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# Psychosocial determinants of pre-exposure prophylaxis use among pregnant adolescent girls and young women in Cape Town, South Africa: A qualitative study

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## Abstract

**Background:** In South Africa, at least 7.5 million people (age  $\geq 15$  years) are living with Human Immunodeficiency Virus (HIV). In 2020, 220,000 new infections occurred, approximately one-third of which were among cisgender adolescent girls and women (age  $\geq 15$  years). The perspectives of pregnant adolescent girls and young women (AGYW) as key, targeted end-users of pre-exposure prophylaxis (PrEP) in this setting are not well known.

**Methods:** We purposively recruited participants enrolled in an ongoing cohort study at an urban antenatal clinic in Cape Town, South Africa for in-depth interviews between July–September 2020. We restricted our analysis to pregnant AGYW (age: 16–25 years) who initiated daily oral PrEP (Tenofovir/Emtricitabine) antenatally and self-reported either high PrEP persistence ( $\geq 25$  days in the past 30 days and no missed PrEP collection), or low PrEP persistence and/or discontinuation (missing  $>5$  days in the last 30 days or missed PrEP collection). The findings were organized thematically, per the adapted Health Behavior Model (2000), using *Nvivo-v.1.5*.

**Results:** We interviewed 18 AGYW (mean age = 22 years), at a mean of 14 weeks postpartum. Higher self-esteem and high-quality study provider–client relationships, including empathic psychosocial support, facilitated PrEP continuation. Reported barriers included unstable social structure characteristics (i.e., financial hardship) and individual factors (i.e., unintended pregnancy, parental rejection, and inadequate peer- and [non-cohabiting] partner support). Participants self-perceived a need for PrEP, feeling susceptible to non-consensual, forced sex, or considering partners' (presumed) sexual risk-taking. Limited community awareness regarding PrEP availability and/or perceived complexity in navigating health system access to PrEP, impede continuation.

**Conclusions:** PrEP-focused healthcare access pathways for pregnant and postpartum AGYW need to be simplified. Further research is needed on health system determinants (i.e., structural barriers, provider–client interactions, and related outcomes) of oral PrEP utilization. In 2022, South Africa announced regulatory approval of long-acting PrEP options (i.e., the dapivirine ring for non-pregnant women and injectable cabotegravir, respectively); these may mitigate implementation barriers reported in this study. However, the safety and efficacy of long-acting PrEP (e.g., injectables, implants) among pregnant or breastfeeding women, specifically, remains to be confirmed in this setting.

## Keywords

Adolescents, young women, Human Immunodeficiency Virus, pre-exposure prophylaxis, South Africa, sub-Saharan Africa

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## Introduction

Over half of HIV infections in sub-Saharan Africa occur among cisgender women.<sup>1</sup> In South Africa, at least 7.5 million adults (age  $\geq 15$  years) were living with HIV and 220,000 new infections occurred in 2020; approximately one-third of which were among cisgender adolescent girls and women (age  $\geq 15$  years).<sup>2,3</sup> There is evidence that the HIV acquisition risk increases over two-fold during pregnancy and postpartum.<sup>4,5</sup> HIV is associated with vertical and partner transmission, opportunistic infections, and increased morbidity and mortality.<sup>6</sup> Adolescent girls and young women (AGYW) may be predisposed to sexual and reproductive healthcare (SRH)-seeking hesitancy, especially if parental consent is thought to be required.<sup>7,8</sup> The South African National Antenatal HIV Sentinel Survey (2019), representative of pregnant women accessing antenatal care (ANC), reported that unintended pregnancy rates were markedly higher among adolescents (age: 15–19 years; 76%) and young women (age: 20–24 years; 57%), compared to older women (age: 35–49 years; 45%).<sup>8</sup> Of all women surveyed, 18% were married and 28% were cohabiting with their partner.<sup>8</sup> Younger age (15–19 years), single relationship status, and limited access to SRH respectively contribute to the intersectional issues of unintended pregnancy and HIV among AGYW in sub-Saharan Africa.<sup>9,10</sup>

Due to regular engagement with health services during maternal care, pregnant AGYW may be well-positioned to utilize daily oral pre-exposure prophylaxis (PrEP).<sup>3</sup> Their age range offers a window of opportunity to foster constructive SRH-norms, choices, and practices.<sup>11,12</sup> Previous clinical trial findings demonstrate that oral PrEP (tenofovir disoproxil fumarate, combined with emtricitabine [TDF/FTC]) is safe for utilization and well-tolerated among pregnant women, including AGYW.<sup>13</sup> Moreover, a recent systematic review of oral PrEP exposure among pregnant or breastfeeding women (PBFW) did not find differences in pregnancy- and infant health outcomes.<sup>14</sup> The World Health Organization (WHO) endorsed oral PrEP as highly effective and safe for utilization among PBFW and adolescents at substantial risk of HIV.<sup>15</sup> The South African National Guidelines (2020) for PrEP provision recommend offering oral PrEP to sexually active adolescents and PBFW.<sup>16</sup> Despite the change in guidelines, several important barriers to PrEP access and continuation exist, such as stigma and a perception of only episodic risk of possible HIV exposure and PrEP access in antenatal and postnatal care.<sup>17</sup> Such barriers necessitate the maintenance of high intrinsic motivation for daily oral PrEP persistence.

Whilst there are prior studies on daily oral PrEP continuation, the perspectives of pregnant AGYW as key, targeted end-users in this setting are unknown.<sup>18,19</sup> AGYW differ from older women, developmentally and with respect to biopsychosocial domains.<sup>3</sup> Biologically, AGYW demonstrate higher rates of (idiopathic) genital mucosal inflammation and an attributable 3-fold increase in their HIV acquisition risk.<sup>3,20</sup>

Psychosocially, AGYW are generally unmarried and display greater susceptibility to relational power imbalances, age-disparate or transactional relationships, sexual risk-taking, sexual violence, unintended pregnancy, and early school dropout.<sup>3,9,10</sup> Our study aimed to evaluate the psychosocial facilitators and barriers of PrEP utilization and self-reported persistence, as defined below, during pregnancy and postpartum among AGYW in Cape Town, South Africa.

## Methods

The PrEP in Pregnancy and Postpartum (PrEP-PP) study is an ongoing cohort study, comprised of 1,200 pregnant women who were recruited at an urban ANC facility in Cape Town. The inclusion criteria for the (parent) study enrolment were: age  $\geq 16$  years; pregnant at first ANC visit; seronegative for HIV and Hepatitis B at first ANC visit; no medical or psychiatric contraindications to oral PrEP utilization, and intention to give birth in Cape Town. PrEP-initiating participants received nurse-prescribed PrEP for daily oral administration. Quarterly follow-up was instituted for repeat prescriptions, HIV testing, and prevention counseling regarding HIV risks in pregnancy and postpartum and the risks and benefits of PrEP utilization. Each participant was followed up for the remainder of their gestation (once recruited) and then for 12 months, postpartum.

For this sub-study, we purposively recruited pregnant AGYW from the PrEP-PP study cohort between July–September 2020. The inclusion criteria were: age 16–25 years; initiated daily oral PrEP antenatally; delivered a live infant (once postpartum, with or without breastfeeding); remained enrolled in the PrEP-PP study for  $\geq 3$  months, and provided written, informed consent. The lower age limit was determined as a result of age  $< 16$  years precluding enrolment in the parent PrEP-PP study and for a larger sample size, we included AGYW  $\leq 25$  years of age. The final sample of interviewees ( $N = 18$ ) comprised all participants who met all inclusion criteria. We categorized (I) high PrEP persistence (HPP) as consistent, daily utilization for  $\geq 25$  days in the past 30 days and no missed PrEP collection; (II) low PrEP persistence (LPP) constituted missing doses for  $> 5$  days in the last 30 days or missed PrEP collection. These persistence categories were extrapolated from common definitions applied in other studies in the region.<sup>17,21–24</sup> Participants each received R100 (~USD6) grocery vouchers and R20 (~USD2) for transportation.

Individual, in-depth interviews were conducted with each participant postnatally, in a local language (isiXhosa), using a semi-structured interview guide. The guide was pre-developed per evidence-based categories of potential determinants of PrEP continuation, derived from a conceptual model by Ickovics and Meisler (1997).<sup>25</sup> The interviewer (female) is experienced with qualitative data capturing and had no prior familiarity with the participants, nor involvement with the data coding.

Fourteen (78%) interviews occurred telephonically during the national COVID-19 lockdown. The remainder ( $n = 4$ , 22%) were held privately within the health facility, with physical distancing and precautionary use of face-masks. Each interview took approximately 30–40 minutes and was recorded by audio- and post-interview field notes. Another trained research staff member transcribed the interview questions and responses verbatim and translated these to English. The interviewer reviewed the translated transcripts and amended these for accuracy, as required.

A research assistant, in collaboration with the Principal Investigator (PI) (DJD), analyzed the interview data repeatedly and retrospectively, using a framework approach. Data analysis comprised familiarization, iterative coding (by a single coder) using *Nvivo-v.1.5* (QRS International, Australia), charting, indexing, and mapping. Then, the transcripts were annotated and recurring themes identified and interpreted. The research assistant is a female South African; she received prior training on the utilization of *Nvivo-v.1.5*. Higher-order themes were elicited from an adapted version of Anderson's Health Behavior Model (2000).<sup>26,27</sup> Sub-themes, featuring in  $\geq 3$  different participant responses, were extracted to thematic saturation. The study PI (DJD) reviewed the codebook and full-length manuscript, verifying the accuracy and generalizability of findings, and advising on necessary changes. Results are presented per the COnsolidated criteria for REporting Qualitative research (COREQ).<sup>28</sup> A summary diagram of this qualitative sub-study execution is included (Supplement Figure-S2).

## Conceptual framework

An adapted version of Andersen's Health Behavior Model (2000) synthesizes the following overarching determinants of health service utilization among vulnerable populations, including adolescents: *predisposing factors* for health service utilization; a *self-perceived need* for healthcare, and *enabling or disabling factors* for healthcare uptake.<sup>26,27</sup> The Model is applied here with self-reported daily oral PrEP continuation as the *personal health practice* of interest; the inferred *outcome* is the prevention of possible HIV infection and (vertical) transmission<sup>27</sup> (Supplement Figure-S1).

## Results

We interviewed eighteen participants, at a mean of 14 weeks postpartum. At baseline, the mean age was 22 years and the mean gestational age 22 weeks at recruitment. At interviewing, participants had been in the PrEP-PP study for a mean of 32 weeks. Two participants (11%) were married and three (17%) were cohabiting and unmarried. Eleven participants (61%) were unemployed. (Supplement Table-S1)

Eleven participants (61%) self-reported high PrEP persistence and 7 (39%) displayed low PrEP persistence. In the latter group, some participants were intermittent users, occasionally taking PrEP.

We present the main psychosocial determinants of self-reported PrEP persistence below (Supplement Figure-S1, Table-S2).

### Predisposing motivators

**Self-esteem and self-efficacy.** Greater self-esteem was both a motivator and consequence of PrEP persistence. Several participants viewed PrEP utilization as an act of self-care and proactive healthcare uptake; this incentivized daily continuation, irrespective of any challenges. Because this prevention method does not rely on partner buy-in, most participants were confident that they would continue with implementation. Post counseling, they felt assured of their protection against possible HIV infection and (vertical) transmission, while on PrEP. Their demonstrated self-efficacy in persisting on PrEP daily enhanced self-esteem.

*"I was not worried about [stigma]; no matter how [others] would have reacted, I was not going to stop taking [PrEP] because it protects me and my baby."* – 19 years, (HPP)

*"...I was happy because I knew [my] boyfriend was cheating a lot and I was protecting myself, using PrEP."* – 21 years, (LPP)

### Predisposing barriers: Psychosocial stressors

#### Social structure characteristics

**Financial hardship.** Many participants were unemployed and financially dependent on their parents or partners. Some expressed anxiety about how they would cope financially with their pregnancy and foreseeable childcare responsibilities. These concerns constrained their self-efficacy in persisting on PrEP.

*"[B]oth my mother and I are not working, so I was frustrated about our [financial] situation...I didn't know what more I can do."* – 20 years, (LPP)

**Single relationship status.** Being young, most participants were unmarried and/or not in stable, long-term relationships with cohabiting partners. Several women described frequent conflict and arguments with partners as further stressors. Generally, they felt unsupported by their partner during pregnancy and postpartum and reported that this affected their PrEP continuation.

*"[My partner and I] were having fights sometimes and I would go home only to find [another] problem. So, these things were not [sitting] well with me."* – 19 years, (HPP)

*"I would feel like terminating the baby. All [my partner] cared about was wanting the baby but didn't care about what I wanted."* – 21 years, (LPP)

### Individual factors: Psychologic coping (modifiable)

**Partner or peer influence.** Being young and pregnant, several participants displayed heightened sensitivity to partner- and peer influence. Inadequate social support from partner and/or peers led them to feel socially isolated and discouraged to persist on PrEP. One participant felt despondent and excluded as a result of the opportunity cost to partake in common social activities (e.g., partying, socializing) of same-age peers.

*"I was sad and depressed because people were going out to have fun while I stay at home alone... Even my baby daddy [partner] would leave me alone and go out to have fun."* – 20 years, (LPP)

**Unintended pregnancy.** Several participants felt overwhelmed by unintended pregnancy. Faced with community stigmatization, their morale to persist on PrEP and regular follow-up diminished. Some contemplated terminating their pregnancy, as they were apprehensive about current and/or future socioeconomic challenges (e.g., social isolation, financial difficulty). These concerns hindered PrEP persistence.

*"I would wake up in the morning and decide to go to the clinic another day...Sometimes I had no money...[T]hings would make me sad quickly – maybe, if someone is dismissing me, or when [my partner] says he won't bring money. I would feel sad and want to terminate the pregnancy."* – 21 years, (LPP)

**Parental rejection or support.** Some participants faced parental rejection, in response to unintended pregnancy. Resultantly, they felt ill-equipped to continue on PrEP.

*"I didn't tell [my mother about the pregnancy]; I think she saw my [antenatal] clinic booklet...[S]he was very furious [and] asked me to take my bags and leave her house. I didn't even know where to go, I was crying and I didn't know what I was doing."* – 21 years, (LPP)

A few others explained that their parents (mother) were supportive of their PrEP utilization. Consequently, they felt more assured that they should persist on it.

*"[My mother] said I should take [PrEP]...and I should not mind anyone who says I have HIV [stigmatization]...[She said that PrEP] should not leave our home."* – 21 years, (LPP)

### Self-perceived need to utilize oral pre-exposure prophylaxis

**Control over sexual health status.** Many participants were vulnerable to non-consensual sex incidents with individuals of unknown serostatus, including within social settings

among peers. This prompted PrEP implementation, as a means to safeguard themselves against HIV.

*"[M]y decision [to take PrEP] was based on [incidents] happening around us...[W]e are being rap[ed] as young women...[On PrEP,] even if such would happen...I can be protected[.]"* – 25 years, (LPP)

One participant recounted feeling unsafe at a party; PrEP utilization conferred greater control over her sexual health status, as she felt protected against possible HIV acquisition.

*"...I told myself that he will not have sex with me...I was with my friends. I could see he wanted to win me, to have sex with me forcefully, but I escaped."* – 21 years, (LPP)

### Enabling or disabling factors

**Quality of provider-client relationship (enabler).** Most participants emphasized high satisfaction with the quality of healthcare received from the study counselors. Approachable attitudes, non-judgmentalism, and efficiency were reported quality-of-care elements, which facilitated PrEP persistence. Participants appreciated how the study counselors adapted healthcare provision to their individual needs; this extended to empathic psychosocial support provision, for stressors experienced beyond the study remit. The person-centered health service encouraged PrEP persistence.

*"[The counselors] asked about my [personal] issues or problem[s]... they would help me with these problems as well."* – 19 years, (HPP)

*"[The study staff] care about me...When I didn't have money to go [to the clinic], I would think about how much they care. Even when I am embarrassed about missing [appointments], they still care."* – 21 years, (LPP)

**Health system barriers to accessing pre-exposure prophylaxis-focused healthcare (disabler).** Several participants mentioned that beyond the study remit, there were gaps in PrEP provision and counseling, including for PBFW. Other reported access barriers related to a lack of community awareness about PrEP and resultant stigmatization surrounding PrEP utilization. Perceived complexity in navigating the health system, to the desired end of initiating PrEP, was also described. Such limitations in healthcare access prevent PrEP continuation post-study.

*"[M]any people don't know about PrEP...[Y]ou should allow everyone or any girl child starting from 16 or even 14 years of age to access PrEP...I wish [they] can be given PrEP here in this clinic because [elsewhere], they do not get all the information..."* – 16 years, (HPP)

*“I have heard that they have PrEP in public clinics but I know the complexities in the public clinics, which would make it difficult for us to get these tablets.” – 21 years, (LPP)*

## Discussion

We identified important psychosocial determinants of oral PrEP persistence among AGYW during pregnancy and postpartum. Higher self-esteem and high-quality provider-client relationships, including empathic biopsychosocial support, motivated PrEP continuation while pregnant. Participants self-perceived a need for oral PrEP, feeling susceptible to non-consensual sex incidents. Where supportive attitudes of parents (mother) prevailed, participants felt assured that they should persist on PrEP. They also described extensive barriers to daily continuation – i.e., financial hardship, unintended pregnancy, and parental rejection. Being young, participants displayed greater sensitivity to peer- or partner influence; exclusion by peers and/or inadequate support from respective, (non-cohabiting) partners hindered PrEP persistence. Generally, limited community awareness regarding PrEP availability and/or perceived complexity in navigating the health system to access oral PrEP, impede continuation.

Prior studies report a strong, self-perceived need among pregnant and non-pregnant women in sub-Saharan Africa for self- and/or infant protection against HIV.<sup>18,29,30</sup> In similar contexts, oral PrEP integration into SRH, and the agency and autonomy associated with its use, have encouraged persistence.<sup>29</sup> However, inconvenient access, low community awareness, and limited social support deter continuation.<sup>29</sup> Despite recent research, universal access to PrEP has not been established and is most limited among PBFW.<sup>19</sup> To expand access, community-based mobile clinics have been deployed.<sup>31</sup> Convenient access to mobile clinics – especially in locations where AGYW congregate (e.g., near schools) – has demonstrably strengthened provider-community-client relationships.<sup>31</sup> These results emphasize the value of integrating PrEP, coupled with prevention counseling on the importance of daily utilization, into routine SRH for AGYW.<sup>18,29,32</sup> Further, prevention counseling should be age- and developmentally appropriate, and tailored to individual client needs.<sup>33</sup>

Our study participants valued person-centered healthcare and greater control over their sexual health. Accordingly, offering PrEP to AGYW may represent a manner of individualizing preventative SRH.<sup>34</sup> Less anxiety about potential condom breaks and avoidance of interpersonal conflict in negotiating condom use with partners may underlie a preference for oral PrEP over condoms among AGYW in sub-Saharan Africa.<sup>35,36</sup> Notwithstanding these motivators, various unfavorable attributes of PrEP have been described.<sup>19</sup> These pertain to stigmatization, forgotten pill-taking, unpleasant pill size and taste, side effects, and fear of judgment by healthcare providers at clinic visits.<sup>19,37</sup>

To allay such barriers, AGYW have requested long-acting PrEP options in comparable settings.<sup>37</sup> Long-acting PrEP is preferred due to lower dosing intervals, the variety of product formulations (e.g., injectables, implants) available, minimal burden, and the “invisibility” of utilization.<sup>38,39</sup> Critically, due consideration of end-user preferences and emphasis on empathy may foster trust in provider-client interactions and facilitate PrEP continuation.<sup>37–44</sup> Additionally, parental rejection may lead to social isolation and greater health risks.<sup>7,38,45</sup> Hence, holistic, biopsychosocial support provision at points of PrEP-focused healthcare for pregnant and postpartum AGYW is imperative.

Single relationship status may predispose AGYW to PrEP utilization. Comparable studies reflect that end-users have a high risk perception, concerning (non-cohabiting) partners’ presumed sexual risk-taking and/or unknown serostatus.<sup>18,44</sup> Serodiscordant relationships and perceptions of PrEP utilization as a measure of self-care for personal or infant wellbeing, have been characterized as other possible, underlying reasons for PrEP persistence.<sup>30,34,44</sup> The latter reasoning is consistent with our study findings and may relate to maintaining optimal health for the pursuit of personal aspirations and/or childcare.<sup>30,34</sup>

In 2022, Zimbabwe was the first African country to announce regulatory approval of long-acting, injectable cabotegravir for HIV prevention.<sup>40</sup> The South African Health Products Regulatory Authority also approved long-acting PrEP (i.e., WHO-endorsed, injectable cabotegravir for “people at substantial risk of HIV infection” and the dapivirine ring for non-pregnant women  $\geq 18$  years, respectively) for utilization.<sup>41,42</sup> However, the approval status of injectable PrEP for PBFW has not yet been stated categorically.<sup>41,42</sup> Following these developments, our study highlights a need to optimize PrEP roll-out programs relative to uptake determinants. Among the low persistence group, self-esteem and greater control over sexual health were the main motivators of implementation; whereas, financial hardship, health system barriers, and inadequate partner- or peer support were chief deterrents. Comparatively, the primary motivator in the high persistence group was high-quality healthcare from the study counselors; whereas, no single deterrent predominated. These results suggest that for optimized continuation on PrEP, roll-out programs need to promote: (i) effective, timely (antenatal) PrEP-focused healthcare provision, which emphasizes how PrEP can prevent HIV acquisition and transmission; (ii) empathic counseling that improves self-confidence to persist on PrEP and which recognizes the distinct stressors (e.g., social isolation) that pregnant AGYW commonly experience, and (iii) simplified health system access pathways to PrEP-centric healthcare.

Our study has some limitations. It relied on convenience sampling for participant recruitment, and may be less generalizable to pregnant AGYW, elsewhere in

South Africa or sub-Saharan Africa. Because the data were analyzed retrospectively, there was no opportunity to contemporaneously clarify participant responses or source missing information, especially among those who displayed low PrEP persistence – ostensibly, a special-interest population for targeted public health intervention. Social desirability may have influenced participants' self-reporting of PrEP continuation.

Future studies should focus on identifying health system determinants of PrEP persistence, in terms of structural barriers, provider-client interactions, related health outcomes (e.g., continuation rates), and strategies to optimize these accordingly. Implementation research on long-acting PrEP options, which may mitigate stigma and structural barriers to daily pill-taking and monthly clinic visits, is urgently needed.

## Conclusions

We identified several psychosocial determinants of oral PrEP utilization among pregnant and postpartum AGYW in this setting. Self-esteem, parental support, and high-quality provider-client relationships, encompassing empathic biopsychosocial support provision, promote PrEP persistence. Conversely, unstable social structure characteristics (i.e., financial hardship) and inadequate social support (i.e., unintended pregnancy, parental rejection, and single relationship status) were key impediments to PrEP continuation in this population. AGYW perceived a need to take PrEP, feeling susceptible to forced sex and rape. Women reported that clinic-based PrEP services were limited in quality and access, especially while pregnant or breastfeeding; more research is needed to improve PrEP services for pregnant and postpartum AGYW. In 2022, South Africa announced regulatory approval of long-acting PrEP options (dapivirine ring for non-pregnant women and injectable cabotegravir, respectively); these may mitigate reported structural barriers to daily PrEP pill-taking. However, the safety and efficacy of long-acting PrEP (e.g., injectables, implants) among PBFW, specifically, remains to be confirmed in this setting.

## Appendix

### Abbreviations

•AGYW	– Adolescent girls and young women
•AIDS	– Acquired Immunodeficiency Syndrome
•ANC	– Antenatal care
•ARVs	– Antiretroviral agents
•CMHC	– Community-based mobile health clinic
•COREQ	– CO <sup>n</sup> solidated criteria for RE <sup>p</sup> orting Qualitative research checklist
•COVID-19	– Coronavirus disease-2019

•FTC	– Emtricitabine (Antiretroviral agent)
•HPP	– High PrEP persistence
•HIV	– Human Immunodeficiency Virus
•IRB	– Institutional Review Board
•LPP	– Low PrEP persistence
•PBFW	– Pregnant or breastfeeding women
•PI	– Principal Investigator
•PrEP	– Pre-exposure Prophylaxis
•PrEP-PP	– PrEP in Pregnancy and Postpartum (Cohort study)
•R	– South African Rand (Local currency)
•SRH	– Sexual and reproductive healthcare
•TDF	– Tenofovir disoproxil fumarate (Antiretroviral agent)
•TDF/FTC	– Tenofovir disoproxil fumarate, combined with Emtricitabine (Antiretroviral agent)
•USD	– U.S. Dollar
•WHO	– World Health Organization.

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### Authors' contributions

**SH:** Retrospective, iterative analysis of the interview transcript data, coding of transcript data, thematic analysis, writing of the manuscript, editing of consecutive manuscript drafts, revision and approval of final manuscript. **NK:** Review of consecutive manuscript drafts, suggestions on required amendments and edits, and review and approval of final versions of the manuscript. **RM:** Data management, quality control management, and review and approval of final versions of the manuscript. **NM:** Implementation of study methods, review of study data for quality, and approval of final versions of the manuscript. **L-GB:** Conceptualization of original study and approval of final versions of the manuscript. **PG:** Conceptualization of original study and approval of final versions of the manuscript. **TJC:** Conceptualization of original study and approval of final versions of the manuscript. **LM:** Conceptualization of original study and approval of final versions of the manuscript. **DJD:** Conceptualization of original study; conducted the parent- and sub-study; review and editing of consecutive drafts of the manuscript, including the study methods, results, analysis (codebook, thematic analysis), and all revisions; advice on required amendments to the manuscript, and review and approval of final manuscript.

### Declaration of conflicting interests

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### Ethics approval

The University of Cape Town (#297/2018) and the University of California Los Angeles Institutional Review Board (IRB#18-001, 622) approved the study. All participants provided written informed consent at enrolment.

### Informed consent

All participants provided written informed consent per the University of Cape Town Human Research Ethics Committee and the University of California Los Angeles Institutional Review Board, and the data presented here is de-identified.

### Data availability

Data are available on request to [djosephdavey@mednet.ucla.edu](mailto:djosephdavey@mednet.ucla.edu)

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### Supplemental Material

Supplemental material for this article is available online.

### References

1. Joint United Nations Programme on HIV/AIDS (UNAIDS). *2021 UNAIDS global AIDS update — confronting inequalities — lessons for pandemic responses from 40 years of AIDS*, Geneva, Switzerland: Joint United Nations Programme on HIV/AIDS (UNAIDS), 2021. [Internet]. 14 July 2021. [Accessed 2022 Mar 27]; Available from: <https://www.unaids.org/en/resources/documents/2021/2021-global-aids-update>.
2. Joint United Nations Programme on HIV/AIDS (UNAIDS). *Country factsheets. South Africa 2020* [Internet]. 2022. [Accessed 2022 May 1]; Available from: <https://www.unaids.org/en/regionscountries/countries/southafrica>.
3. Abdool Karim Q, Baxter C and Bix D. Prevention of HIV in adolescent girls and young women: key to an AIDS-free generation. *J Acquir Immune Defic Syndr* 2017; 75(Suppl 1): S17–S26. DOI: [10.1097/QAI.0000000000001316](https://doi.org/10.1097/QAI.0000000000001316).
4. Drake AL, Wagner A, Richardson B, et al. Incident HIV during pregnancy and postpartum and risk of mother-to-child HIV transmission: a systematic review and meta-analysis. *PLoS Med* 2014; 11(2): e1001608. DOI: [10.1371/journal.pmed.1001608](https://doi.org/10.1371/journal.pmed.1001608).
5. Maskew M, Bor J, MacLeod W, et al. Adolescent HIV treatment in South Africa's national HIV programme: a retrospective cohort study. *Lancet HIV* 2019; 6(11): e760–e768. DOI: [10.1016/S2352-3018\(19\)30234-6](https://doi.org/10.1016/S2352-3018(19)30234-6).
6. McCluskey SM, Siedner MJ and Marconi VC. Management of virologic failure and HIV drug resistance. *Infect Dis Clin North Am* 2019; 33(3): 707–742. DOI: [10.1016/j.idc.2019.05.004](https://doi.org/10.1016/j.idc.2019.05.004).
7. Ahinkorah BO, Kang M, Perry L, et al. Prevalence of first adolescent pregnancy and its associated factors in sub-Saharan Africa: a multi-country analysis. *PLoS One* 2021; 16(2): e0246308. DOI: [10.1371/journal.pone.0246308](https://doi.org/10.1371/journal.pone.0246308).
8. Woldesenbet S, Kufa T, Lombard C, et al. The prevalence of unintended pregnancy and its association with HIV status among pregnant women in South Africa, a national antenatal survey, 2019. *Sci Rep* 2021; 11(1): 23740. DOI: [10.1038/s41598-021-03096-z](https://doi.org/10.1038/s41598-021-03096-z). Accessed 2022 Mar 7.
9. Ahinkorah BO. Individual and contextual factors associated with mistimed and unwanted pregnancies among adolescent girls and young women in selected high fertility countries in sub-Saharan Africa: A multilevel mixed effects analysis. *PLoS One* 2020; 15(10): e0241050. DOI: [10.1371/journal.pone.0241050](https://doi.org/10.1371/journal.pone.0241050). [Internet][Accessed 2022 Mar 7]. Available from:..
10. Yah CS, Ndlovu S, Kutwayo A, et al. The prevalence of pregnancy among adolescent girls and young women across the Southern African development community economic hub: a systematic review and meta-analysis. *Health Promot Perspect* 2020; 10(4), pp. 325–337. DOI: [10.34172/hpp.2020.51](https://doi.org/10.34172/hpp.2020.51). (Accessed 2022 Mar 7).
11. Joint United Nations Programme on HIV/AIDS (UNAIDS). *Women and HIV: a spotlight on adolescent girls and young women*. 2019. [Internet]. [Accessed 2021 Nov 12]; Available from: [https://www.unaids.org/sites/default/files/media\\_asset/2019\\_women-and-hiv\\_en.pdf](https://www.unaids.org/sites/default/files/media_asset/2019_women-and-hiv_en.pdf).
12. United Nations Children's Fund (UNICEF). *UNICEF programme guidance for the second decade: programming with and for adolescents* [Internet]. 2018. [Accessed 2021 Nov 12]; Available from: <https://www.unicef.org/media/57336/file>.
13. Gill K, Johnson L, Dietrich J, et al. Acceptability, safety, and patterns of use of oral tenofovir disoproxil fumarate and emtricitabine for HIV pre-exposure prophylaxis in South African adolescents: an open-label single-arm phase 2 trial. *Lancet Child Adolesc Health* 2020; 4(12): 875–883. DOI: [10.1016/S2352-4642\(20\)30248-0](https://doi.org/10.1016/S2352-4642(20)30248-0). Accessed 2022 Apr 18.
14. Joseph Davey DL, Pintye J, Baeten JM, et al. Emerging evidence from a systematic review of safety of pre-exposure prophylaxis for pregnant and postpartum women: where are we now and where are we heading? *J Int AIDS Soc* 2020; 23(1): e25426. DOI: [10.1002/jia2.25426](https://doi.org/10.1002/jia2.25426). Accessed 2022 Apr 18.
15. World Health Organization (WHO). *WHO global HIV programme pre-exposure prophylaxis. (PrEP)* [Internet]. 2022. [Accessed 2022 Apr 18]; Available from: <https://www.who.int/teams/global-hiv-hepatitis-and-stis-programmes/hiv/prevention/pre-exposure-prophylaxis>.



16. South African National Department of Health. *South African Guidelines for the provision of pre-exposure prophylaxis. (PrEP) to persons at substantial risk of HIV infection [Internet]*. 2020. [Accessed 2022 May 14]; Available from: <https://www.prepwatch.org/resource/south-african-guidelines-prep-2020/>.
17. Pintye J, O'Malley G, Kinuthia J, et al. Influences on early discontinuation and persistence of daily oral PrEP use among Kenyan adolescent girls and young women: a qualitative evaluation from a PrEP implementation program. *J Acquir Immune Defic Syndr* 2021; 86(4): e83–e90. DOI: [10.1097/QAI.0000000000002587](https://doi.org/10.1097/QAI.0000000000002587). (Accessed 2022 Apr 18).
18. Joseph Davey DL, Knight L, Markt-Maloney J, et al. Had made the decision, and no one was going to stop me—facilitators of PrEP adherence during pregnancy and postpartum in Cape Town, South Africa. *AIDS Behav* 2021; 25(12): 3978–3986. DOI: [10.1007/s10461-021-03320-x](https://doi.org/10.1007/s10461-021-03320-x).
19. Beesham I, Dovel K, Mashele N, et al. Barriers to oral HIV Pre-exposure Prophylaxis (PrEP) adherence among pregnant and post-partum women from Cape Town, South Africa. *AIDS Behav* 2022; 26(9): 3079–3087. DOI: [10.1007/s10461-022-03652-2](https://doi.org/10.1007/s10461-022-03652-2). [Accessed Available from: .]
20. Masson L, Passmore JA, Liebenberg LJ, et al. Genital inflammation and the risk of HIV acquisition in women. *Clin Infect Dis* 2015; 61(2): 260–269. DOI: [10.1093/cid/civ298](https://doi.org/10.1093/cid/civ298). (Accessed 2022 Aug.15).
21. Celum CL, Bukusi EA, Bekker LG, et al. PrEP use and HIV seroconversion rates in adolescent girls and young women from Kenya and South Africa: the POWER demonstration project. *J Int AIDS Soc* 2022; 25(7): e25962. DOI: [10.1002/jia2.25962](https://doi.org/10.1002/jia2.25962). Available from: .
22. Celum C and Baeten J. PrEP for HIV prevention: evidence, global scale-up, and emerging options. *Cell Host Microbe* 2020; 27(4): 502–506. DOI: [10.1016/j.chom.2020.03.020](https://doi.org/10.1016/j.chom.2020.03.020).
23. Moran A, Mashele N, Mvududu R, et al. Maternal PrEP use in HIV-uninfected pregnant women in South Africa: role of stigma in PrEP initiation, retention and adherence. *AIDS Behav* 2022; 26(1): 205–217. DOI: [10.1007/s10461-021-03374-x](https://doi.org/10.1007/s10461-021-03374-x).
24. Baeten JM, Haberer JE, Liu AY, et al. Preexposure prophylaxis for HIV prevention: where have we been and where are we going? *J Acquir Immune Defic Syndr* 2013; 63(Suppl 2): S122–S129. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3710117/>
25. Ickovics JR and Meisler AW. Adherence in AIDS clinical trials: a framework for clinical research and clinical care. *J Clin Epidemiol* 1997; 50(4): 385–391. DOI: [10.1016/s0895-4356\(97\)00041-3](https://doi.org/10.1016/s0895-4356(97)00041-3).
26. Andersen R. *A behavioral model of families' use of health services*. Chicago: Center for Health Administration Studies, University of Chicago, 1968. Available from: <https://www.cabdirect.org/cabdirect/abstract/19702701913>
27. Gelberg L, Andersen RM and Leake BD. The Behavioral Model for Vulnerable Populations: Application to medical care use and outcomes for homeless people. *Health Serv Res* 2000; 34(6): 1273–1302. [Accessed 2022 Apr 19] Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1089079/>
28. Tong A, Sainsbury P and Craig J. Consolidated criteria for reporting qualitative research (COREQ): A 32-item checklist for interviews and focus groups. *Int J Qual Health Care* 2007; 19(6): 349–357. [Internet][Accessed 2022 Feb 13]; 19 Available from: DOI: [10.1093/intqhc/mzm042](https://doi.org/10.1093/intqhc/mzm042).
29. Rousseau E, Katz AWK, O'Rourke S, et al. Adolescent girls and young women's PrEP-user journey during an implementation science study in South Africa and Kenya. *PLoS One* 2021; 16(10): e0258542. [Internet][Accessed 2022 Mar 24]. Available from: DOI: [10.1371/journal.pone.0258542](https://doi.org/10.1371/journal.pone.0258542).
30. Bjertrup PJ, Mmema N, Dlamini V, et al. PrEP reminds me that I am the one to take responsibility of my life": A qualitative study exploring experiences of and attitudes towards pre-exposure prophylaxis use by women in Eswatini. *BMC Public Health* 2021; 21(1): 727. DOI: [10.1186/s12889-021-10766-0](https://doi.org/10.1186/s12889-021-10766-0). (Accessed 2022 May 14).
31. Rousseau E, Bekker LG, Julies RF, et al. A community-based mobile clinic model delivering PrEP for HIV prevention to adolescent girls and young women in Cape Town, South Africa. *BMC Health Serv Res* 2021; 21(1): 888. DOI: [10.1186/s12913-021-06920-4](https://doi.org/10.1186/s12913-021-06920-4). [Accessed 2022 Apr 30] Available from: .
32. Kinuthia J, Pintye J, Abuna F, et al. Pre-exposure prophylaxis uptake and early continuation among pregnant and postpartum women within maternal and child health clinics in Kenya: results from an implementation programme. *Lancet HIV* 2020; 7(1): e38–e48. DOI: [10.1016/S2352-3018\(19\)30335-2](https://doi.org/10.1016/S2352-3018(19)30335-2). Accessed 2022 May 14] Available from: .
33. Giovenco D, Gill K, Fynn L, et al. Experiences of oral pre-exposure prophylaxis (PrEP) use disclosure among South African adolescent girls and young women and its perceived impact on adherence. *PLoS One* 2021; 16(3): e0248307. DOI: [10.1371/journal.pone.0248307](https://doi.org/10.1371/journal.pone.0248307). (Accessed 2022 Apr 30).
34. Barnighausen KE, Matse S, Kennedy CE, et al. This is mine, this is for me": preexposure prophylaxis as a source of resilience among women in Eswatini. *AIDS* 2019; 33(Suppl 1): S45–S52. DOI: [10.1097/QAD.0000000000002178](https://doi.org/10.1097/QAD.0000000000002178). [Accessed 2022 May 14]. Available from: .
35. Iruengu EM, Ngure K, Mugwanya KK, et al. "Now that PrEP is reducing the risk of transmission of HIV, why then do you still insist that we use condoms?" the condom quandary among PrEP users and health care providers in Kenya. *AIDS Care* 2021; 33(1): 92–100. DOI: [10.1080/09540121.2020.1744507](https://doi.org/10.1080/09540121.2020.1744507).
36. Camlin CS, Koss CA, Getahun M, et al. Understanding demand for PrEP and early experiences of PrEP use among young adults in rural Kenya and Uganda: a qualitative study. *AIDS and Behavior* 2020; 24(7): 2149–2162. DOI: [10.1007/s10461-020-02780-x](https://doi.org/10.1007/s10461-020-02780-x). (Accessed 2022 May 14).
37. Muhumuza R, Ssemata AS, Kakande A, et al. Exploring perceived barriers and facilitators of PrEP uptake among young people in Uganda, Zimbabwe, and South Africa. *Arch Sex Behav* 2021; 50(4): 1729–1742. DOI: [10.1007/s10508-020-01880-y](https://doi.org/10.1007/s10508-020-01880-y). Accessed Available from: 2022 Apr 19.
38. Minnis AM, Atujuna M, Browne EN, et al. Preferences for long-acting Pre-Exposure Prophylaxis (PrEP) for HIV prevention among South African youth: results of a discrete choice experiment. *J Int AIDS Soc* 2020; 23(6): e25528. DOI: [10.1002/jia2.25528](https://doi.org/10.1002/jia2.25528). Accessed 2022 May 22.
39. Montgomery ET, Atujuna M, Krogstad E, et al. The invisible product: preferences for sustained-release, long-

- acting pre-exposure prophylaxis to HIV among South African youth. *J Acquir Immune Defic Syndr* 2019; 80(5): 542–550.
40. World Health Organization (WHO). *Zimbabwe is the first country in Africa to announce regulatory approval for long-acting injectable cabotegravir for HIV prevention [Internet]*. 2022. [Accessed 2022 Dec 13]; Available from:<https://www.who.int/news/item/01-11-2022-zimbabwe-first-country-in-africa-announced-regulatory-approval-for-long-acting-injectable-cabotegravir-for-hiv-prevention>.
  41. South African Health Products Regulatory Authority (SAHPRA). *SAHPRA registers new long-acting HIV pre-exposure prophylaxis*. 2022. [Accessed 2022 Dec 13]; Available from:<https://www.sahpra.org.za/press-releases/sahpra-registers-new-long-acting-hiv-pre-exposure-prophylaxis/>.
  42. International Partnership for Microbicides. *South Africa approves dapivirine vaginal ring for use by women [Internet]*. 2022. [Accessed 2022 Dec 13]; Available from:<https://www.ipmglobal.org/content/south-africa-approves-dapivirine-vaginal-ring-use-women>.
  43. Flickinger TE, Saha S, Roter D, et al. Clinician empathy is associated with differences in patient-clinician communication behaviors and higher medication self-efficacy in HIV care. *Patient Educ Couns* 2016; 99(2): 220–226. DOI: 10.1016/j.pec.2015.09.001. Accessed 2022 May 24.
  44. Joseph Davey DL, Mvududu R, Mashele N, et al. Early pre-exposure prophylaxis (PrEP) initiation and continuation among pregnant and postpartum women in antenatal care in Cape Town, South Africa. *J Int AIDS Soc* 2022; 25(2): e25866. DOI: 10.1002/jia2.25866. (Accessed 2022 Mar 24).
  45. Rupp R and Rosenthal SL. Parental influences on adolescent sexual behaviors. *Adolesc Med State Art Rev* 2007; 18(3): 460–470. [Accessed 2022 Mar 8]. vi Available from:<https://pubmed.ncbi.nlm.nih.gov/18453227/>