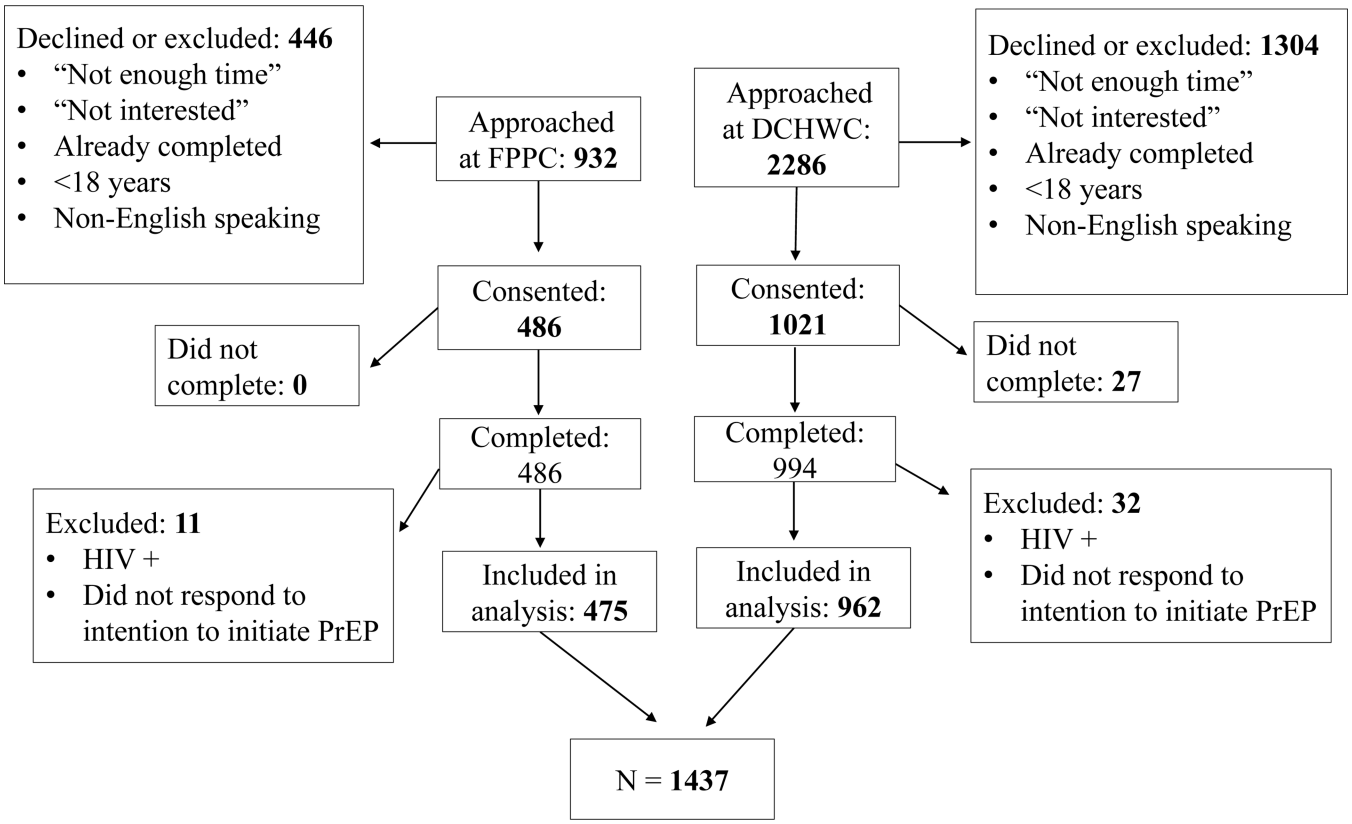

Figure 1.
Study Flow

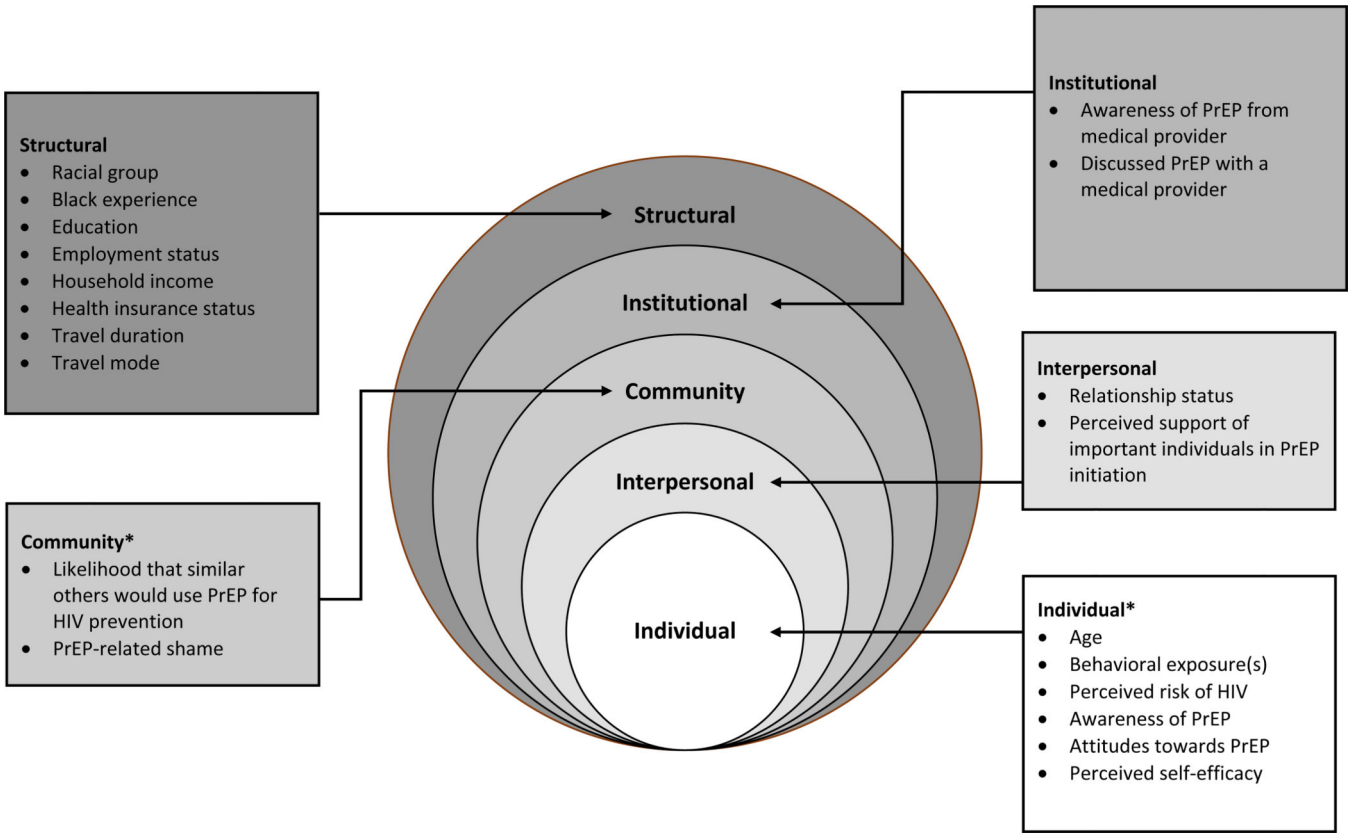

Figure 2.
Socio-ecological Model
*Variables at these levels were derived using the Reasoned Action Approach

Table 1.

Bivariate analysis of determinants of intention to initiate PrEP by socio-ecological level

Variables	Total (N=1437)	No intention to initiate PrEP (n= 1289)	Intention to Initiate PrEP (n=148)	P value
A. Individual				
Age	28.8±9.2	28.7±9.2	30.1±9.9	0.08
Behavioral exposure				
Injection Drug Use (lifetime; no/yes)	64(4.5)	51(4.0)	13(8.8)	0.02
Inconsistent Condom Use (never, rarely, or sometimes vs. always)	1020(71.0)	915(71.0)	105(70.9)	>.99
>2 Sex Partners (yes/no)	426(29.6)	371(28.8)	55(37.2)	0.04
Number of Behavioral Risk Factors – Median (10%, 90%)	2(0,3)	2(0,3)	2(1,4)	<.01
Recent History of STI (past 12 months)	208(14.5)	180(14.0)	28(18.9)	0.11
Casual Sex Partner(s) (current)	429(29.9)	373(28.9)	56(37.8)	0.03
Transactional Sex (past 12 months)	42(2.9)	33(2.6)	9(6.1)	0.03
Perceived Risk (Lifetime) (scale 1– 4)	1.6±0.7	1.6±0.7	1.7±0.7	0.63
Perceived Risk (Near Future) (scale 1– 4)	1.4±0.6	1.4±0.6	1.4±0.6	0.86
Awareness of PrEP				
Before today, have you ever heard of people who do not have HIV taking PrEP to reduce the risk of getting HIV? (no/yes)	541(39.0)	484(38.8)	57(40.7)	0.71
Attitudes				
Overall, would you say that using PrEP daily to prevent HIV is a good or a bad thing? (scale 1– 5)	4.1±1.0	4.0±1.0	4.6±0.9	<.01
Using daily PrEP to prevent HIV would make me feel in control of my health. (scale 1– 5)	3.8±1.2	3.7±1.2	4.4±1.1	<.01
PrEP is a safe way to prevent HIV infection. (scale 1– 5)	4.0±1.0	4.0±1.0	4.5±1.0	<.01
PrEP is an effective tool to prevent HIV infection. (scale 1– 5)	4.1±1.0	4.0±1.0	4.4±1.1	<.01
Perceived Self-Efficacy				
If I really wanted to, I could use PrEP daily for HIV prevention. (scale 1– 5)	4.0±1.1	3.9±1.2	4.5±1.0	<.01
If I really wanted to, I could remember to take the pill every day. (scale 1– 5)	4.0±1.2	3.9±1.2	4.4±1.1	<.01
If I really wanted to, I could take the pill every day, even if it gave me a stomachache. (scale 1– 5)	3.0±1.4	2.9±1.3	4.0±1.3	<.01
I could use PrEP for HIV prevention, even if my main partner didn't want me to. (scale 1– 5)	4.1±1.1	4.1±1.1	4.5±1.1	<.01
I just can't take pills.	2.0±1.3	2.0±1.3	1.7±1.2	<.01
B. Interpersonal				
Relationship Status				0.68
Married or Living Together	190(13.3)	171(13.3)	19(13.0)	
Divorced, Separated, or Widowed	84(5.9)	78(6.1)	6(4.1)	
Single or Never Married	1157(80.9)	1036(80.6)	121(82.9)	
Norms				

Variables	Total (N=1437)	No intention to initiate PrEP (n= 1289)	Intention to Initiate PrEP (n=148)	P value
Thinking about the people who are important to you — would they support or not support your using PrEP for HIV prevention in the next 12 months? (scale 1–5)	3.9±1.2	3.8±1.2	4.4±0.9	<.01
Top Five Important People (±10)				
Doctor	6.6±4.2	6.3±4.2	8.4±3.1	<.01
Main Sex Partner	5.2±4.9	4.9±4.9	7.7±3.5	<.01
Child	4.7±4.9	4.5±4.9	6.4±4.4	<.01
Best Friend	4.6±4.5	4.3±4.4	6.8±3.8	<.01
Sister	4.4±4.7	4.2±4.7	6.6±4.2	<.01
C. Community				
Thinking about people who are similar to you — how likely would they be to use PrEP for HIV prevention in the next 12 months? (scale 1– 5)	3.2±1.2	3.1±1.2	4.1±1.1	<.01
People would shame me if they learned that I was taking PrEP. (scale 1– 5)		2.0±1.1	1.8±1.2	<.01
D. Health System				
Heard about PrEP from a doctor[1]	148(27.4)	121(25.0)	27(47.4)	<.01
In the past 12 months, have you had a discussion with a healthcare provider about taking PrEP?[1]	120(22.3)	93(19.3)	27(48.2)	<.01
E. Structural				
Race				0.03
Black / African American	1050(74.8)	928(73.8)	122(84.1)	
White / Caucasian	144(10.3)	135(10.7)	9(6.2)	
Other / Multiple Races	209(14.9)	195(15.5)	14(9.7)	
Black Experience – Black/African American (Yes vs. No)	1050(74.8)	928(73.8)	122(84.1)	<.01
Education				<.01 [.01]
Less than 12th Grade	69(4.8)	56(4.4)	13(8.8)	
12th Grade or GED	413(28.8)	362(28.2)	51(34.7)	
Some college, Associate or Technical Degree	548(38.3)	489(38.1)	59(40.1)	
Bachelor's Degree	275(19.2)	260(20.2)	15(10.2)	
Graduate Studies	127(8.9)	118(9.2)	9(6.1)	
Employment Status				.10
Employed Full-Time	643(45.6)	583(46.1)	60(41.7)	
Employed Part-Time	296(21.0)	272(21.5)	24(16.7)	
Student	126(8.9)	113(8.9)	13(9.0)	
Unemployed, Homemaker, or Retired	344(24.4)	297(23.5)	47(32.6)	
Household Income				<.01 [.03]
0-$14,999	533(41.9)	472(41.3)	61(47.3)	
$15,000–29,999	228(17.9)	206(18.0)	22(17.1)	
$30,000–49,999	301(23.7)	263(23.0)	38(29.5)	
$50,000 or more	210(16.5)	202(17.7)	8(6.2)	

Variables	Total (N=1437)	No intention to initiate PrEP (n= 1289)	Intention to Initiate PrEP (n=148)	P value
Health insurance status (Insured vs. Uninsured)	1054(75.5)	947(75.6)	107(74.3)	0.76
Travel Duration (n=1331)				0.50
≤ 15 Minutes	335(25.2)	294(24.6)	41(30.4)	[0.07]
25–29 Minutes	577(43.4)	520(43.5)	57(42.2)	
30–44 Minutes	269(20.2)	242(20.2)	27(20.0)	
45–59 Minutes	96(7.2)	89(7.4)	7(5.2)	
≥60 Minutes	54(4.1)	51(4.3)	3(2.2)	
Travel Mode (n=1337)				0.93
Own car	502(37.6)	452(37.6)	50(37.0)	
Friend or Family Car	197(14.7)	178(14.8) 95(7.9)	19(14.1) 12(8.9)	
Bus	107(8.0)	161(13.4)	19(14.1)	
Metro	180(13.5)	14(1.2)	0(0)	
Bicycle	14(1.1)	52(4.3)	8(5.9)	
Walk	60(4.5)	250(20.8)	27(20.0)	
Car-share	277(20.7)			

Note: The P-values within the brackets were based on Cochran-Armitage Trend Test. Others were based on Fisher's Exact Test.

Table 2:

Multivariable logistic regression of intention to initiate PrEP on factors with significant bivariate associations

Variable	Adjusted Odds Ratio Estimate	95% Wald Confidence Interval	
Individual-level			
Behavioral Exposure (past 12 months)			
Injection Drug Use (Yes vs. No)	2.23	1.004	4.95
Casual Sex Partner (Yes vs. No)	1.15	0.72	1.83
>2 Sex Partners (Yes vs. No)	1.29	0.79	2.11
Transactional Sex (Yes vs. No)	2.59	1.03	6.48
Attitudes (1–5)[1]	1.56	1.13	2.15
Self-Efficacy (1–5) [1]	1.32	1.02	1.72
Interpersonal-level			
Global Injunctive Norm Score (1–5)[1]	1.15	0.90	1.47
Community-level			
Global Descriptive Norm Score (1–5) [1]	1.65	1.33	2.04
Health System-level			
Heard about PrEP from Health Care Provider (Yes vs. No)	1.28	0.64	2.53
Discussed Taking PrEP with a Health Care Provider (Yes vs. No)	2.39	1.20	4.75
Structural-level			
Race			
White (vs. African American)	1.04	0.45	2.45
Other (vs. African American)	0.79	0.40	1.56
Education (Years of Schooling)	0.85	0.76	0.96
Income Level			
$15k–29k (vs. 0–$14k)	0.90	0.49	1.65
$30k–49k (vs. $15k–29k)	1.63	0.87	3.07
>= $50k (vs. $30k–49k)	0.40	0.17	0.94

[1]The estimated odds ratio indicates the odds of behavioral intention to use for every one level increase in the score.