



Contents lists available at ScienceDirect

Contraception

journal homepage: www.elsevier.com/locate/contraception

Original Research Article

Participation in an HIV prevention intervention and access to and use of contraceptives among young women: A cross sectional analysis in six South African districts ☆☆☆★☆☆

Kim Jonas^{a,b,*}, Carl Lombard^{c,d}, Witness Chirinda^a, Darshini Govindasamy^{a,b}, Tracy McClinton Appollis^{a,b}, Caroline Kuo^e, Glenda Gray^f, Roxanne Beauclair^g, Mireille Cheyip^h, Catherine Mathews^{a,b}

^a Health Systems Research Unit, South African Medical Research Unit, Cape Town, South Africa

^b Adolescent Health Research Unit, Division of Child and Adolescent Psychiatry, Faculty of Health Sciences, University of Cape Town, Cape Town, South Africa

^c Biostatistics Unit, South African Medical Research Unit, Cape Town, South Africa

^d Division of Epidemiology and Biostatistics, Department of Global Health, Stellenbosch University, Cape Town, South Africa

^e Expert Consultant, Rhode Island, United States

^f South African Medical Research Unit, Cape Town, South Africa

^g Department of Science and Innovation (DSI)–National Research Foundation (NRF) Center of Excellence in Epidemiological Modelling and Analysis, Stellenbosch University, Stellenbosch, South Africa

^h Division of Global HIV and Tuberculosis, Center for Global Health, US Centers for Disease Control and Prevention, Pretoria, South Africa

ARTICLE INFO

Article history:

Received 10 September 2021

Received in revised form 4 May 2022

Accepted 18 July 2022

Keywords:

Access
Contraception
Contraceptive use
HIV prevention
South Africa
Unintended pregnancy

ABSTRACT

Objective: This study investigated whether young women's participation in a combination HIV-prevention intervention was associated with accessing and using condoms and other contraceptives.

Study Design: A cross-sectional household survey was conducted from 2017 to 2018 among a representative sample of young women aged 15–24 years old living in six South African districts in which the intervention was implemented. Cross-tabulations and multivariate regression analyses of weighted data were performed to examine access to and use of condoms and other contraceptives.

Results: In total 4399 young women participated, representing a 60.6% response rate. Of participants, 61.0% ($n = 2685$) reported accessing condoms and other contraceptives in the past year. Among those who ever had sex ($n = 3009$), 51.0% used condoms and 37.4% other contraceptives at last sex. Among 15–19 year old, participation in the combination intervention was positively associated with reporting contraceptive use other than condoms at last sex (Prevalence Ratio (PR): 1.36; 95% CI: 1.21–1.53) and reporting use of both condoms and other contraceptives at last sex (PR: 1.45; 95% CI: 1.26–1.68). No associations were observed in the age group 20–24.

Conclusion: Our findings suggest that combination HIV prevention interventions may lead to increased access and use of condoms and other methods of contraception among adolescent women, but this needs to be confirmed in experimental studies. We need to test different or more intensive interventions to increase contraceptive use in young women aged 20–24.

Implications: Participating in combination HIV prevention interventions that are delivered via multiple approaches may promote access to, and use of condoms and other methods of contraceptives among adolescent women, and thereby help reduce unintended pregnancies.

© 2022 The Author(s). Published by Elsevier Inc.

This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

* Conflict of interest: The authors declare that they have no competing interests. The findings, conclusions, and views expressed in this paper are those of the authors and do not necessarily represent the official position of the CDC, SAMRC, or their funding agencies.

☆☆ Funding: This manuscript was supported by the President's Emergency Plan for AIDS Relief (PEPFAR) through the Centers for Disease Control and Prevention under the terms of Cooperative Agreement 1U2GGH001150, and the Social Impact Bond of the South African Medical Research Council funded by the Global Fund.

The combination HIV prevention interventions were funded by the Global Fund to Fight AIDS, TB and Malaria, and implemented in 10 districts in South Africa by a range of government departments and civil society organizations that were appointed by the organizations responsible for the management of the adolescent girl and young women program: Western Cape Department of Health, KwaZulu-Natal Treasury, Kheth'Impilo, Soul City Institute for Social Justice, and the Networking HIV and AIDS Community of Southern Africa (NACOSA). The program was aligned with the She Conquers campaign and was implemented with support from the South

<https://doi.org/10.1016/j.contraception.2022.07.005>

0010-7824/© 2022 The Author(s). Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

1. Introduction

The number of new HIV infections is decreasing in South Africa [1], but the incidence remains the highest worldwide and young women aged 15–24 years account for 30% of new infections [2, 3]. AIDS is the second leading cause of death in young people aged 15–24 years in South Africa [4]. Globally, interventions to promote safe sex have been effective in reducing HIV transmission among young people; however, adolescent pregnancy rates in developing countries are not declining as they are in the developed countries [5]. An estimated 21 million adolescent girls aged 15–19 years become pregnant every year in the developing countries and the majority of these pregnancies are unintended. The impact of unintended pregnancies include depression and anxiety and early school dropout, which may further exacerbate the cycle of poverty [6, 7]. Unintended pregnancies among HIV-positive young women are a major contributor to mother-to-child-transmission of HIV [6].

Access to, and use of, contraceptives are key to preventing unintended pregnancies. However, the prevalence of contraceptive use among young women is suboptimal despite contraceptives being available free of charge in South Africa. In 2016, 19% of all sexually active women of reproductive age in South Africa reported an unmet need for contraception, with an even higher unmet need among adolescent girls aged 15–19 years (31%) and among young women aged 20–24 years (28%) [4].

To expand and enhance HIV prevention and improve access to sexual and reproductive health (SRH) services including contraception, a South African combination HIV-prevention intervention for adolescent girls and young women aged 10–24 years, funded by the Global fund, was implemented by governmental and non-governmental organizations in 10 high-burden districts of South Africa from 2016 to 2019 [8]. The combination intervention promoted access to contraceptives through linkages to SRH services and commodities aiming to reduce unintended pregnancies. A detailed description of the intervention components, including the SRH components examined in this paper, are presented in Box 1.

The main aim of these analyses was to investigate whether participation in the combination intervention was associated with accessing and using condoms and other methods of contraceptives among young women aged 15–24 years old.

2. Methods

2.1. Study design and sampling

We conducted secondary analysis using data from a cross-sectional, representative household survey of young women living in six of the 10 districts in which the combination HIV prevention intervention was implemented [8]. South Africa is divided into 9 provinces that consist of 53 districts an area within a province demarcated for administrative purposes [9]. The survey was conducted between 2017 and 2018 among young women aged 15–24 years old and used a stratified sampling design comprised of a three staged sampling approach. Detailed description of the methods has been documented in the HERStory report and published elsewhere [8, 10].

African National AIDS Council (SANAC) through the Country Coordinating Mechanism (CCM) and the CCM Secretariat.

* *Author Contribution:* All authors participated in the conception and design of the study. KJ drafted the manuscript. KJ, CL, RB, CM conceptualized the study, prepared and performed the analyses and the interpretation of findings. All authors participated in the reviewing of the manuscript drafts until content was satisfactory for submission. All authors approved the submission of this manuscript.

** *Availability of data and materials:* The dataset used for the current study is available from the corresponding author on reasonable request.

* Corresponding author.

E-mail address: kim.jonas@mrc.ac.za (K. Jonas).

Permission to conduct the study was obtained from the South African Medical Research Council's Ethics Committee. For participants under 18 years of age, parental or caregiver consent was obtained before getting consent from the adolescent girl. Participants were reimbursed with a gift (for example, earphones) and voucher to the value of R75 (US \$5). Details about the procedure have been published [8, 10].

2.2. Measures

The primary outcomes were (1) accessing condoms, defined as having accessed a male condom and/or a female condom in the past year, (2) accessing contraceptives, defined as having accessed another method of contraceptives other than condoms in the past year. For the purposes of this study, other methods of contraceptives were defined as: oral contraceptives (the pill), injectable contraceptives, emergency contraceptives (morning after pill), the implant, and intrauterine device (IUD), (3) contraceptive use other than condoms at last sex, defined as use of one of the above-mentioned contraceptive methods other than condoms at last sexual intercourse, (4) Dual contraception at last sex, defined as use of condoms plus another method of contraceptives at last sex.

The primary exposure was participation in the key components of the combination intervention, defined as reporting ever having attended or being a member of Soul Buddyz Clubs, Rise Clubs, Women of Worth Clubs, or the Keeping Girls in School Programme.

Other variables included age, currently in school, relationship status, socioeconomic status (SES), ever had sex, transactional relationship, transactional sex, having accessed SRH related websites, having had social support from parents, having experienced intimate partner violence (IPV) and/or sexual violence in the past 12 months, and pregnancy history. The measures are described in Mathews et al (2021) [10].

2.3. Analysis

We incorporated sample weights into the analyses as we aimed to generalize our results to the broader population of young women across all the 6 districts [10]. In the bivariate analyses, we included all participants, while in the multivariate analyses, we included only participants who reported ever having had sex, who also responded to the questions that comprised the primary outcomes. We conducted cross-tabulations to explore the factors associated with contraceptive access in the past year and use of contraceptive at last sex.

We performed 2 survey-based binomial generalized linear regression models using a log link function to determine: (1) the association firstly between intervention participation and use of contraceptives other than condom at last sex; (2) the association between intervention participation and use of dual contraception last sex (condoms plus another method of contraceptives). We assessed whether age moderated the associations. We assessed the interaction between age, and the intervention effect by incorporating the interaction term in the model. Variables were chosen based on how they performed on the bivariate analyses initially, and then based on evidence regarding factors that affect intervention participation. We adjusted the model for potential confounders (being in a relationship, having had a boyfriend in the past 12 months, having had transactional sex, having had transactional relationship, having had social support from parents, having used a condom at last sex as a method of contraception, and had experienced IPV and/or sexual violence in the past year) all a priori.

All fractions, adjusted prevalence ratio (aPRs) and 95% confidence intervals (95% CIs) were estimated using survey-based analysis. The significance level was set at a p -value of equal to, or less than 0.05 ($p \leq 0.05$). We used Stata version 14 to perform the analyses [11].

Table 1
Socio-demographic characteristics of young women included in the ^dHERStory Study, South Africa, 2018–2019

Variable	n (%)
Age group	
15–19	2515 (56.7)
20–24	1884 (43.3)
Currently in school	
Yes	2518 (56.2)
No	1881 (43.8)
Socioeconomic status	
Relatively high SES	792 (20.3)
Relatively low SES	3607 (79.7)
In a relationship	
Yes	2775 (62.0)
No	1624 (38.0)
Had a boyfriend in the past 12 months ^a	
Yes	2953 (67.3)
No	1387 (31.4)
Ever had sex	
Yes	3009 (68.4)
No	1390 (31.6)
Accessed SRH related websites (BeWise, MomConnect, iLoveLife, Chommy, & Rise)	
Yes	739 (17.5)
No	3660 (82.5)
Has had transactional relationship	
Yes	481 (10.7)
No	3918 (89.3)
Has had transactional sex	
Yes	424 (9.5)
No	3975 (90.5)
Ever pregnant ^{a b}	
Yes	1680 (52.1)
No	1412 (46.3)
Pregnant more than once ^{a.c}	
Yes	453 (26.7)
No	1213 (72.4)
First pregnancy before the age of 18 years old ^{a c}	
Yes	583 (36.2)
No	990 (63.8)
First pregnancy intended ^{a c}	
Yes	408 (26.6)
No	1218 (70.1)
Ever chosen abortion ^{a c}	
Yes	123 (7.8)
No	1538 (91.0)
HIV status	
Negative	3829 (87.6)
Positive	568 (12.4)
Participated in the intervention	
Yes	2103 (48.4)
No	2296 (51.6)
Social support from parents	
High support	2730 (61.9)
Moderate support	1207 (27.8)
Low support	462 (10.3)
Experienced IPV and/or sexual violence in the past 12 months	
Yes	1263 (29.6)
No	3136 (70.4)

^a Participants were given the response option “prefer not to answer” as well, which we did not include in this table as a very small percentage chose this option. [1.3% ($n = 59$) were excluded for the variable “had a boyfriend in the past 12 months”, 1.2% ($n = 35$) were excluded for the variable “ever pregnant”, 1.1% ($n = 18$) for abortion, 3.4% ($n = 54$) for first pregnancy intended].

^b Only asked for those who reported to have ever had sex.

^c Only asked for those who reported to have ever been pregnant.

^d Evaluation of a South African combination HIV prevention intervention for adolescent girls and young women: HERStory Study.

3. Results

3.1. Description of the participants

We included 4399 young women, a survey response rate of 60.6%. Of these, 3009 (68.4%) reported they had ever had sex and therefore met the inclusion criteria for the multi-

variate analyses. Among these, 2884 (95.8%) met the inclusion criteria for complete case analysis. The mean age of participants was 19.1 (standard deviation (SD) 2.7). Slightly more than half (56.2%) of the total sample were currently in school. Among the participants who reported they had ever had sex ($n = 3009$), 52.1% reported they had ever been pregnant (Table 1).

Table 2Factors associated with accessing condoms and other methods of contraceptives among young women, by age group ($n = 4399$), ^cHERStory Study, South Africa, 2018–2019

Variable	Accessed condoms in the past year			Accessed other methods of contraceptives in the past year		
	Yes n (%)	No n (%)	p -value	Yes n (%)	No n (%)	p -value
Currently in school						
Yes	1019 (41.3)	1499 (58.7)	<0.01	753 (30.3)	1765 (69.7)	<0.01
No	1238 (66.3)	643 (33.7)		1024 (53.8)	857 (46.2)	
Socioeconomic status						
Relatively high SES	411 (52.4)	381 (47.6)	0.90	315 (39.3)	477 (60.7)	0.32
Relatively low SES	1846 (52.2)	1761 (47.8)		1462 (41.0)	2145 (59.0)	
In a relationship						
Yes	1687 (61.8)	1088 (38.2)	<0.01	1394 (50.7)	1381 (49.3)	<0.01
No	570 (36.7)	1054 (63.3)		383 (24.3)	1241 (75.7)	
Had a boyfriend in the past 12 months ^a						
Yes	1682 (57.9)	1271 (42.1)	<0.01	1359 (46.1)	1594 (53.9)	<0.01
No	547 (40.5)	840 (59.5)		397 (29.2)	990 (70.8)	
Accessed SRH related websites (BeWise, MomConnect, iLoveLife, Chommy, & Rise)						
Yes	623 (72.3)	239 (27.7)	<0.01	487 (55.6)	375 (44.4)	<0.01
No	1634 (47.1)	1903 (52.9)		1290 (36.8)	2247 (63.2)	
Has had transactional relationship						
Yes	337 (69.4)	144 (30.6)	<0.01	280 (57.8)	201 (42.2)	<0.01
No	1920 (50.2)	1998 (49.8)		1497 (38.6)	2421 (61.4)	
Has had transactional sex						
Yes	300 (71.3)	124 (28.7)	<0.01	247 (58.4)	177 (41.6)	<0.01
No	1957 (50.3)	2018 (49.7)		1530 (38.8)	2445 (61.2)	
Ever pregnant ^{a, b}						
Yes	1170 (69.8)	510 (30.2)	<0.01	1084 (63.8)	596 (36.2)	<0.01
No	803 (57.7)	609 (42.3)		548 (39.6)	864 (60.4)	
HIV status ^a						
Positive	388 (69.7)	180 (30.3)	<0.01	312 (54.0)	256 (46.0)	<0.01
Negative	1868 (49.8)	1961 (50.2)		1465 (38.8)	2364 (61.2)	
Participated in the intervention						
Yes	1146 (55.7)	957 (44.3)	<0.01	826 (39.6)	1277 (60.4)	0.11
No	1111 (49.0)	1185 (51.0)		951 (41.6)	1345 (58.4)	
Social support from parents						
High support	1355 (50.5)	1375 (49.5)	0.01	1066 (39.3)	1664 (60.7)	<0.01
Moderate support	625 (53.3)	582 (46.7)		489 (40.5)	718 (59.5)	
Low support	277 (59.8)	185 (40.2)		222 (48.8)	240 (51.2)	
Experienced IPV and/or sexual violence in the past 12 months						
Yes	815 (65.0)	448 (35.0)	<0.01	667 (53.0)	596 (47.0)	<0.01
No	1442 (46.9)	1694 (53.1)		1110 (35.4)	2026 (64.6)	

Bold = p -value for the difference between those who participated in the intervention and factors associated with participation

^a Participants were given the response option "prefer not to answer" as well, which we did not include in this table as a very small percentage chose this option. [1.3% ($n = 59$) were excluded for the variable "had a boyfriend in the past 12 months" and 1.6% ($n = 49$) were excluded for the variable "ever pregnant"].

^b Only asked for those who reported to have ever had sex.

^c Evaluation of a South African combination HIV prevention intervention for adolescent girls and young women: HERStory Study.

3.2. Access to condoms and other methods of contraception in the past year

Of the 4399 participants, 52.3% ($n = 2257$) had accessed condoms and 40.6% ($n = 1777$) accessed other methods of contraceptives in the past year. Among the 3009 participants who ever had sex, 52.7% ($n = 1599$) had accessed condoms and 64.7% ($n = 1938$) had accessed other methods of contraceptives in the past year. **Table 2** shows factors associated with accessing condoms and other methods of contraception in the past year for all 4399 participants. Almost all variables were associated with access to condoms and other methods of contraception except for SES for both outcomes and participation in the intervention for the contraceptives other than condoms outcome.

Among those who participated in the intervention, 55.7% ($n = 1146$) accessed condoms compared to 49.0% ($n = 1111$) who did not participate in the intervention. Of those who participated in the intervention, 39.6% ($n = 826$) had accessed other methods of contraceptives in the past year compared to 41.6% ($n = 951$) who did not participate in the intervention (**Table 2**).

3.3. Use of contraceptives other than condoms at last sex among young women who had ever had sex

Table 3 shows factors associated use of contraceptives other than condoms at last sex among participants who had ever had

sex. The factors associated with the increased prevalence of use of contraceptives other than condoms include having participated in the intervention, having been in an intimate relationship, having had a transactional relationship, having had transactional sex, and ever having been pregnant. Condom use at last sex was associated with slightly decreased use of other contraceptives at last sex. About a third (36.7%, $n = 560$) of those who used a condom at last sex reported using another method of contraceptives at last sex compared to 38.9% ($n = 500$) of those who reported not to use condom at last sex (**Table 3**).

When stratified by age, in the 15–19 year age subgroup, having participated in the intervention, having been in an intimate relationship, having had a transactional relationship, having had transactional sex, and ever having been pregnant were associated with an increased likelihood of using contraceptives other than condoms at last sex; while in the 20–24 years age subgroup, having been in an intimate relationship, having had a transactional relationship, having had transactional sex, and having ever been pregnant, were associated with an increased likelihood (**Table 3**).

3.4. Association between intervention participation and use of contraceptives other than condoms, and dual contraception at last sex

Table 4 shows the association between participation in key components of the combination HIV prevention intervention and the use of contraceptives other than condoms at last sex among

Table 3

Factors associated with the use of contraceptives other than condoms at last sex among young women who had ever had sex, by age groups (n=2884), ^cHERStory Study, South Africa, 2018–2019

Variable	15–19 years n = 1237 Used contraceptives at last sex			20–24 years n = 1647 Used contraceptives at last sex			Total N = 2884 Used contraceptives at last sex		
	Yes n (%)	No n (%)	p-value	Yes n (%)	No n (%)	p-value	Yes n (%)	No n (%)	p-value
Currently in school									
Yes	279 (31.1)	625 (68.9)	0.02	161 (42.5)	216 (57.5)	0.33	440 (34.4)	841 (65.6)	0.01
No	121 (37.1)	212 (62.9)		511 (40.4)	759 (59.6)		632 (39.7)	971 (60.3)	
Socioeconomic status									
Relatively high SES	58 (27.8)	146 (72.2)	0.06	132 (39.9)	193 (60.1)	0.62	190 (35.2)	339 (64.8)	0.18
Relatively low SES	342 (33.8)	691 (66.2)		540 (41.1)	782 (58.9)		882 (37.9)	1473 (69.1)	
In a relationship									
Yes	328 (35.4)	618 (64.6)	<0.01	566 (42.8)	771 (57.2)	0.01	894 (39.7)	1389 (60.3)	<0.01
No	72 (24.6)	219 (75.4)		106 (33.3)	204 (66.7)		178 (29.2)	423 (70.8)	
Had a boyfriend in the past 12 months ^a									
Yes	326 (33.2)	674 (66.8)	0.61	532 (41.4)	761 (58.6)	0.31	858 (37.8)	1435 (62.2)	0.26
No	70 (30.8)	156 (69.2)		133 (38.5)	208 (61.5)		203 (35.4)	364 (64.6)	
Accessed SRH related websites (BeWise, MomConnect, iLoveLife, Chommy, & Rise)									
Yes	119 (42.5)	162 (57.5)	<0.01	166 (42.8)	208 (57.2)	0.38	245 (43.4)	318 (56.6)	0.01
No	281 (29.9)	675 (70.1)		506 (40.2)	767 (59.8)		827 (35.8)	1494 (64.2)	
Used condom at last sex ^a									
Yes	227 (32.1)	488 (67.9)	0.06	333 (40.8)	486 (59.2)	0.16	560 (36.7)	974 (63.3)	0.01
No	166 (34.7)	320 (65.3)		334 (41.4)	477 (58.6)		500 (38.9)	797 (61.1)	
Have transactional relationship									
Yes	72 (45.7)	92 (54.3)	0.01	128 (51.8)	124 (48.2)	<0.01	200 (49.4)	216 (50.6)	<0.01
No	328 (30.8)	745 (69.2)		544 (39.0)	851 (61.0)		827 (35.4)	1596 (64.6)	
Have transactional sex									
Yes	66 (48.3)	75 (51.7)	<0.01	113 (50.8)	110 (49.2)	0.01	179 (49.9)	185 (50.1)	<0.01
No	334 (30.8)	762 (69.2)		559 (39.4)	865 (60.6)		893 (35.6)	1627 (64.4)	
Ever pregnant ^{a, b}									
Yes	171 (38.0)	277 (62.0)	0.01	502 (43.6)	635 (56.4)	0.01	673 (42.1)	912 (57.9)	<0.01
No	226 (30.1)	552 (69.9)		165 (34.9)	331 (65.1)		391 (31.9)	883 (68.1)	
HIV status ^a									
Positive	55 (43.6)	74 (56.4)	0.01	147 (41.9)	199 (58.1)	0.58	202 (42.4)	273 (57.6)	0.01
Negative	345 (31.6)	763 (68.4)		525 (40.6)	775 (59.4)		870 (36.4)	1538 (63.6)	
Participated in the intervention									
Yes	248 (37.1)	429 (62.9)	<0.01	265 (40.4)	380 (59.6)	0.75	513 (38.8)	809 (61.2)	0.09
No	152 (27.5)	408 (72.5)		407 (41.1)	595 (58.9)		559 (36.1)	1003 (63.9)	
Social support from parents									
High support	228 (31.5)	489 (68.5)	0.03	403 (39.4)	622 (60.6)	0.08	631 (36.1)	1111 (63.9)	0.08
Moderate support	130 (36.5)	246 (63.5)		184 (42.1)	248 (57.9)		314 (39.5)	494 (60.5)	
Low support	42 (29.2)	102 (70.8)		85 (46.0)	105 (54.0)		127 (38.6)	207 (61.4)	
Experienced IPV and/or sexual violence in the past 12 months									
Yes	154 (37.6)	268 (62.4)	0.01	266 (42.7)	360 (57.3)	0.18	420 (40.6)	628 (59.4)	0.01
No	246 (30.2)	569 (69.8)		406 (39.7)	615 (60.3)		652 (35.4)	1184 (64.6)	

^a Participants were given the response option “prefer not to answer” as well, which we did not include in this table as a very small percentage chose this option. [1.3% (n = 59) were excluded for the variable “had a boyfriend in the past 12 months” and 1.6% (n = 49) were excluded for the variable “ever pregnant”].

^b Only asked for those who reported to have ever had sex.

^c Evaluation of a South African combination HIV prevention intervention for adolescent girls and young women: HERStory Study.

participants who had ever had sex, adjusted for potential confounders. The intervention effect was significantly modified by age (PR: 0.74; 95% CI: 0.63–0.86). Adolescent women aged 15–19 who participated in the intervention were more likely to report use of contraceptives other than condoms at last sex, compared with those who did not participate in the intervention (PR: 1.36; 95% CI: 1.21–1.53) but there was no such association among the participants of the 20–24 year old group (PR=1.00; 95% CI 0.90–1.12).

Table 5 shows the association between participation in key components of the intervention and the use of dual contraception (condom plus another form of contraception) at last sex among participants who had ever had sex, adjusted for potential confounders. There is a significant interaction with age and intervention, $p < 0.001$. Young women aged 15–19 who participated in the intervention were more likely to report dual contraception at last sex, than those who did not participate in the intervention (PR: 1.46; 95% CI: 1.26–1.68) but there was no such association in the 20–24 year age group (PR: 1.04; 95% CI: 0.92–1.16).

Table 6

4. Discussion

We examined associations between participating in a combination HIV prevention intervention, and accessing and using condoms and/or other methods of contraceptives among young women living in 6 South African districts. Adolescent girls who had participated in the intervention were more likely at last sex to have used contraceptives other than condoms, and to have used both condoms and another form of contraception, compared with those who did not participate in the intervention. However, there was no association between intervention participation and these outcomes among participants aged 20–24 years. These findings suggest that combination HIV prevention interventions have the potential to increase access and use of condoms and other methods of contraception among adolescent girls, and reduce unintended pregnancies. However, this needs to be confirmed in experimental studies. They also suggest that we need further research to explore the specific barriers to contraceptive access and use experienced by women aged 20–24 years, to inform the age-tailored re-design of combination interventions to overcome such barriers.

Table 4

Results of the binomial generalized linear regression model showing the association of intervention participation and the use of contraceptives other than condoms at last sex among young women who had ever had sex, by age-groups ($n = 2884$), ^bHERStory Study, South Africa, 2018–2019

Variable	Adjusted Prevalence Ratios (aPR)	p-value	95% Confidence Interval lower	upper
Intervention				
No (ref)				
Yes	1.36	< 0.001	1.21	1.53
Age Category				
15–19 (ref)	-	-		
20–24	1.33	< 0.001	1.20	1.49
Intervention with interaction term				
Yes (15–19 years old, ref)	-	-		
Yes (20–24 years old)	0.74	< 0.001	0.63	0.86
Currently in school				
No (ref)	-	-		
Yes	0.97	0.49	0.89	1.06
Socioeconomic status				
Relatively low SES (ref)	-	-		
Relatively high SES	0.95	0.37	0.85	1.06
Ever been pregnant ^a				
No (ref)	-	-		
Yes	1.26	< 0.001	1.15	1.37
HIV status				
Positive (ref)	-	-		
Negative	0.92	0.09	0.83	1.01

Bold = significance.

^a Participants were given the response option “prefer not to answer” as well, which we did not include in this table as a very small percentage chose this option. Age specific intervention effects estimated from the model adjusted for the covariates in the model. Age 15–19; PR=1.36; 95% CI 1.21–1.53, $p < 0.001$. Age 20–24; PR=1.00; 95% CI 0.90–1.12, $p < 0.001$.

^b Evaluation of a South African combination HIV prevention intervention for adolescent girls and young women: HERStory Study

Table 5

Results of the binomial generalized linear regression model showing the association of intervention participation and the use of dual contraception (condoms plus another form of contraception) at last sex among young women who had ever had sex, by age-groups ($n = 2884$), ^bHERStory Study, South Africa, 2018–2019

Variable	Adjusted Prevalence Ratios (aPR)	p-value	95% Confidence Interval lower	upper
Intervention				
No (ref)				
Yes	1.45	< 0.001	1.26	1.68
Age Category				
15–19 (ref)	-	-		
20–24	1.28	< 0.001	1.12	1.49
Intervention with interaction term				
Yes (15–19 years old, ref)	-	-		
Yes (20–24 years old)	0.71	< 0.001	0.59	0.86
Currently in school				
No (ref)	-	-		
Yes	1.01	0.80	0.92	1.12
Socioeconomic status				
Relatively low SES (ref)	-	-		
Relatively high SES	1.01	0.88	0.90	1.13
Ever been pregnant ^a				
No (ref)	-	-		
Yes	1.07	0.14	0.97	1.18
HIV status				
Positive (ref)	-	-		
Negative	0.87	0.01	0.78	0.97

Bold = significance.

^a Participants were given the response option “prefer not to answer” as well, which we did not include in this table as a very small percentage chose this option. Age specific intervention effects estimated from the model adjusted for the covariates in the model. Age 15–19; PR=1.46; 95% CI 1.26–1.68, $p < 0.001$. Age 20–24; PR=1.04; 95% CI 0.92–1.16, $p < 0.01$.

^b Evaluation of a South African combination HIV prevention intervention for adolescent girls and young women: HERStory Study.

Among those who had ever had sex, fewer than half of the participants used contraceptive methods other than condoms at last sex (in both age groups), even if they had participated in the intervention. This highlights the importance of finding more effective approaches to increase contraception coverage among adolescent girls and young women, even in the context of combination HIV prevention programs. Low uptake of contraceptives and high rates

of unintended pregnancies among young women in this study, is similar to findings reported from other countries in the sub-Saharan Africa region and a cause for concern [12–15]. Our findings concur with previous research in the country and in other LIMCs where low use of contraceptives among adolescents was reported [12–15].

Table 6
Description of the combination HIV prevention intervention components for the adolescent girls and young women implemented in 10 South African districts, 2016–2019

Name	Description	Intervention components
Soul-Buddyz Club	An in-school peer-education/youth club model in primary schools for children struggling academically, affected by HIV or with signs of neglect. Clubs were facilitated by educators, who attended annual training, and used age-appropriate materials	Biomedical Linkage and referral to health and other services Behavioral SRH education and peer support Structural Promote access to grants Promote an environment for ongoing learning Social cohesion
Keeping Girls In-school	A high school-based intervention for adolescent girls at risk of dropping out of school including those affected by HIV, with caregiving responsibilities or with signs of neglect. It aimed to identify and support female learners who were at risk of dropping out of school prematurely. It included a peer education program facilitated by Peer Group Trainers or Health Educators	Biomedical HIV testing; TB, STI and GBV screening; Linkage and referral to services Behavioral SRH education; peer support; home visits to encourage school attendance Structural Career guidance; homework support; Promote an environment for ongoing learning
RISE Clubs (In-school)	The Rise clubs were constituted by 15–20 young women from a school, who meet regularly to discuss issues that affect them. The clubs also linked young women to career guidance through career jamborees and homework support. The curriculum is contained in Rise magazines	Biomedical Linkage and referral to health services including HCT, PMTCT, ART, SRH Behavioral SRH education; caregiving support; peer support; build self-efficacy and resilience Structural Social cohesion Community activism Career guidance
RISE Clubs (Out-of-school)	The clubs were constituted by 15–20 young women from a community, who met regularly to discuss issues that affect them. The clubs also linked young women to educational and economic opportunities and local microenterprise development organizations	Biomedical Linkage and referral to health services including HTS, PMTCT, ART, SRH services Behavioral SRH education; caregiving support; peer support; build self-efficacy and resilience Structural Social cohesion Economic strengthening Community activism
Health and welfare jamborees	These events were held in school or community venues and brought health, social and other services to communities to facilitate access for adolescent girls and young women and their communities	Biomedical HTS; TB, STI and GBV screening; linkage and referral to health services Behavioral SRH education Structural Career opportunities; social grants; birth registrations
Community dialogues	Targeted at men and women 14 years of age and above living in the areas of the adolescent girl and young women intervention. Trained facilitators used promotional materials to guide dialogues in school or community venues. They promoted gender equity, prosocial male norms, and the uptake of men's SRH services	Biomedical Linkage and referral to health services Behavioral SRH education Structural GBV prevention

ART, antiretroviral therapy; GBV, gender-based violence; HTS, HIV testing services; STI, sexually transmitted infections; PMTCT, prevention of mother-to-child transmission; SRH, sexual and reproductive health; TB, tuberculosis.

Use of other methods of contraceptives other than condoms at last sex among the younger women (15–19 years old) who are currently in school was lower than those not in school. This finding corroborates the slowly declining pregnancy rates among school going adolescent girls, as well as the high burden of HIV infection rates in this subpopulation [6].

HIV positive young women in our study were more likely to report use of contraceptives other than condoms and dual contraception at last sex than the HIV negative young women. This is encouraging as unintended pregnancies among HIV positive women increase the risk for MTCT, and consequently high risks for maternal and child morbidity and mortality rates [6]. This is likely attributed to the integration of the HIV program and family planning services in primary health care. Young women who reported to have ever had a pregnancy were also more likely to report use of contraceptives other than condoms at last sex. This is also positive as it shows that young women are being offered family planning services after delivery of the baby or at post-natal care services. Promoting access and use of contraceptives for both HIV positive and for HIV negative young women, as well as for those who had had a pregnancy and those who had not yet have a pregnancy is essential. This would help reduce the maternal and child morbidity and mortality rates that are attributed by this sub population, and help improve contraceptive use among all young women.

Combination interventions, like the 1 used for this study, can be considered in all SRH programming as they have shown potential to improve access and use of contraceptives, and improve other indicators of SRH. In other settings, community-based combination HIV prevention interventions showed promising results in reducing HIV incidence among pregnancy and postpartum women in the

country [16], and significant reductions in HIV incidence and had an impact on the HIV care continuum outcomes among female sex workers in Tanzania [17].

Limitations of this study include its cross-sectional design (we were not able to determine causality), the response rate, the difficulty of measuring intervention participation comprehensively given that some components of the intervention were not branded, and that the survey was conducted during the second and third years of intervention implementation, and the intervention may not have had time to demonstrate impact on access and use of SRH services.

Acknowledgment

We would like to acknowledge and thank the adolescent girls and young women who agreed to make themselves available to take part in this research, and share their views, opinions and experiences with us.

References

- [1] Williams BG, Gupta S, Wollmers M, Granich R. Progress and prospects for the control of HIV and tuberculosis in South Africa: a dynamical modelling study. *The Lancet Public Health* 2017;2(5):e223–30 doi: doi:10.1016/S2468-2667(17)30066-X.
- [2] Hubacher D, Mavranzouli I, McGinn E. Unintended pregnancy in sub-Saharan Africa: magnitude of the problem and potential role of contraceptive implants to alleviate it. *Contraception* 2008;78(1):73–8 doi: doi:10.1016/j.contraception.2008.03.002.
- [3] Dellar RC, Dlamini S, Karim QA. Adolescent girls and young women: key populations for HIV epidemic control. *J International AIDS Society* 2015;18:19408 doi: doi:10.7448/IAS.18.2.19408.
- [4] Demographic SA. Health Survey (SADHS), 2016. Key indicators report 2018. Pretoria

- [5] UNFPA, 2015. *Girlhood, Not Motherhood: Preventing Adolescent Pregnancy*. UNFPA, New York. World Health Organization (WHO), 2015. *Maternal, Newborn, Child and Adolescent Health*. Available at: http://www.who.int/maternal_child_adolescent/topics/maternal/adolescent_pregnancy/en. (Accessed 14 April 2020).
- [6] World Health Organization, 2021. HIV/AIDS. July Available at: <https://www.who.int/news-room/fact-sheets/detail/hiv-aids> (Accessed 19 July 2021).
- [7] Darroch JE, Woog V, Bankole A, Ashford LS, Points K. Costs and benefits of meeting the contraceptive needs of adolescents. Guttmacher Institute, 2016.
- [8] Mathews C, Lombard C, Puren A, Cheyip M, Ayalew K, Jonas K, et al. *Evaluation of a South African combination HIV prevention programme for adolescent girls and young women: HERStory Study*. Cape Town: South African Medical Research Council; 2020.
- [9] Sartorius K, Sartorius B. Service delivery inequality in South African municipal areas: a new way to account for inter-jurisdictional differences. *Urban Studies* 2016;53(15):3336–55 doi: [10.1177/0042098015613001](https://doi.org/10.1177/0042098015613001).
- [10] Mathews C, Cheyip M, Beauclair R, Puren A, Lombard C, Jonas K, et al. HIV care coverage among HIV-positive adolescent girls and young women in South Africa: Results from the HERStory Study. *South African Medical Journal* 2021;111(5):460–8. doi: [10.7196/SAMJ.2021.v111i5.15351](https://doi.org/10.7196/SAMJ.2021.v111i5.15351). Available at: https://hdl.handle.net/10520/ejc-m_samj-v111-n5-a17. [Accessed 14 February 2022].
- [11] StataCorp, Stata Statistical Software: Release 14. 2015 College Station, TX: StataCorp LP.
- [12] Jonas K, Duby Z, Maruping K, Dietrich J, Slingsers N, Harries J, et al. Perceptions of contraception services among recipients of a combination HIV-prevention interventions for adolescent girls and young women in South Africa: a qualitative study. *Reproductive Health* 2020;17(1):1–4 doi: [10.1186/s12978-020-00970-3](https://doi.org/10.1186/s12978-020-00970-3).
- [13] Makola L, Mlangeni L, Mabaso M, Chibi B, Sokhela Z, Silimfe Z, et al. Predictors of contraceptive use among adolescent girls and young women (AGYW) aged 15 to 24 years in South Africa: results from the 2012 national population-based household survey. *BMC Women's Health* 2019;19(1):158 doi: [10.1186/s12905-019-0861-8](https://doi.org/10.1186/s12905-019-0861-8).
- [14] Hagan JE, Buxton C. Contraceptive knowledge, perceptions and use among adolescents in selected senior high schools in the central region of Ghana. *J Sociol Res* 2012;3(2):170–80 doi: [10.5296/jsr.v3i2.2311](https://doi.org/10.5296/jsr.v3i2.2311).
- [15] Charles JM, Rycroft-Malone J, Hendry M, Pasterfield D, Whitaker R. Reducing repeat pregnancies in adolescence: applying realist principles as part of a mixed-methods systematic review to explore what works, for whom, how and under what circumstances. *BMC pregnancy and childbirth* 2016;16(1):1–2 doi: [10.1186/s12884-016-1066-x](https://doi.org/10.1186/s12884-016-1066-x).
- [16] Fatti G, Shaikh N, Jackson D, Goga A, Nachega JB, Eley B, et al. Low HIV incidence in pregnant and postpartum women receiving a community-based combination HIV prevention intervention in a high HIV incidence setting in South Africa. *PLoS One* 2017;12(7):e0181691 doi: [10.1371/journal.pone.0181691](https://doi.org/10.1371/journal.pone.0181691).
- [17] Kerrigan D, Mbwambo J, Likindikoki S, Davis W, Mantsios A, Beckham SW, et al. Project Shikamana: community empowerment-based combination HIV prevention significantly impacts HIV incidence and care continuum outcomes among female sex workers in Iringa, Tanzania. *J Acquired Immune Deficiency Syndromes (1999)* 2019;82(2):141 doi: [10.1097/QAI.0000000000002123](https://doi.org/10.1097/QAI.0000000000002123).