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

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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.

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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.

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**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.

**Keywords**
Access; Contraceptive use; Contraception; HIV prevention; Unintended pregnancy; South Africa

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].

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].
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 ≤ 0.05). We used Stata version 14 to perform the analyses [11].

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 multivariate 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).

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 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.

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].

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 a 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.

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Availability of data and materials

The dataset used for the current study is available from the corresponding author on reasonable request.

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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.
Table 1

Socio-demographic characteristics of young women included in the HERStory 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**                     |          |
| 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) |
| Variable                                      | n  | (%) |
|----------------------------------------------|----|-----|
| Ever pregnant<sup>a,b</sup>                  |    |     |
| Yes                                          | 1680 | (52.1) |
| No                                           | 1412 | (46.3) |
| Pregnant more than once<sup>a,c</sup>         |    |     |
| Yes                                          | 453  | (26.7) |
| No                                           | 1213 | (72.4) |
| First pregnancy before the age of 18 years old<sup>a,c</sup> |    |     |
| Yes                                          | 583  | (36.2) |
| No                                           | 990  | (63.8) |
| First pregnancy intended<sup>a,c</sup>        |    |     |
| Yes                                          | 408  | (26.6) |
| No                                           | 1218 | (70.1) |
| Ever chosen abortion<sup>a,c</sup>           |    |     |
| 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) |

<sup>a</sup>Participants were given the response option “prefer not to answer” as well, which we did not included 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].
Only asked for those who reported to have ever had sex.

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

Evaluation of a South African combination HIV prevention intervention for adolescent girls and young women: HERStory Study.
Table 2

Factors associated with accessing condoms and other methods of contraceptives among young women, by age group (n = 4399), HERStory 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          |           |          |         |           |          |         |
| Yes                                           | 1682 (57.9) | 1271 (42.1) | <0.01 | 1399 (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                                 |           |          |         |           |          |         |
| Yes                                           | 170 (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                                    |           |          |         |           |          |         |
|                                | Accessed condoms in the past year | Accessed other methods of contraceptives in the past year |
|--------------------------------|----------------------------------|----------------------------------------------------------|
|                                | Positive                         | Negative                                                 |
|                                | 388 (69.7)                       | 180 (30.3)                                               |
|                                | 1868 (49.8)                      | 1961 (50.2)                                              |
|                                | <0.01                            | 1465 (38.8)                                              |
|                                | 312 (54.0)                       | 256 (46.0)                                               |
|                                | < 0.01                           | 2364 (61.2)                                              |
| Participated in the intervention|                                  |                                                          |
| Yes                            | 1146 (55.7)                      | 957 (44.3)                                               |
|                                | <0.01                            | 826 (39.6)                                               |
|                                | 1277 (60.4)                      | 1465 (38.8)                                              |
| 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 included 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.
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), HERStory Study, South Africa, 2018–2019

| Variable                               | 15–19 years n = 1237 |   | 20–24 years n = 1647 |   | Total N = 2884 |   |
|----------------------------------------|-----------------------|---|-----------------------|---|----------------|---|
|                                        | Yes a (%)             | No a (%)   | p-value               | Yes a (%)             | No a (%)   | p-value               | Yes a (%)             | No a (%)   | 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<sup>a</sup> |           |            |                       |                       |            |                       |                       |            |                       |
| 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 (35.40)           | 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<sup>a</sup>   |                       |            |                       |                       |            |                       |                       |            |                       |
| 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) |                       |
|                        | 15–19 years \( n = 1237 \) | 20–24 years \( n = 1647 \) | Total \( N = 2884 \) |
|------------------------|----------------------------|-----------------------------|----------------------|
| **Ever pregnant\(^a\)\(^b\)** |                           |                             |                      |
| Yes                    | 171 (38.0)                 | 502 (43.6)                  | 673 (42.1)           |
| No                     | 226 (30.1)                 | 165 (34.9)                  | 391 (31.9)           |
| **HIV status\(^a\)**    |                           |                             |                      |
| Positive               | 55 (43.6)                  | 147 (41.9)                  | 202 (42.4)           |
| Negative               | 345 (31.6)                 | 525 (40.6)                  | 870 (36.4)           |
| **Participated in the intervention** |                       |                             |                      |
| Yes                    | 248 (37.1)                 | 265 (40.4)                  | 513 (38.8)           |
| No                     | 152 (27.5)                 | 407 (41.1)                  | 559 (36.1)           |
| **Social support from parents** |                       |                             |                      |
| High support           | 228 (31.5)                 | 403 (39.4)                  | 631 (36.1)           |
| Moderate support       | 130 (36.5)                 | 184 (42.1)                  | 314 (39.5)           |
| Low support            | 42 (29.2)                  | 85 (46.0)                   | 127 (38.6)           |
| **Experienced IPV and/or sexual violence in the past 12 months** |                       |                             |                      |
| Yes                    | 154 (37.6)                 | 266 (42.7)                  | 430 (40.6)           |
| No                     | 246 (30.2)                 | 406 (39.7)                  | 652 (35.4)           |

\(^a\) Participants were given the response option “prefer not to answer” as well, which we did not included 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.
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), \(^b\)HERStory Study, South Africa, 2018–2019

| Variable                                | Adjusted Prevalence Ratios (aPR) | p-value | 95% Confidence Interval lower | Interval 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\(^d\)               |                                  |         |                               |                |
| 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.

\(^d\)Participants were given the response option “prefer not to answer” as well, which we did not included 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). a HERStory 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 included 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.
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, PMTCTE, 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  
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.