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# Perceptions of the attributes of new long-acting HIV pre-exposure prophylaxis formulations compared with a daily, oral dose among South African young women: a qualitative study

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## ABSTRACT

Oral PrEP is highly effective against the acquisition of HIV but is underutilised by young women. New options, like the monthly dapivirine vaginal ring (DVR) and injectable long-acting cabotegravir (CAB-LA), are emerging. However, little is known about young women's perceptions of these alternatives. This qualitative study explored perceptions of the attributes of PrEP technologies in South Africa. Young women accessing sexual health services were purposively selected to participate in 22 in-depth interviews, five focus group discussions and two workshops using the nominal group technique, between August 2022 and March 2023. A thematic approach guided by the diffusion of innovation attributes, including relative advantage, compatibility with the student's lives, complexity of the technology, and trialability, was used for data analysis. The DVR was the least preferred because of lower efficacy, the perceived complexity of inserting it in the vagina and some safety concerns. Oral PrEP, which some had tried and discontinued, was least compatible with students' busy schedules. Integrating PrEP and contraceptives with similar return visit patterns could enhance service delivery. Intensive demand creation campaigns will be needed to increase PrEP utilisation and dispel myths about the vaginal ring.

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## SUSTAINABLE DEVELOPMENT GOALS

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## Introduction

HIV prevalence remains high despite decades of implementing HIV prevention interventions. Adolescent girls and young women (AGYW) [15–24 years] are particularly vulnerable to the acquisition of HIV (Pettifor et al., 2021). In South Africa, about a third of new infections are reported among this age group and HIV is mainly transmitted heterosexually (Simbayi et al., 2019). There are several challenges with existing HIV prevention methods, such as condoms, medical male circumcision and abstinence, among others. Women often have limited agency to use these methods and voluntary medical circumcision among men has not reached the levels of uptake to protect them from HIV (Hamidi, 2022; Masese et al., 2021). Young people generally struggle to consistently and correctly use condoms (Luecke et al., 2016). Power imbalances in sexual relationships limit young women's power in HIV prevention, especially in negotiating condom use (Closson

et al., 2022; Singer et al., 2023). Pre-exposure prophylaxis (PrEP), therefore, gives young women power over HIV prevention. Currently, available PrEP methods are all ARV-based.

Oral PrEP is highly effective in preventing new HIV infections in South Africa. Its efficacy in clinical trials was over 90% (Celum et al., 2019). Oral PrEP became available in South Africa in 2016. It was first made available to key populations, such as sex workers and men who have sex with men (Pillay et al., 2020). In 2017, it became available to AGYW, including students at selected tertiary institutions (Pillay et al., 2020). However, despite its availability, young women often struggle to take the daily oral PrEP pill, and the continuation remains low (Chebet et al., 2023). PrEP uptake remains low, estimated at 20% in two implementation studies (Kinuthia et al., 2020). Long-acting PrEP technologies like the injectable long-acting cabotegravir (CAB-LA) and the monthly dapivirine vaginal ring (DVR) have recently become

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available through several demonstration studies around the country.

PrEP technologies come in different forms and offer varied levels of protection against HIV. In addition, they have different forms of administration. CAB-LA is an injectable ARV administered bi-monthly, intramuscularly, for HIV-negative people. It is also over 90% effective in preventing HIV infections (Donnell et al., 2023). In the HPTN 084 trial, which looked at the HIV prevention efficacy of CAB-LA compared to oral PrEP, CAB-LA proved to be superior to oral PrEP, with nine times fewer HIV infections reported among CAB-LA users compared to oral PrEP users (Delany-Moretlwe et al., 2022). DVR is a novel, woman-centred, long-acting HIV prevention method (Bhavaraju et al., 2021). The ring is made of silicon and acts by slowly releasing the ARV, dapivirine. It can be self-administered intravaginally for 28 days, working at the site of potential infection and use can be discreet (Bhavaraju et al., 2021). DVR reduced HIV infection risk by 27% overall and by 56% in women older than 21 years in the ASPIRE study (Baeten et al., 2016). In the Ring study, HIV incidence was reduced by 31% overall and by 37% among women older than 21 years (Baeten et al., 2016). Comparatively, the DVR efficacy is lower than that of CAB-LA and oral PrEP. DVR has received approval from the South Africa Health Products Regulatory Authority (SAHPRA) and is now available through selected study sites. However, little is known about how young women perceive these PrEP products, and perceptions will inform demand-creation activities. We explored young women's preferences and willingness to use these new PrEP technologies.

Accounting for user preferences is crucial in developing new HIV prevention interventions (Browne et al., 2020). Gathering young people's perceptions on long-acting methods has the potential to increase their acceptability and provides an opportunity to influence product uptake. By soliciting young women's perceptions of the new long-acting PrEP methods, the messaging and provider training can be adapted.

Delivering the different PrEP technologies will require different promotion efforts to increase uptake, and these new products' perceptions can be understood through the diffusion of innovations (DOI) analytic framework. The DOI has been used in fields such as agriculture, social work and public health, especially in nursing, to introduce new practices, policies, interventions or technologies (Dearing, 2009; Lin et al., 2016; Putteeraj et al., 2022; Scott et al., 2008; Zhang et al., 2015). The attributes include relative advantage, compatibility, complexity, trialability and observability. DOI was also

applied in a study that looked at adolescents' perceptions of the attributes of a long-acting reversible contraceptive method (Murphy et al., 2017). The perceptions of the attributes of the innovation, in this case, the new PrEP technologies, influence the adoption rate in a social system (Rogers, 2003). We therefore aimed to explore young women's perceptions of the attributes of these new PrEP technologies and how these could influence willingness to use PrEP.

## Materials and methods

We conducted an exploratory, formative qualitative study to explore young women's preferences and willingness to use these new PrEP technologies between August 2022 and March 2023. The new technologies include CAB-LA and DVR.

The study was conducted in the City of Tshwane, Gauteng Province of South Africa. The poverty rate in Tshwane stands at 31.3%, according to the City of Tshwane poverty profiling (South African Government, 2020). The selected institutions are in a township where 99.2% of the population comprises Black Africans (Wikipedia, 2022). The area is also highly populated and contains some informal settlements. We purposively selected two tertiary institutions, a university and a Technical and Vocational Education and Training (TVET) college. Both tertiary institutions were mainly government-funded. Mobile clinics frequently visit the two sites providing sexual and reproductive health services (SRH). The SRH services provided included screening for sexually transmitted infections, contraceptive services and oral PrEP for HIV prevention. These services are financed through external donor funding and provided to students free of charge.

Young, sexually active women who had used a contraceptive method and were aged 18–24 years were invited to take part in Focus Group Discussions (FGDs), In-Depth Interviews (IDIs) and workshops. Those who had participated in FGDs and consented were later invited to participate in a workshop at two tertiary institutions.

Two trained female field workers recruited 18–24-year-old young women for FGDs, IDIs and workshops. The data collectors explained the aim of the study to the participants at the campus clinic waiting area, the college campus, and the mobile clinics. Also, they provided information about the different PrEP technologies before asking questions. Participants with some experience in using contraceptive methods were purposively selected. They were recruited from the campus clinic waiting area, mobile

clinics, and the college campus. Study information was provided to students at the campus clinics and on a college campus, where trained female data collectors addressed students in groups, and those interested volunteered to participate.

All participants were given the demonstration DVR to feel and touch it. In addition, they also viewed a video demonstrating how DVR should be inserted. PS and the two trained data collectors pre-tested the tools. Pre-testing of the interview guides was done to check if participants understood the questions and also to determine the duration of the interviews and the participants' understanding of the questions. An informed consent process was carried out with individuals who expressed an interest in the study. The workshops, IDIs and FGDs were conducted face-to-face in English using semi-structured interview guides. However, participants were allowed to express themselves in their vernacular language if they felt they could explain themselves better that way as the two data collectors conversed in various languages such as isiZulu, Xitsonga, Sepedi, Setswana, isiNdebele and seSotho and could translate them into English. PS collected some of the data. She was a qualitative researcher on a PrEP project at the time, with post-graduate qualifications in social sciences.

On both campuses, IDIs were conducted in a boardroom or outdoors with auditory privacy. A total of twenty-two IDIs were conducted. The IDIs took 30–60 minutes and were audio recorded. During and after IDIs, field workers captured field notes.

The IDI guide covered the following topics: use of contraceptive services, PrEP use, willingness to use new HIV prevention methods and social and community concerns. Probes were used where necessary.

Recruitment of participants for FGDs was done through similar places described in IDIs. Five FGDs with 6–10 participants were scheduled around student availability. Students interested in participating in FGDs approached the field workers to provide details of their availability. The FGDs took 1.5–2 hours and were audio recorded. The note taker for each FGD captured notes during and after the interview discussion. The FGD guide topics were similar to those covered in the IDI guide.

Workshop participants were recruited during FGDs. This was done by asking participants if they would be willing to be contacted in future to participate in a workshop. Only those who consented to be contacted again were invited to attend the workshop. We conducted one workshop at each tertiary institution using a nominal group technique, with nine participants at the TVET college and 13 at the

university site. The purpose of the workshop was to generate service attributes that were important to participants and to prioritise them. We started each workshop by explaining its purpose to the whole group then we later divided the participants into 2 groups for the 9 participants and 3 groups for the thirteen participants. The guiding questions for the groups included: how they would like to access long-acting PrEP methods and this covered the preferred place of delivery; how they prefer to get information, the acceptable costs, among other attributes. Participants shared their perceptions of CAB-LA and DVR in the workshops, including their willingness to use the products when they became available. Similar to the IDIs and FGDs, we audio-recorded the workshops, which they ran for 1.5–2 hours. The note taker also captured notes during and after the workshop.

This study was approved by the University of the Witwatersrand [protocol number: M111133]. Participants also provided written consent. Further study permissions were obtained from the institutions' management authorities to conduct the study on the two institutions' campuses. Participants received USD2.90 as reimbursement for the time they spent in the study.

### **Data analysis**

All audio recordings were transcribed verbatim. To ensure good quality control, two field workers checked all transcripts. They swapped transcripts for a second round of quality checks before sending the documents to the researcher for final checking. NVivo 12 software (QSR International) was used for coding. We used a thematic approach to data analysis and used the relevant attributes of the DOI to organise the themes, including other themes that were identified from the data. Deductive codes were applied as study objectives, and literature informed them. The DOI was kept in mind as these codes were generated. Inductive codes were also applied through repeated reading of the transcripts. We also identified sub-themes, such as the frequency and mode of administration of PrEP technology. PS coded the transcripts and discussed codes with NJC until an agreement was reached.

### **Findings**

A total of 22 young women participated in IDIs and 40 in FGDs, with 22 of these participating in the workshop as well. The mean age of participants was 21. Most of the IDI participants were using injectable contraceptives that are either Nur-Isterate [32%]

administered bi-monthly or Depo Provera [32%] administered every 3 months; 18% were on oral contraception; 14% had discontinued contraception while the rest were other methods. Only a few of the participants had ever used oral PrEP. Most of the university students stayed on campus while the college students rented off-campus accommodation in the township where the vocational college was based, as it did not offer any accommodation.

To understand students' preferences and willingness to use LA-PrEP methods, we organised our themes using the attributes of DOI. The themes were divided into relative advantage, compatibility with the students' lifestyles, complexity of the PrEP technology, and trialability and observability of the PrEP method. These attributes of DOI are depicted in Table 1.

The sub-themes included the PrEP method's frequency, mode of administration, familiarity with administrative mode, perceived pain, perceived ease of use, and visibility of the method. Students generally preferred CAB-LA, while DVR was the least preferred due to an unfamiliar administration mode and a lower efficacy. Some students reported that they did not need to try something with less than 50% effectiveness.

... *what's the use of using it if it's not gonna protect me? That's risky, I'm just. I'm still putting myself at risk, so what's the use of using something that's gonna protect you only 50%?* [IDI 01-01-13, 19 years].

### Relative advantage

The PrEP intervention's relative advantage was the degree to which the type of PrEP was perceived as better than the current idea or practice (Rogers, 1983). Most students highlighted that injectable PrEP had a relative advantage over oral PrEP. DVR was also viewed to have advantages over the daily oral pill. The advantages were in the frequency of administration, trust in the mode of administration and discreet use.

**Table 1.** PrEP innovation attributes and the associated explanations for each attribute.

Attribute	Explanation
Relative Advantage	The extent to which one form of PrEP is perceived to be better than the other.
Compatibility	The extent to which one form of PrEP is perceived to be consistent with female students' preferences, values, experiences and beliefs.
Complexity	The extent to which the PrEP form is perceived to be difficult to understand or use
Trialability	The extent to which a PrEP technology can be experimented with on a limited basis.
Observability	The extent to which the use of long-acting PrEP produces tangible results [staying HIV-negative]

### Frequency of administration

Taking a daily pill was difficult for those students who had tried to take oral PrEP. Some participants compared taking oral PrEP to taking antiretroviral drugs due to its frequency of administration. Most participants perceived the DVR and CAB-LA to have a relative advantage over oral PrEP due to their frequency of administration. Students preferred the bi-monthly administration of CAB-LA because they did not need to think about it after getting the injection until the next return visit to the clinic. A student explained how she would prefer to use CAB-LA, "because it's once in a while and we already on contraceptives like Nur-isterate, so we're used to being injected. It won't be a problem." [P23, FGD01-01-03]. Students highlighted that they enjoyed taking a while before coming back to the health facility. A student explained, "Will use that method cause[because] will take time before we inject... , unlike this PrEP of taking a pill every day." [P18, FGD 01-01-01].

Having a clear routine of method administration was important for some young women, and this influenced their preference for using certain methods over others. DVR was viewed as having this advantage as there is a set date for its administration which the participant perceives as helpful in preparing her mind for it. "I know that I've got a set date, my mind is prepared for it." [IDI 03-01-05, 20years]. In addition, getting DVR for a month was also perceived to instil a sense of safety compared to taking the daily oral PrEP.

Some students thought the DVR or CAB-LA could be a solution for those who might not remember to take their pills every day. The DVR was also perceived to be a better option, especially for participants who were not happy with taking a daily pill, fearing that they might forget to take the pill. While some participants perceived the CAB-LA to be an option for them because they would forget to take the pill, a participant explained, "because I feel like sometimes, I will forget, so, I prefer injection" [IDI 01-01-05, 22 years], others opted for DVR as they had used injectable methods before for contraception. A participant explained,

I will prefer the, the ring one because I think for pills sometimes I am a person I might forget to drink these pills which will put me in risk, yes so injection yoh! [exclamation], I no longer want injections. But a ring, I think, is a solution for me ... I think the ring is ten out of ten [IDI 01-01-03, 21 years].

### A method suitable for past PrEP users

DVR was also considered to be a preferred choice for past PrEP users who had discontinued oral PrEP. For those participants who once tried oral PrEP but would

forget to take it as required, DVR would then be an alternative PrEP technology.

Ok. I think I think like the ring it would be perfect for me to use it because like. Uh, using PrEP like for didn't work out for me, and then yeah. And then, you know, sometimes, like Ok. We can get raped, like the person would not like to use condoms, yeah. [IDI 03-01-01, 21 years].

### Disadvantages of long-acting methods

There were a couple of participants who did not see an injection (CAB-LA) as having an advantage over other modes of administration as they were scared of taking an injection, which they believed was painful. One such participant explained how she was not willing to take an injection because of perceived pain: "Because the injection like uhm ... is painful, that's why, I am afraid of it" [IDI 03-01-07, 22 years]. The perceived pain associated with the method, therefore, influenced the young women's willingness to use the PrEP methods. Some participants also expressed their unwillingness to use injectable PrEP due to perceived allergies to injections. A participant explained why she would not prefer injections and said, "No, I'm allergic to injections" [IDI 03-01-01, 21 years].

One of the disadvantages of using DVR was the perceived discomfort of inserting it: "Imagine opening up my vagina and inserting it. I'm pretty sure I'm going to feel something; I'm going to feel pain" [IDI 03-01-04, 20 years].

### Discreet use of long-acting methods

Another advantage of CAB-LA and DVR was that they could be used discreetly. Discretion of method also contributed to students' willingness to use the PrEP method. The long-acting methods also came with convenience as CAB-LA does not need to be carried around, unlike oral PrEP pills. Students highlighted that they would be comfortable with taking long-acting methods and would be able to go anywhere they could think of as the method was invisible.

Yes, then the injection, rather than,,the pill. All because, uhm ... at least a person is comfortable like you can just go anywhere and nobody knowing even like, just like, it's invisible, rather than the pills. [IDI 01-01-12, 22 years].

### Trust in the injection

The injection mode of administration was trusted compared to the other PrEP technologies. Some participants believed that there was nothing that they

could do which would disturb CAB-LA. A participant explained,

With the pill for example, you cannot drink alcohol and stuff so, I don't know if it's true but then I feel like taking a pill can be an inconvenience a bit, than the injection because you're taking a pill every day ... So, there's not much you can do cause ... like it's an injection ... it's inside. There's nothing you can do which can disturb, I believe, there's nothing you can do which can disturb it. So, I think it's better. [P4, Workshop-U].

### Compatibility

Compatibility was used to describe the degree to which the long-acting PrEP method is perceived as consistent with the individual's existing values, beliefs, past experiences and needs (Rogers, 1983). CAB-LA was perceived to be consistent with students' lifestyles in terms of their current contraceptive use, as most participants reported using injectable contraception. Compatibility with new long-acting PrEP methods was described in terms of familiarity with the mode and frequency of administration. Students explained how they were already using injectable contraceptives, which they were getting mostly every two months; hence, they were already used to being injected. A student said, "*because it's a once in a while, and we already on contraceptives like Nuristerate, so we're used to being injected. It won't be a problem.*" [P23, FGD01-01-03].

CAB-LA's frequency of administration was perceived to be compatible with students' lifestyles as they were also taking injectable contraceptives with a similar frequency of administration. Students also expressed willingness to use DVR, arguing that it did not have many administrative requirements. Because of the frequency of administration, it was also likened to having a monthly period.

I think the ring because it doesn't have too much admin, like, and I, I would only have to take it out once the month ends and put on another one, It's the same thing as going on your period [IDI 03-01-05, 20 years].

In the workshop, in smaller groups, students generally agreed that CAB-LA was more compatible with their lifestyles compared to oral PrEP. Reporting back to a bigger group a participant said,.

So we all chose injections neh, [right]and then our reasons were, me personally I chose the injection because it's fast like when I go to the clinic like I, I, like I get out just within ten minutes or so, and then others chose the injection because, because it

stays in the system for a longer period, and then again, okay because also is a once off thing, unlike pills, like you drink them each and every single day, and we know that we are students and we are lazy to drink pills especially those who go to campus, just imagine you have to drink a pill at eight o'clock and you are not at the campus, I mean at the res [residence], yes, so the injection is better, is better for all of us I think.. [P29, workshop UG5].

Unlike oral PrEP, CAB-LA was also compatible with students' lifestyles. A participant explained how young women enjoy going out to have fun, which could make it difficult for them to stick to a daily routine of taking oral PrEP.

Yes, because with students, we are kind of wild, we go out, we don't have time, imagine if I were to be at Short Left maybe. Short Left is this other club that we usually go to, so imagine if I'm taking PrEP and then we are going to the Groove at seven and, I told myself that I'm going to take PrEP every like every day at seven you see so that means I'm not going to take PrEP by the time because I'm not around, we are so wild as students [P16, FGD03-01-01].

Not having regular access to food made it difficult for some participants to use daily oral PrEP. A participant spoke of the difficulty of taking daily oral PrEP, explaining that she does not eat on certain days. Oral PrEP pills were then not compatible with her lifestyle. A participant said, "you can't drink pills without eating food, so sometimes I go a day without eating" [P17, FGD 01-01-01].

Another participant argued that she could not choose an oral PrEP method as she was taking many other medications; hence, she needed a method with a different form of administration. She said, "*Already I am sick, meaning I take a lot of medicines, so taking uhm ... PrEP I feel like it's going to add more pressure on me for my side, yes.*" [P21, FGD 01-01-03].

Lack of familiarity with a method made some students not prefer some PrEP technologies. Some students thought they would not be able to use DVR as they have never used tampons because they perceive them to be uncomfortable. A participant highlighted that, "I have never ever used tampons because I don't think they are comfortable so is that ring" [P26, FGD 01-01-03]. Another participant explained her thoughts on how DVR could be an option for young women who have used tampons before. "the girls that maybe use tampons when they're on their periods like probably it will be easy for them" [P29, FGD 01-01-03].

In addition, some students explained how familiarisation with the mode of administration made them more likely to choose a PrEP method with a similar

mode of administration. Explaining why CAB-LA would be her preferred option, a participant explained,

... and we are young girls who are taking contraceptives, uhm ... I think it will be easy for us to inject because uhm ... we are used to ... [P17, FGD03-01-01].

### Complexity

The complexity of the technology describes the degree to which a PrEP method is perceived as difficult to understand or use (Rogers, 1983). Complexity included aspects mainly related to the DVR mode of administration, such as concerns over safety and the ring size. Other reasons students cited for thinking PrEP was difficult to use included the fear of missing appointments, dislike of the method, frequency of administration, and side effects.

Some participants thought they would not be able to use DVR, citing that they did not think it would be easy to administer, considering that it comes in one size.

Have you ever worn a tampon that's not your size, because there are sizes, there are smaller ones, yeah, or wearing a tampon, then when its full, have you ever seen how it feels, yoh I can imagine just? ... [P23, FGD01-01-03].

Other participants were also concerned with the size of the oral PrEP pill. They thought it was too big for them to swallow it. A participant said,

"The pill is huge, compared to the one of Triphasil so it's huge to swallow." [IDI 03-01-04, 20 years old].

Other participants feared that DVR would slip in and make it difficult to take out.

"I'm scared that it will slip and go all the way in" [P27, FGD 01-01-03].

.. but if I have to put it myself, I would make mistake or put it, maybe I would put it uhm ... deep, deep, deep, deep, deep then it would be difficult for it to come out] [laughs] it becomes difficult for it to come out and I would have a problem. [IDI 03-01-09, 21 years].

Some participants thought that health professionals should administer the ring to avoid its disappearance. One participant explained, "I prefer that this thing must be inserted at the clinic, not for me to do it myself" [P7, FGD 03-01-01]. Some participants compared DVR to CAB-LA and the implant, as both methods are administered by health administrators.

Participants also feared they might be unable to correctly follow the instructions. *I think maybe you are going to do it wrongly, maybe you didn't get the*

*instructions right, and then you will be going to do what what or something, but the implant you're going to get it from the clinic and the injections, yeah* [IDI 01-01-01, 23 years].

Other participants added that they wanted someone to blame should anything go wrong. Providers could be blamed if something goes wrong with the injection, for example. "If it's being administered by the nurses, that way you will have someone to blame and go back to her" [P5, FGD03-01-01].

### Oral PrEP Frequency of administration

Some participants also explained the complexity of using oral PrEP. This was seen in taking a daily pill which was likened to taking HIV treatment daily. A participant explained, "It's like you are drinking a pill to prevent yourself from drinking a pill" [P11, FGD 01-01-01].

### Trialability

This describes the degree to which a technology, in this case PrEP, can be experimented with on a limited basis (Rogers, 1983). The participants' willingness to try new PrEP technologies seemed to be influenced by the product's mode and the frequency of administration. All methods could be tried and then discontinued. The DVR could be removed immediately. There was some hesitation about even trying some of the methods. Compared to other PrEP technologies, trying out DVR was considered a bigger challenge as the way it should be administered was not only perceived as uncomfortable but also as painful. Some participants reported that trying out CAB-LA would be difficult at first, but they were still open to trying it. A participant likened the hesitation to try out CAB-LA to the COVID-19 vaccine hesitancy,

I think this injection thing, when you start it will be hard for students to adapt, but it's the same as the COVID-19 injection we didn't want to vaccinate like most of us, but we finally vaccinated so it will be the same, at first we are not going to accept the injection and stuff but when time goes, almost everyone will, what, what is needed is maybe people who are nurses to educate about this. [P18, FGD 01-01-01].

Only a few participants were willing to try oral PrEP due to pill burden. Some participants likened the daily taking of pills to taking ARV pills which are also administered daily,

I have a problem with drinking PrEP every day that means I'm similar to someone who is taking HIV pills, so I think the implementation of six months

injection and what not it's going to be very helpful [P16, FGD01-01-01].

### Discussion

Participants generally preferred CAB-LA over daily oral PrEP and were sceptical about using DVR. While a few participants perceived that the injection may be painful, most were still willing to use it as it was compatible with their lifestyles. Some participants were also used to getting injectable contraceptives every 2 months. A household survey conducted in South Africa found that the majority of women were using injectable contraceptives (Chersich et al., 2017). Injectables are, therefore, a familiar mode of administration, hence the general preference for CAB-LA over other PrEP technologies.

Using the DOI attributes, we found that CAB-LA administered every 2 months had a relative advantage over oral PrEP, which has to be taken daily. CAB-LA was generally compatible with students' lifestyles; however, with the return visits for injectable contraceptives. The DVR's perceived complexity made it the least preferred PrEP technology among the students. The observability of the results of using PrEP was, however, a challenge in this study, as proving that someone had remained HIV-negative after using PrEP was difficult as it could not be easily observed by one's peers. However, in one study, this was inferred from HIV testing results where participants shared experiences of their friends and sexual partners who were using PrEP and not using condoms but remaining negative for HIV as confirmed through testing (Schuyler et al., 2021).

Generally, the students expressed willingness to use CAB-LA mainly because of its relative advantage over oral PrEP. The relative advantage seemed to be in the frequency of administration, which would be every two months, which was also compatible with students' lifestyles. Young women generally seem to prefer methods which are not administered regularly, as taking a daily pill was seen to be a burden. This finding is supported by another study conducted among young people in South Africa, where daily pill-taking was also seen as a burden (Laher et al., 2020). However, contrary to these findings, a study conducted in South Africa, Zimbabwe and Uganda reported that some young people found it easy to take pills, and they found them easy to carry around and easy to swallow (Luecke et al., 2016). Although these young women found pills easy to swallow, studies have reported that most young people discontinue taking pills within the first month of initiating

PrEP (Martin et al., 2023). In a different study, participants showed a general preference for long-acting methods such as CAB-LA due to better adherence and a dislike of pills (3). Long-acting products are therefore needed to ensure sustained use of PrEP. This also emphasises the need for PrEP choice, as one size will not fit all.

CAB-LA was also perceived to be compatible with students' lifestyles. The compatibility seemed to have stemmed from the students' familiarity with injectable contraceptive methods as the most commonly used method in the country. Perceptions of ease of product use are often influenced by familiarity with the product and ultimately influence product acceptability (Luecke et al., 2016). In addition, CAB-LA mode and forms of administration were perceived to be compatible with students' lifestyles of randomly going out to have fun with their friends, sometimes with no time to pack oral PrEP pills. Long-acting methods would, therefore, prepare young people for outings they would not have prepared for. Some of the outings result in heavy use of alcohol. Alcohol consumption could compromise one's ability to remember to take daily PrEP (Hojilla et al., 2019; Ogbuagu et al., 2019). Studies conducted among students in tertiary institutions have reported how heavy use of alcohol could lead students to engage in risky sexual practices, making them vulnerable to HIV (Osuafor & Okoli, 2021; Smith et al., 2014). The discreetness of long-acting PrEP would help young people deal with the stigma attached to carrying around, including the use of oral PrEP pills and ultimately reducing HIV risk. Long-acting PrEP methods were, therefore, generally perceived to be more compatible with students' lifestyles.

Stigma seemed to be a challenge among students. This challenge is not, however, unique to the student population. Previous studies have reported on the stigma attached to taking PrEP pills (Golub, 2018; Haire, 2015). Some students explained that the PrEP pills looked like ARV pills; hence, if one were taking them, then their peers would suspect that they were on HIV treatment. Changing how the PrEP pill looks could make it more acceptable. Addressing stigma would also make the pills more acceptable, which will help in the expansion of choices. Also, reducing the size of the PrEP pill may make it more acceptable to young women.

While participants reported a general preference for injectable PrEP, some highlighted that injections were not an option for them. This was either due to fear of injections or previous allergic reactions. A fear of needles was also reported as one of the

concerns with injectable PrEP (Patel et al., 2018). Therefore, there is a need to offer alternatives as user preferences vary across populations. Offering alternative PrEP choices will help ensure that more women are covered by a PrEP method of their choice.

The complexity of using different PrEP technology placed DVR at a disadvantage in addition to the low efficacy. Some young women were not willing to try DVR because it would be inserted inside their bodies, and they felt unsafe. A similar finding has also been reported in another study where women were opposed to products which are inserted in the vagina due to the perceived discomfort and concerns about fertility and cancers (Luecke et al., 2016). The other complexity of the method stemmed from self-administration. While in this study, young women did not feel skilled enough to insert DVR properly and trusted the providers to do it for them. Women could be provided an opportunity to practice inserting the DVR themselves in a private space in the clinic. Clinic administration whether by a provider, or the woman herself, was favoured as it would spare participants from having to hide the products from their partners (Luecke et al., 2016). How the products were administered influenced the young women's willingness to use PrEP methods.

While self-administration of DVR could offer more privacy to young women and reduce pressure on healthcare providers, the students still seemed to trust the products trained providers administer. Young women seemed to want someone to hold responsible and return to them should anything go wrong with the PrEP technology. Examples of contraceptive injectables and implants, which trained providers administer, were then given. To allay this fear, as the PrEP products become available, initially, service providers may need to either insert the DVR for individuals who need the support or guide them on how to do it. This may see more young women opting to use DVR. Young women, therefore, seem to have confidence in the skills of trained healthcare providers. This confidence they have in the providers can then be harnessed to support initial product use until the young women have gained trust in the products.

While most students did not express willingness to use DVR, most likely due to its low efficacy, this PrEP technology seemed to be an alternative for young women who have used oral PrEP before and stopped. This could imply that these young women were eager to prevent HIV but could not deal with the daily pill burden. Also, DVR was perceived to be an option for young women who have used tampons before, as these were perceived to be familiar with the mode of

administration. Demand generation for DVR would, however, need to address this misconception. Previous studies have highlighted familiarity with the mode of administration as one of the important components influencing preferences for PrEP (Laher et al., 2020; Patel et al., 2018). An earlier study on HIV PrEP preferences conducted among young adult African American MSM showed that most participants chose oral PrEP due to familiarity with taking oral pills as a standard medication delivery modality (Patel et al., 2018). In another study conducted among young women, taking pills was considered to be easy. However, contrary to these findings, our study found that some participants said they would choose a different PrEP method as they were also taking other medications orally; hence, a method with a different mode of administration would work better for them. Recent studies have, however, reported that most young people discontinue PrEP due to side effects and pill burden (Ongolly et al., 2021). Therefore, there is a need for health providers to offer many choices so that there is a method to cater for young women's circumstances as individuals.

The study had some limitations. A few of the study participants had used oral PrEP. At the time of data collection, DVR and CAB-LA were unavailable, so participants discussed hypothetical preferences without having tried the methods. While all participants touched and felt the DVR, none had used CAB-LA. Future studies should capture the views of participants who have used the actual products. Participants who selected CAB-LA may not have properly understood that they would still need to take oral PrEP if they decided to discontinue using it, as this was not explained to them. Given some of the resistance expressed to taking pills on a daily basis that we found in this study, the important message about needing to take oral PrEP for a limited period of time when discontinuing would need to be integrated into counselling sessions prior to initiation onto CAB-LA. The study was also conducted among young women in tertiary institutions in one district of South Africa, and their perceptions of long-acting PrEP methods and their transferability to other contexts in South Africa may be limited.

## Conclusion

Students showed a general preference for CAB-LA over oral PrEP and DVR. CAB-LA administration was compatible with students' patterns of injectable contraceptive use. Offering contraceptives and PrEP with similar patterns of return visits provides an

opportunity to integrate sexual and reproductive health services. Since all the PrEP methods have advantages and drawbacks, promoting choice is necessary, as one size will not fit all. Some students, although few, liked the idea of being able to remove or stop oral PrEP immediately. The stigma around the oral PrEP pill, however, still needs to be addressed through educating communities on the different PrEP methods. PrEP is a viable strategy in South Africa, although pills are not the preferred mode of delivery. Also, providers will need to be trained to promote informed choice counselling so they spend enough time discussing the different PrEP methods and their advantages and drawbacks to enable young women to make informed decisions about a method that fits into their lifestyle. In addition, considering that DVR is generally perceived to be a complicated PrEP technology, thereby reducing its trialability among young women, it is necessary to debunk the myths around it, especially among young women, by providing detailed information to increase its acceptability. Also, demand creation must be intensified to create PrEP awareness among young women.

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