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Socio-demographic and programmatic factors associated with access to 'layered' interventions among adolescent girls and young women in selected sites in Nairobi, Kenya

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ABSTRACT

Background: Adolescent girls and young women (AGYW) aged 9-24 years are three times more likely to be newly infected with human immunodeficiency virus (HIV) as compared to their male counterparts. Determined, resilient, empowered AIDS-free, mentored, and safe (DREAMS) program aims to reduce rates of HIV infection among AGYW. This study aimed to identify socio-demographic and programmatic factors associated with access to a minimum package of evidence-based interventions to which AGYW are exposed (referred to as 'layering' in the program).

Methods: Retrospective cross-sectional routine program data abstraction was done for 21,616 AGYW receiving DREAMS services in four DREAMS program sites in Nairobi County between April 2022 to September 2022. Study variables were age, time since DREAMS enrolment, level of education, and number of social asset building (SAB) sessions attended. Logistic regression was used to determine the net factors associated with access to the interventions.

Results: The mean age of the respondents was 16.8 and the median number of SAB sessions attended was 8. Attending ten or more SAB sessions was associated with increased odds of accessing multiple evidence-based interventions (AOR=3.828; CI: 3.492-4.196; p<0.001). Similarly, attaining secondary education and staying in the program for more than 12 months were significantly (p<0.0001) associated with being layered. Being layered was associated with having more than ten SAB sessions irrespective of the age of the AGYW or duration in the DREAMS program.

Conclusions: To improve access to multiple evidence-based interventions, it may be important to emphasize increasing the number of SAB sessions for the AGYWs.

Keywords: AGYW, DREAMS, Kenya

INTRODUCTION

According to a 2022 United Nations acquired immune deficiency syndrome (AIDS) report, adolescent girls and young women (AGYW) from sub-Saharan Africa (SSA) remain at substantial risk of acquiring human

immunodeficiency virus (HIV). Young women aged 15-24 years are twice as likely to be living with HIV as compared to their male counterparts.¹ An estimated 2.2 million AGYW aged 15-24 years are living with HIV globally, with 300,000 being newly infected annually. SSA accounts for 87% of the newly infected AGYWs. Despite a 54%

reduction in HIV incidence since its peak in 1996, the population of AGYW in SSA remains a priority population for HIV epidemic control.²

By 2022, Kenya was among the top four countries that were hardest hit by the HIV epidemic, with 1.4 million people living with HIV (PLHIV), 22,000 AIDS-related deaths, and 21,000 new HIV infections³. Of these new infections, young people (15-24 years) accounted for 12,000 cases (57%). In Kenya, women and girls continue to bear the brunt of the epidemic, and they tend to become infected at a much earlier age than men and boys of the same age.⁴ Eight out of every ten new HIV infections occurring among young people occur among adolescent girls and young women.⁵

In a study investigating the association between exposure to the DREAMS program and sexual acquisition or transmission of HIV among AGYW in South Africa, those residing in peri-urban or urban settings were found to have a higher likelihood of acquiring and transmitting HIV.⁶ Additionally, in urban informal settlements of Nairobi, HIV prevalence was nearly twice as high compared to other areas. This disparity is primarily due to the multitude of vulnerabilities faced by residents, compounded by pervasive poverty. AGYW living in slums encounter particularly challenging circumstances characterized by unequal power dynamics exacerbated by age-disparate sexual relationships, limited access to sexual and reproductive health information, and high rates of gender-based violence.⁷

The DREAMS partnership is an ambitious public-private investment established in 2015 by the U.S. Presidential Emergency Plan for AIDS relief (PEPFAR) to reduce the rate of new HIV infections among AGYW in ten sub-Saharan African countries.⁸ DREAMS is based on the principle that 'combination HIV prevention,' an approach to reduce HIV transmission through integrated behavioral, biological, and structural interventions tailored to the needs of a population, is essential. In the case of DREAMS, the multiple sources of HIV risk for adolescent girls and young women are conceptualized through a theory of change model. They are addressed through a package of 'layered' evidence-based interventions.⁹ 'Layering' is defined by PEPFAR as the "provision of multiple interventions or services from the DREAMS core package to each DREAMS recipient while taking into account contextual level interventions (i.e., those that are not delivered directly to an AGYW but from which she may benefit)".¹⁰

There is evidence that layering reduces the risk of HIV acquisition among AGYW through different pathways ranging from reduced transactional sex due to economic empowerment, reduced sexual violence due to exposure to school support and parenting programs, and consistent condom use and pre-exposure prophylaxis due to increased awareness.¹¹ Layered interventions for AGYW aged 9-14 years include attending social asset building (SAB)

sessions, receiving HIV and violence risk screening and prevention, as well as financial literacy training. For those aged 15-17 years, additional support is provided through pre-exposure prophylaxis (PrEP), HIV and STI screening, condom education and demonstration, as well as contraception information, education, and communication (IEC). Furthermore, AGYW aged 18-24 years are offered HIV testing along with entrepreneurship training to empower them economically.^{10,11} DREAMS programs aim to have at least 90% of the AGYWs being served by the programs layered within the first year of enrolment. Failing to achieve this goal necessitates the program to review its strategies to optimize layering.

The SAB component of the DREAMS core package is often a critical part of the DREAM layering process. SAB sessions assist AGYW in making important connections and in receiving support from each other and near-peer role models. This is done by the AGYW holding small, female mentor-led group meetings in safe, public spaces on a regular basis, often weekly. The sessions provide the most vulnerable AGYW with social networks such as relationships with peers and adults who can offer emotional support, information, and material assistance. Interventions that build social capital have been shown to increase agency and empowerment among AGYW.¹² The model used by County Ownership and Networks to maintain Nairobi Epidemic Control (CONNECT) DREAMS program for social asset building is safe spaces through which AGYW receive support, but also serve as a programmatic hub to link girls to additional DREAMS interventions and services.¹³

HOPE worldwide Kenya is currently implementing a DREAMS project in Nairobi as part of the CONNECT program. This initiative is being carried out as a sub-grant of Center for International Health, Education, and Biosecurity (CIHEB)-Kenya, with funding from the U.S. Centers for Disease Control and Prevention (U.S. CDC) through PEPFAR. The project targets resource-poor areas of Nairobi, aiming to reach over 90,000 AGYW through 18 project outlet sites. To improve program effectiveness and increase coverage among AGYW living in informal settlements, we conducted a retrospective study to examine factors associated with the layering of services provided by the CONNECT DREAMS project at four selected outlets (two high-volume and two low-volume sites). The findings from this analysis will inform program decisions to enhance coverage and promote 'layering' of interventions for AGYW in Nairobi.

METHODS

Study area

The CONNECT DREAMS project is implemented through 18 project outlet sites in 15 sub-counties and 44 wards in Nairobi's informal settlements. Error! Reference source not found. shows the map of Nairobi County

showing the sub-counties and number of wards in each sub-county of DREAMS CONNECT implementation.

Enrollment and service provision

The enrollment and provision of services in the DREAMS program takes the following steps.

Identification of eligible AGYW

Various approaches are used to identify AGYW for enrollment into the DREAMS program. These include referral from community members, from schools, referral by peers and snowballing, referral of pregnant and breastfeeding AGYW from health facilities, and referral from key population programs.

Eligibility screening

The identified AGYW are screened using a standard eligibility screening tool. To be eligible, an AGYW must be aged 10-24 years old, be resident in a low-resource setting/ward, have a vulnerability (e.g., having had/being in a gender based violence (GBV) environment), and be willing to join the program.

Enrollment

The AGYW is enrolled by capturing all necessary details of the AGYW in an electronic system called DREAMSOFT. This serves as a baseline of the vulnerabilities that the AGYW has. The services provided by the program aim to increase the AGYW's ability to address these vulnerabilities. If the AGYW is 18 years or older, she signs an informed consent form. If she is younger, she signs an assent form, and the parent/guardian signs a parental consent form to facilitate enrolment.

Service provision and layering

The AGYW is then assigned to a trained mentor so that each mentor will support no more than 60 AGYW. The mentor and the AGYW meet in safe spaces where their social assets are built, and most services provided. The services provided are age-appropriate and are geared towards reducing rates of HIV infection among AGYW through 'layered' evidence-based interventions. In this study, we examined the socio-demographic and programmatic factors associated with layering among AGYW.

Graduation

Once an AGYW has received the full range of layered interventions and her vulnerabilities have been effectively addressed, she is considered to have completed the program and is graduated out. This graduation creates an opportunity for other AGYW to benefit from the program's services and support.

However, it is important to note that even after graduation, if an AGYW experiences new vulnerabilities or challenges, she can be re-enrolled in the program. This ensures that individuals who may require additional assistance or face new risks are not left without support. The program remains flexible and responsive to the evolving needs of AGYW, providing them with a safety net should they require further intervention in the future.

Data collection and analyses

During June 2022-December 2022, the CONNECT DREAMS project served 21,616 AGYW in four sites in Nairobi, representing 21% of the 101,558 AGYW being served in the program. These sites included two of the highest volume sites (Savannah, 8,304 AGYW; Kayole, 7,841 AGYW) and two of the lowest volume sites (Kibagare, 2,566 AGYW; Kiambiu 2,905 AGYW). These sites were selected proportionate to the number of DREAM girls served after stratification by site type (by volume) and location. We examined layering status of all the 21,616 AGYW served by the program during the period under review in the selected four sites. The inclusion criteria entailed AGYW aged 10-24 years that were enrolled in the CONNECT DREAMS program and were served through any of the four sites of Savannah, Kayole, Kibagare and Kiambiu during the June 2022-December 2022 period.

Variables

The dependent variable for this study was layering. Layering status was measured by whether an AGYW received all the age-appropriate interventions based on her age in years namely: 9-14, 15-17, and 20-24 years, as described in our introduction section. The independent variables were: Age of the AGYW (measured in complete years lived at enrolment), number of contact days at SAB sessions (out of the expected 24 SAB contact days for the 6-month period at the ideal rate of one SAB contact per week), time in the program (measured in months since enrolment), site type (high volume versus low volume), and level of education (primary and below, secondary and above).

Data analyses

Routine program data for the 21,616 AGYW was abstracted in an excel software platform and exported to statistical package for the social sciences (SPSS) version 26.¹⁴ The results were presented as proportions and odds ratios (OR) with 95% confidence intervals (CI) calculated to determine the differences, if any, in layering status of the AGYW against a set of independent variables. Pearson's correlation coefficients were used to show associations between the dependent variable and the independent variables. A binary logistic regression model was used to assess the net socio-demographic and programmatic factors that were associated with AGYW layering.

Ethical issues

The protocol upon which this study is based was reviewed and approved by Amref Health Africa Institutional Review Board (IRB) under the approval number: ESRC P1421/2023 and University of Maryland Baltimore (UMB) IRB under the approval number HP-00106405. It was also reviewed in accordance with the U.S. Center for Disease Control and Prevention (CDC) and was conducted consistent with applicable federal law and CDC policy in particular, the HHS Policy for Protection of Human Research Subjects as outlined in 45 C.F.R. §§ 46.101-46.505 and Policy for the Protection of Human Subjects as outlined in 21 C.F.R. §§ 50, 56, 312 and 812. We received a waiver of informed consent for the use of retrospective data. All data were kept confidential, and only the study team had access to program beneficiary data.

RESULTS

Demographic and programmatic characteristics of AGYW

A total of 21,616 AGYW were served in the four sites. Most (42%) of the AGYW were aged 15-19 years (9,137), and the mean age was 16.8 years (IQR. 12.9-20.7). More than half (11,759, 54%) had stayed in the program for 13-24 months and majority were in school (17,294, 80%). More AGYW (16,799, 78%) had attended 10 SAB sessions or less and the median number of SAB sessions attended was 8 (IQR 4-10) days (Table 1).

Associations between demographic and programmatic characteristics of the AGYW and layering status

At least 86% (n=4,125) of AGYW who had attended more than 10 SAB sessions had been layered compared to 62% (n=10,381) of those with 10 or less number of contact days at SABs. AGYW who had more than 10 SAB sessions were more likely to be layered (AOR=3.828; 95% CI [3.492-4.196]; p<0.0001) as compared to those with <10 number of SAB contact days (Table 2). Similarly, AGYW

in low-volume project sites were 3.5 times more likely to be layered (AOR=3.545; CI: 3.098-4.084; p<0.0001) than those in high-volume sites. The AGYWs who had completed secondary education and above were 3.4 times more likely to be layered (AOR=3.389; CI: 3.067-3.759; p value<0.0001) compared to AGYWs with primary level education or below. Further, AGYWs out of school were 3.2 times more likely to be layered than those in school (AOR=3.226; CI: 2.811-3.701; p value<0.001).

AGYW aged 15-19 years were most likely to be layered (69%), followed by those aged 20-24 years (68%) and lastly, those aged 10-14 years (63%). Multivariate results, as shown in Table 2, show that, compared to AGYWs aged 10-14 years, those 15-19 years were twice as likely to be layered (AOR=2.062; CI: 1.653-2.534; p value<0.001).

Layering improved with the duration an AGYW had been in the program with those in the program for 0-6 months being the least likely to be layered (50%), followed by 7-12 months (61%), 13-24 months (67%), and more than 25 months (90%). Compared to AGYWs who had been in the program for six months or less, those who had been in the program for at least 25 months were almost ten times more likely to be layered (AOR=9.523; CI=6.410-14.084). However, our analyses showed that irrespective of the duration in the program, AGYW who had 11 or more SAB sessions were significantly more likely (AOR=3.828; CI=3.492-4.192; p<0.0001) to be layered as compared to those who had less than 10 SAB sessions during the 6 months.

Analyses of Pearson's correlation coefficients showed that the level of schooling and time since enrollment were positive and significantly associated with being layered (p<0.001). Layered status with the number of SAB sessions showed the highest correlation among the variables ($r=0.416$, p<0.0001) (Table 3). Chi-square test results for schooling status, level of schooling, time since enrollment, and number of SAB sessions with layering status were all significant (p<0.05).

Table 1: Demographic and programmatic characteristics and layering status of the AGYW served in the four DREAMS[®] sites (n=21,616), Nairobi, April 2022 to September 2022.

Characteristics	Total AGYW	Layered [®] (n=14,506)		Not layered (n=7,110)	
		No	%	No	%
Age of AGYW (years)					
10-14	6,742	4,550	68	2,192	32
15-19	9,137	6,322	69	2,815	31
20-24	5,737	3,634	63	2,103	37
Site type					
Low volume	5,471	4,715	86	756	13
High volume	16,145	9,791	61	6,354	39
Duration in the program (months)					
0-6	129	64	50	65	50
7-12	7,410	4,480	61	2,930	39
13-24	11,759	7,881	67	3,878	33
25+	2,318	2,081	90	237	10

Continued.

Characteristics	Total AGYW	Layered ^b (n=14,506)		Not layered (n=7,110)	
		No	%	No	%
Level of education of AGYW					
Primary and below	12,840	8,047	62.7	4,793	37.3
Secondary and above	8,776	6,459	74	2,317	26
Schooling status					
In school	17,294	10,938	63	6,356	37
Out of school	4,322	3,568	82	754	18
Contact days at SAB					
>10	4,817	4,125	86	692	14
≤10	16,799	10,381	62	6,418	38

^aDREAMS is an acronym for determined, resilient, empowered, aids-free, mentored, and safe; ^blayering is defined as, “provision of multiple interventions or services from the DREAMS core package to each DREAMS recipient while taking into account contextual level interventions (i.e., those that are not delivered directly to an AGYW but from which she may benefit)

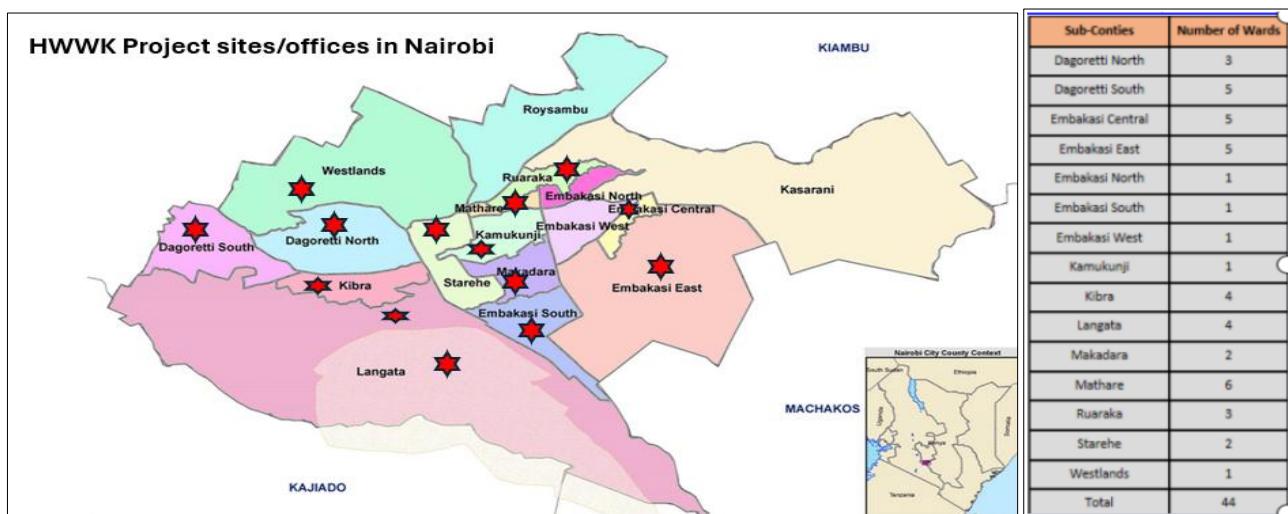


Figure 1: Map of Nairobi showing CONNECT^a DREAMS^b implementation counties.

^aCONNECT is an acronym for County Ownership and Networks to maintain Nairobi Epidemic Control (CONNECT); ^bDREAMS is an acronym for determined, resilient, empowered, AIDS-free, mentored, and safe. The CONNECT DREAMS project is implemented in 44 wards in Nairobi County

Table 2: Socio-demographic and programmatic factors associated with layering^b status of AGYW served by DREAMS^b project in Nairobi, April 2022 to September 2022.

Variables	Layered (%)	Not layered (%)	Crude OR (95% C. I)	P value	AOR (95% C. I)	P value
Schooling status						
In school (ref)	10,938 (63)	6,356 (37)	1			
Out of school	3,568 (82)	754 (18)	2.749 (2.527- 2.992)	<0.0001	3.226 (2.811- 3.701)	<0.0001
Highest level of education						
Primary education and below (ref)	8,047 (63)	4,793 (37)	1		1	
Secondary education and above	6,459 (74)	2,317 (26)	1.660 (1.564- 1.762)	<0.0001	3.389 (3.067- 3.759)	<0.0001
Age in years						
10-14 (ref)	4,550 (68)	2,192 (32)	1		1	
15-19	6,322 (69)	2,815 (31)	1.154 (1.076- 1.237)	0.0001	2.062 (1.653- 2.534)	<0.0001
20-24	3,634 (63)	2,103 (37)	0.833 (0.773- 0.897)	<0.0001	0.735 (0.657- 0.721)	<0.0001
Duration in program (months)						

Continued.

Variables	Layered (%)	Not layered (%)	Crude OR (95% C. I)	P value	AOR (95% C. I)	P value
0-6 (ref)	64 (50)	65 (50)	1		1	
7-12	4,480 (61)	2,930 (39)	1.553 (1.096-2.199)	0.003	2.702 (1.852-3.952)	<0.0001
13-24	7,881 (67)	3,878 (33)	2.064 (1.458-2.921)	<0.0001	5.494 (3.759-8.065)	<0.0001
More than 25	2,081 (90)	237 (10)	8.917 (6.157-12.925)	<0.0001	9.523 (6.410-14.084)	<0.0001
Type of site						
High volume (ref)	9,791 (61)	6,354 (39)	1		1	
Low volume	4,715 (86)	756 (14)	3.104 (2.875-3.352)	<0.0001	3.545 (3.098-4.0251)	<0.0001
Number of SAB sessions (contact days)						
10 or less (ref)	10,381 (62)	6,418 (38)	1		1	
11 or more	4,125 (86)	692 (14)	3.685 (3.3806-4.017)	<0.0001	3.828 (3.492-4.196)	<0.0001

[†]DREAMS is an acronym for determined, resilient, empowered, aids-free, mentored, and safe; [‡]layering is defined as, “provision of multiple interventions or services from the DREAMS core package to each DREAMS recipient while taking into account contextual level interventions (i.e., those that are not delivered directly to an AGYW but from which she may benefit)

Table 3: Pearson’s correlation coefficients showing associations between pairs of variables, Nairobi, April 2022 to September 2022.

Variables	Age in years	Level of schooling	Time since enrollment	Number of SAB sessions	Layered status [§]
Age in years					
Pearson correlation	1				
Sig. (2-tailed)					
Level of schooling					
Pearson correlation	0.466**	1			
Sig. (2-tailed)	p<0.0001				
Duration in months					
Pearson correlation	0.169**	-0.010	1		
Sig. (2-tailed)	p<0.0001	p=0.137			
Number of SAB contact days					
Pearson correlation	-0.253**	0.041**	-0.231**	1	
Sig. (2-tailed)	p<0.0001	p<0.0001	p<0.0001		
Layered status					
Pearson correlation	-0.011	0.114**	0.263**	0.416**	1
Sig. (2-tailed)	p=0.095	p<0.0001	p<0.0001	p<0.0001	

**Significant at p<0.0001; [§]layering is defined as, “provision of multiple interventions or services from the DREAMS core package to each DREAMS recipient while taking into account contextual level interventions (i.e., those that are not delivered directly to an AGYW but from which she may benefit)

DISCUSSION

Number of SAB sessions attended

We have found that AGYW who had attended more than 10 SAB sessions were almost three times more likely to be layered compared to those with 10 or less number of SAB session, irrespective of the duration in the program. Saul and others posit that the SAB component of the core package of DREAMS is a critical part of the DREAMS layering process.⁹ This is because the most vulnerable AGYW often lack strong social networks, such as relationships with peers and adults who can offer emotional support, information, and material assistance, as

posited by Hallman and others.¹² Similarly, in a study using the priorities for local AIDS control efforts (PLACE) methodology implemented in Tanzania, AGYW described their networks as sources of support and advice.¹³

The CONNECT DREAMS SAB model is safe spaces through which AGYW receive support, but also serve as a programmatic hub to link girls to additional DREAMS interventions and services. This assists AGYW in making important connections and in receiving support from each other and near-peer role models. Attending SAB sessions provides an opportunity for the AGYW to receive information about how to access sexual and reproductive health and HIV services. Lack of information has been

identified as one of the barriers to adolescents' reaching their health outcomes.¹⁵ This also corresponds to Pettifor's and others' findings on the effectiveness of regularly holding small, female mentor-led group meetings in safe, public spaces by DREAMS beneficiaries.¹³ Ziraba and others also found out that belonging to an organized social group, like the SAB groups that the AGYW belong to, was associated with lower odds of risky sexual behaviors among slum-dwelling adolescent girls and young women in Nairobi.⁷ The need to emphasize SAB attendance by the AGYW, where HIV risks are spoken about, is enhanced by the finding by Kamire and others that the majority of sexually active AGYW had a low perception of HIV risk despite high reported access to HIV testing services (HTS) and DREAMS) in the past 12 months.¹⁶

Schooling status and level of education

We observed that AGYW who were out of school were significantly more likely to be layered compared to those in school. This can be explained by the inaccessibility of the in-school girls for service provision during school terms. In Kenya, most secondary school-going AGYWs are in boarding schools with less than three months' school holiday breaks in a year when they can receive DREAMS services. However, being in school may avert the risk of acquiring HIV.¹³

The results also show that the AGYWs who had at least secondary education were more likely to be layered compared to those who had not. Wodon and others similarly argued that educating AGYW reduces the risk of HIV through modification of sexual behavior, in addition to social and psychological changes like self-efficacy and empowerment.¹⁷ The authors posit that spending more time in school might increase contact with health-promotion messages delivered within schools, and among girls, limits opportunities to interact with male partners who are often older with a higher HIV risk profile compared to the girls.¹⁸ Similarly, Legarth and others concluded that free and equal access to healthcare, and low educational attainment might increase risk of HIV infection among heterosexual individuals.¹⁹

Age of the AGYW

Our findings show that layering was significantly associated with the age of the AGYW. Compared to AGYWs aged 10-14 years, there were increased odds of being layered among AGYWs aged 15-19 years, with a slight reduction among the AGYWs aged 20-24 years. The slightly reduced odds among the AGYW aged 20-24 years mirror those of past studies, which found that the AGYW aged 20-24 years are especially difficult to recruit and retain because of the multiple demands on their time, including work and childcare.⁹ Similarly, Phiri and others found that in a community-based, peer-led sexual and reproductive health program in Lusaka, Zambia, participants aged 20-24, those in school, and those in employment were more likely not to attend hubs.²⁰ On the

contrary, in a study examining factors influencing participation in HIV combination prevention interventions in South Africa, it was found that for older (20-24 years) women, intimate partner violence (IPV) and sexual violence in the past 12 months was associated with increased levels of participation and hence being layered.²¹

CONCLUSION

The findings show that DREAMS implementors could emphasize enhancing the number of SAB sessions attended by AGYWs to improve layering. It is desirable for DREAMS programs to partner with schools to facilitate the provision of HIV prevention services for the in-school AGYW. We also demonstrated that programs may explore ways of reaching young women aged 10-14 years as they are least likely to attend SAB sessions.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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