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Multifaceted Interventions and HIV Risky Sexual Behaviours among Adolescent Girls and Young Women: A Case Study of the DREAMS Partnership in Mubende Region, Uganda

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Abstract *Risky sexual behaviour among Adolescent Girls and Young Women (AGYW) is a global health challenge resulting in new cases of HIV infection, sexually transmitted Infections (STIs), unwanted pregnancies and unsafe abortions. This study aimed at examining the effectiveness of multifaceted interventions on reduction of risky sexual behaviours (RSBs) among AGYW in Mubende region, Uganda. The study adopted a descriptive cross-sectional design for both qualitative and quantitative data collection and analysis. Quantitative data was gathered through pre-tested structured questionnaires from 385 randomly selected participants, while qualitative data was collected via focus group discussions and key Informant interviews with purposively selected respondents. Quantitative data was analyzed using STATA 18.0 software, while qualitative data was transcribed verbatim and analyzed using NVIVO software. The findings revealed that 92.5% of the target population was reached by DREAMS interventions. Marital status (AOR = 0.17, 95% CI: 0.04–0.64, p = 0.01), Education status (AOR = 0.001,95% CI: 0.00-0.00, p<0.001), Age at enrollment (AOR = 49.52,95% CI:1.24-1981.93, p= 0.038), Journeys plus (AOR=22.75, 95% CI: 1.26-409.98, p= 0.034), employment after graduation (AOR=14.57, 95% CI: 1.15-184.00, p=0.038), marriage after graduation (AOR=15.95, 95% CI: 1.11-229.21, p=0.042) and starting own business after graduation (AOR=15.32, 95% CI: 1.66-141.33, p=0.016), were the independent variables significantly associated with RSBs. HIV prevention and sexual health, economic empowerment, behaviour change, employment opportunity, reduced unintended pregnancies, retention in school and asset building were identified as the major outcomes achieved by the program. Education status, Marital status, age enrollment, Journeys plus curriculum, employment, marriage and starting own business after graduation positively influenced RSBs.*

Keywords *Adolescent Girls and Young Women, DREAMS, Multifaceted, Risky Sexual Behaviours.*

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Introduction

Risky sexual behaviour (RSB) among adolescent girls and young women (AGYW) is a global health challenge resulting into new cases of HIV infections, sexually transmitted diseases (STDs), unwanted pregnancies and unsafe abortions. Risky sexual behaviours (RSBs) are defined as sexual activities that predispose an individual to the risk of acquiring sexually transmitted infections including HIV and unplanned pregnancies [1, 2]. The major risky sexual behaviours among AGYW include, early sexual debut, age-disparate sex, multiple partnerships, incorrect and inconsistent condom use, transactional sex, drinking alcohol and substance abuse, gaps in knowledge and limited personalized risk perception. Adolescence is a period of life from childhood which involves experimentation and exploration when individuals experience rapid physical, cognitive and social-emotional changes as they transition to adulthood leading them to engage in risky sexual behaviors.

Globally, about one million cases of sexually transmitted diseases are reported daily and adolescents account for approximately 50% of these cases arising from RSBs [3] According to World Health Organization (WHO) global estimates, 376 million new STIs of chlamydia, Gonorrhea, syphilis and Trichomoniasis were reported [3]. This has led to high rates of Sexually Transmitted Infections (STIs) in adolescents compared to other age groups with over 30% of new HIV infections and majority of STDs occurring in this population each year. Worldwide, AGYW aged (15-24 years) are disproportionately affected with HIV infection as compared to their male counterparts due to their increased level of vulnerability [4, 5]. Lack of appropriate interventions to protect the AGYW and cater for their sexual and reproductive health needs results in disproportionately high HIV prevalence globally among this target population. Approximately, 1.9 million AGYW aged (15-24 years) were living with HIV globally as compared with 1.2 million adolescent boys and young men in the same age band [5].

In Sub-Saharan Africa (SSA), the incidence of HIV was estimated at 210,000 among AGYW (15-24 years) in 2022., Women and girls (all ages) accounted for 63% of all new HIV infections. Eighty-two per cent of AGYW who acquired HIV in 2022 live in Sub-Saharan Africa, including two thirds in eastern and southern Africa. Over 50% of new HIV infections in 2022 occurred among men and boys of the same age in all other geographical regions [6]. Additionally, according to the study in Nigeria to investigate the prevalence of risky sexual behaviors (RSBs) among adolescent girls and young women, evidence revealed that 41.1% and 28.3% of adolescent girls and young women are involved in RSBs, respectively.[7].

It has been proven empirically that sexual behaviours in relation to poverty, gender inequality, gender-based violence, lack of access to education, health care services, social protection and information on HIV prevention are major structural drivers that increase the level of AGWs vulnerability to acquisition of new HIV infection [8, 9]**.** These have led AGYW to be less likely to negotiate for safer sex and engage in risky sexual behaviors that predispose them to HIV infection. In the previous cross-sectional study in Uganda to assess the risky sexual behaviors and HIV and syphilis prevalence among in and out of school AGYW, the findings revealed that 54.5% AGYW had ever had sex, of these 12.9% had their sexual debut before age 15; 19.1% reported a history of STIs. Of those that had ever had sex, 79.6% had sex in the 12 months preceding the survey; 75.6% with one (1) and 24.2% with 2+ partners. Condom use with the most recent sexual partner was low, with only 20.4% reporting consistent condom use while 79.6% reported inconsistent or no condom use [10].

Risky sexual behaviours contributing to increased vulnerability to acquisition of HIV infections among AGYW must be addressed in

a bid to achieve eradication of the HIV/AIDS scourge. To address RSBs as a global challenge among AGYW, achieve HIV Epidemic control and promote AGYW wellbeing, an ambitious public-private partnership called "Determined, Resilient, Empowered, AIDS-Free, Mentored and Safe (DREAMS) was launched on World AIDS Day in 2014. DREAMS project is currently implemented in 15 countries in partnership with donor agencies such as Johnson& Johnson, the Bill and Melinda Gates Foundation, Girl Effect, Gilead Sciences and ViiV Healthcare. DREAMS project was implemented in Fort-Mubende region which is among the DREAMS regions that fulfilled the criterion of high HIV prevalence and incidence according to the burden table [11].

However, despite the heavy investments in DREAMS partnership, evidence on the impact of MIs on reducing risky sexual behaviors among AGYW is not clearly documented and knowledge is still scanty in Uganda which affirms originality of the study. There is no evidence that a similar study using cross-sectional study design to investigate effectiveness of MIs on risky sexual behaviors among AGYW on different cohorts was conducted. This study focused on the DREAMS partnership, a novel, multifaceted program launched in Uganda in 2016, specifically targeting vulnerable AGYW aged 10–24 years. To date, no comprehensive evaluation has been conducted to assess the impact of these interventions on reducing RSBs among this population, making this study the first of its kind in the Ugandan context. Second, the study's novelty is reflected in its specific objectives, which address critical knowledge gaps previously unexplored by other scholars. 1) To assess the Reach of MIs among AGYW and 2) To investigate the influence of MIs on risky sexual behaviors among AGYW.

Multifaceted interventions (MIs) refer to multiple evidence-based approaches provided to AGYW that go beyond biomedical interventions in addressing structure drivers that directly or indirectly increase the girl's HIV risk, DREAMS partnership provides evidence –based interventions (multifaceted interventions) with an aim of reducing risky sexual behaviours among AGYW through service layering with a comprehensive package. The DREAMS theory of change hypothesizes that service layering (when multiple interventions from the core package are delivered to vulnerable AGYW those interventions will act synergistically to change both the program outcomes and impact. DREAMS package is categorized as primary, secondary and contextual services provided according to age band (10-14-year-olds), (15-19-year-olds) and (20-24-year-old) aimed at achieving AGYW_PREV (AGYW prevention), building their human, social, health and economic assets.

Layering of services is a DREAMS fundamental principle based on research from related fields demonstrating that multiple interventions have greater impact on risk behaviors than any single intervention [12]. It is against this backdrop, this study therefore sought to investigate the effectiveness of multifaceted interventions on reduction of risky sexual behaviours among adolescent girls and young women (10-24 years) in Mubende region. Uganda. This study is a scientific contribution to existing knowledge, thereby supporting donors, policymakers, and program implementers in designing evidence-based, efficient and cost-effective strategies to prevent risky sexual behaviours and program replication. Finally, the results of this study can provide useful information for scholars to conduct further research to generate more evidence on this issue.

Materials and Methods

Study Design

The study employed descriptive cross-sectional study design using a mixed-methods approach. Data collection was conducted between October and November 2025.

Study Setting

The study was conducted in Mubende and Mityana districts in Mubende region, Uganda. Mubende region was composed of 4 Sub National Units (SNUs) initially which included Luwero, Mityana, Kassanda and Mubende districts. Mubende district in the central region of Uganda composed of 18 (Eighteen) sub counties and one town council before splitting from Kassanda district. It covers an area of approximately 4,620 square kilometres. The total Population of Mubende District as contained in the 2014 Population and Housing Census was 684,348 with 346,654 males and 337,694 females. Mityana is a district in the central region of Uganda. It covers an area of approximately 1,579.3 square kilometres. The district has 9 sub counties, fifty-nine parishes and 840 villages. The total Population of Mityana District as contained in the 2014 Population and Housing Census was 328,964 with 165,717 males and 163,247 females.

Sample Size Determination

The Sample size formula for quantitative variable was employed to obtain the minimum sample size using the formula by Cochran (1976) since the population of the vulnerable AGYW (15-24 years) for the district is known to be large [13].

$$n = \frac{z^2 pq}{e^2}$$

Where: n = the sample size, Z= value of area under the normal curve (Standard normal deviation corresponding to the confidence level of 95% for a tailed test = 1.96), p = Estimated proportion of an attribute present in the population to be 50%, q = 1-p and e = Desired level of precision, which is 5% or 0.05.

Using the formula above the minimum sample size was ascertained.

$$n = \frac{1.96 \times 1.96 \times 0.5 \times 0.5}{0.05 \times 0.05}$$

$$n = \frac{0.9604}{0.0025} = 385$$

Based on the population size of the target population in the two study areas, a total of 125 respondents and 260 respondents participated in the study in Mityana and Mubende districts respectively.

Sampling Techniques

Sampling refers to the statistical method or process of selecting a portion of the population to represent the entire population or process of selecting individual observations from defined study population [14]. A multistage cluster random sampling technique was used to select AGYW aged (15-33) years in Mubende region. Simple random sampling was used to select respondents to participate in the survey to assess the Reach (Proportion of beneficiaries), factors associated with risky sexual behaviors and multifaceted (MIs) among AGYW. Participants for KII interviews and FGDs were purposively and randomly stratified according to age bands to participate in the study respectively to explore their views and experiences.

Study Variables

The explanatory variables under study were DREAMS interventions such as Curriculum based interventions, Asset building, socio-economic strengthening (short term and long-term trades), Education subsidy, HIV Testing Services (HTS) and SASA methodology. The dependent variables under study were risky sexual behaviours such as Early sexual debut (before age of 18 years), multiple sexual partners, type of sexual partner, Correct and consistent condom use, transactional sex, age-disparity, alcohol and drug abuse. Socio-demographic factors such as place of residence, marital status, religion, education status, pregnancy status, wealth, household size, Occupation, employment status of caregiver were the confounders in the study.

Data Collection Techniques and Tools

Data collection tools were designed and pre-tested to capture primary data from Surveys,

KIIs and FGDS for both quantitative and qualitative data collections. Quantitative data was gathered through structured questionnaires from 385 randomly selected participants Survey questionnaires were administered by trained research assistants to AGYW who met the eligibility criteria to participate in the study. The questionnaires comprised of variables on socio-demographics, experience on DREAMS, services offered to the AGYW, sexual activity, HIV status and self-efficacy. Qualitative data was collected via FGDs with AGYW beneficiaries and KIIs with purposively selected facilitators, Artisans and key stakeholders to explore their experiences, opinions, and perceptions. Five (5) FGDs using interview guides were conducted with respondents ranging between 8-12 participants. Three (3) FGDs with AGYW stratified according to age category (15-19 years and 20-33 years) and two (2) FGDs with Facilitators, Instructors and Artisans. Nine (9) KIIs with key stake holders were conducted in the two districts. The discussions were audio recorded after seeking consent from respondents until thematic saturation was reached.

Data Process and Analysis

Descriptive statistics of central tendency (frequencies) and percentages presented in tables were used to explain the socio-demographics of AGYW. The findings were presented using percentages, frequencies and probabilities to predict whether there was a relationship between MIs and RSBs. Chi-square analysis was performed to determine whether there is an association between MIs and change in RSBs as well as the degree of the association if the results are statistically significant.

Logistic regression was used to obtain the odds ratio to determine the effect between the explanatory variables and response variable as the outcome of interest. Chi-square tests were conducted to assess the association between MIs and RSBs, with results considered statistically significant at a p-value of <0.05 and a 95% confidence interval (CI). Following chi-squared Test (X^2), stratified analysis was performed to establish the relationship between MIs and RSBs while controlling for each confounder in the study such as age, education status, marital status and pregnancy status. The multivariable logistic regression analysis adjusting for all potential confounders identified from the survey was used to evaluate the independent variables associated with reduction in HIV associated behaviors. All collected data was analyzed using STATA software (Version 18) for quantitative analysis. To quantify the influence between MIs and RSBs odds ratios and 95% confidence Interval (CI) were used. Qualitative analysis was conducted to generate more evidence on whether multifaceted interventions influence RSBs among AGYW. Focus group discussions with AGYW (15-33 years) and program implementers were conducted to explore their experiences, opinions, and perceptions on DREAMS program, knowledge on RSBs and impact using semi –structured interview guide.

The stratified groups with AGYW beneficiaries according to age bands and program implementer had participants ranging from 8-12. KII with key stake holders such as community leaders, program officers, social workers and male partners were conducted using semi-structured KII guide. The investigator decided to use Braun and clerk's (2006) thematic analysis framework to analyze qualitative data. The 6 steps of thematic analysis employed included (1) Familiarizing yourself with the data (2) Generating initial codes (3) Generating initial themes (4) Reviewing themes (5) Defining and naming the themes and (6) Generating a report. When participants were asked about their experience on DREAMS program different responses were highlighted and recorded by the investigator and until thematic saturation was achieved. Qualitative data were transcribed verbatim and analyzed using NVIVO software through

content analysis and a hybrid deductive-inductive thematic approach.

Results

Descriptive Socio Demographic Characteristics of Study Participants

Table 1 represents data for socio-demographic characteristics of respondents with variations in percentages, frequencies and Reach of DREAMS. Of the 385 respondents randomly selected to participate in the study, more than half 25 (58%) of the participants were in the age group of 18-24 years, followed by 96 (25%) in the age group of 25 years and above. While 15-17 years accounted for the least 64 (17%) participants, those in union, 230 (60%) were the majority, 262 (68.1%) were out of school and largest proportion 353 (91.7%) were not pregnant. Half of the respondents, 195 (50.7%) were unemployed and 121 (31.5%) were in self-employment. Majority 350 (90.9%) of the respondents' care givers were unemployed. Almost all the participants in this current study, 375 (97.4 %) had heard about DREAMS program, half of the participants 188 (50.1%) received information about the program through the word of mouth. Large proportion of the participants 365 (94.8%) were invited to the program and 356 (92.5%) were enrolled on the program. It was observed that 160 (41.6%) were in the cohort of 2022-2023 and almost half, 173 (49.2%) were in the age group of 20-24 years at enrollment, 142 (40.3%) were in the age band of 15-19 years and the least 37 (10.5%) were in the age band of 10-14 years.

Table 1. Socio-demographic Characteristics of Respondents

Variable	Categories	Frequency	Percentages (%)
A: Socio-demographics			
Age group	15-17 years	64	16.6
	18-24 years	225	58.4
	25+ years	96	24.9
Gender	Other	0	0.0
	Female	385	100.0
Marital Status	In union	230	59.7
	Not in union	155	40.3
Education Status	Never_been_in_school	9	2.3
	Out of school	262	68.1
	In school	62	16.1
	Completed School	52	13.5
Pregnancy status	No	353	91.7
	Yes	22	5.7
	Not sure	10	2.6
Employment status	Unemployed	195	50.7
	Part time	51	13.3
	Full time	18	4.7
	Self employed	121	31.4
Employment status of caregiver	Unemployed	350	90.9
	Employed	35	9.1
B: Reach of DREAMS			
Heard of DREAMS	No	10	2.6

	Yes	375	97.4
How you hear about DREAMS	CBO/NGO	31	8.3
	LC	39	10.4
	VHT	81	21.6
	Word-of-mouth	188	50.1
	Other	36	9.6
Ever been invited to DREAMS	No	20	5.2
	Yes	365	94.8
Ever been enrolled on DREAMS	No	29	7.5
	Yes	356	92.5
Year of Enrollment	No	33	8.6
	2016-2017	12	3.1
	2017-2018	8	2.1
	2018-2019	12	3.1
	2019-2020	3	0.8
	2020-2021	12	3.1
	2021-2022	35	9.1
	2022-2023	160	41.6
	2023-2024	110	28.6
Age at Enrollment	10-14years	37	10.5
	15-19years	142	40.3
	20-24years	173	49.2
Know your DREAMS IDs	No	122	34.4
	Yes	233	65.6

Source: *Field Survey, October -2025*

Descriptive Statistics for Uptake of DREAMS Interventions

In the current study, table 2 indicates that 84 (21.8%) participants received Journeys plus curriculum and 303 (78.7%) received stepping stones methodology and majority of the respondents, 219 (56.9%) received No Means No- Female Curriculum. In addition, 131 (34%) received SINOVUYO program and large proportion of 300 (77.9%) received community mobilization and norms change (SASA). Furthermore, 320 (83.1%) received Vocational skills training, while 82 (21.3%) received education support as a secondary service. We observed that,344 (89.4%) belonged to groups, while 346 (89.9%) received services in groups for social asset building. Majority, 337 (87.5%) received HTS screening and of those who were screened, 334 (86.8%) received HIV testing. Additionally, it was observed that large proportion of respondents, 328 (85.2%) were not attending school while 57(14.8%) were still in school. It was observed that after graduation from the program, majority, 113 (29.4%) were able to start their own business, 49 (12.7%) got employed, 71 (18.4%) got married, 55 (14.3%) continued schooling, 53 (13.3%) stayed at home and 44 (11.4%) dropped from school. Finally, large proportion, 340 (88.3%) revealed that the program changed their life and 45 (11.7%) their life unchanged.

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Table 2. Uptake of DREAMS Interventions

C: Exposure to DREAMS interventions			
Variable	**Category**	**Frequency**	**Percentage**
HIV and violence prevention (Journeys Plus)	No	301	78.2
	Yes	84	21.8
Stepping stones	No	82	21.3
	Yes	303	78.7
No means No - AGYW	No	166	43.1
	Yes	219	56.9
SINOVUYO	No	254	66.0
	Yes	131	34.0
SASA	No	85	22.1
	Yes	300	77.9
Apprenticeship	No	65	16.9
	Yes	320	83.1
Education support	No	303	78.7
	Yes	82	21.3
Belonging to a group	No	41	10.7
	Yes	344	89.4
Received DREAMS services in a group	No	39	10.1
	Yes	346	89.9
HTS screening	No	48	12.5
	Yes	337	87.5
HIV Testing	No	51	13.3
	Yes	334	86.8
SECTION E: Impact			
Currently Attending School	No	328	85.2
	Yes	57	14.8
After graduation	Nothing	53	13.8
	I continued with my studies	55	14.3
	I dropped out of school	44	11.4
	I got employed	49	12.7
	I got married	71	18.4
	Started own business	113	29.4
DREAMS changed my life	No	45	11.7
	Yes	340	88.3

Source: *Field survey, October 2025*

Bivariate Logistic Regression Analysis

In this current study, at bivariate analysis level, all socio-demographic characteristics such as age group, marital status, education status, pregnancy status, employment status, and employment status of care givers were identified to be significantly associated with RSBs among AGYW (Table 3). AGYW in the age group of 15-17 years (79.7%) accounted for the largest proportion that practiced safe sexual behaviour, followed by the age group of 18-24 years (13.3%), least (3.1%) were 25 years and above and difference was statistically significant. Similarly, half of the AGYW (50.3%) not in union and 2.6% in union had safe sexual behaviour with a statistically significant difference (p<0.001). In addition, we observed statistically significant difference between AGYW who were in school (93.6%), those out of school (8.8%) and those that had completed school (5.8%) with safe sexual behaviour and Risky sexual behaviour (p<0.001). On the other hand, other socio-demographic variables that were significantly associated with risky sexual behaviours among AGYW included, pregnancy status (p-value=0.003), employment status (p<0.001) and employment status of care givers (p-value=0.002).

Furthermore, heard of DREAMS, how you heard about DREAMS, ever been invited to DREAMS and age at enrolment were independent variables of Reach identified to be significantly associated with risky sexual behaviours among AGYW (Table3). AGYW who did not hear about DREAMS program (50%) and those who heard about the program (21.1%) had safe sexual behaviour (p<0.001) and this was significantly associated with RSBs. AGYW who had safe sexual behaviour, about half of them (43.5%) heard the program through other channels, 25.8% from CBO/NGO, 19.7% by word of mouth, 18.5% from VHTs and 10.3% from LCs (p-value = 0.002). Significant difference was observed between how the AGYW heard about the program and risky sexual behaviour among AGW. In addition, the results revealed that AGYW ever been invited on the program (20.8%) and those who were not invited on the program (40%) had safe sexual behaviours (p-value= 0,043) and the difference was significantly associated with RSBs. Conversely, those that practiced safe sexual behaviour, largest percentage (86.5%) were in the age band of 10-14 years, 25.4% in 15-19 years and 3.5% in 20-24 years at enrollment. There was statistically significant difference between age at enrollment among the groups and risky sexual behaviours (p< 0.001).

Conversely, AGYW who had never been enrolled on the program (21.4%) and 27,6% who had never been enrolled on the program had safe sexual behaviour and there was statistically insignificant difference (p-value = 0.434). The cohort of 2022-2023 constituted the highest proportion (23.7%) of AGYW who had safe sexual behaviour, followed with the cohort of 2023-2024 (23.6%), 30.3% with no year of enrollment and the least with 22.9% was the cohort of 2021-2022 (p-value= 0.133). There was a statistically insignificant difference between year of enrollment and risky sexual behaviour. Finally, AGYW who did not recall their DREAMS ID number and had safe sexual behaviour accounted for the largest proportion (27.1%) compared to those who knew their ID numbers (18.5%) and this was statistically insignificant predictor of risky sexual behaviours (p-value= 0.061).

Regarding exposure to DREAMS interventions, Journeys plus, stepping stones, No Means NO, Apprenticeship, Education status and HIV testing were the MIs found to be significantly associated with risky sexual behaviours. AGYW engaged in safe sexual behaviours, 44.1% received Journeys plus methodology and 15.6% did not, 14.2% received steeping stones methodology and 50% did not,32% received No Means NO curriculum and 8.4% did not (p<0.001). The observed differences between Journeys plus, stepping stones and NMN-Female curriculum were

significantly associated with risky sexual behaviour. In addition, of those that had safe sexual behaviour, 47.7% received apprenticeship and 16.6% did not (p<0.001), 42.7% received education support and 16.2% did not (p<0.001). There was statistically significant difference observed between receiving apprenticeship and education support and RSBs. Similarly, it was observed that AGYW with safe sexual behaviour, 18.9% received HIV testing and 41.2% did not (p<0.001). There was statistically significant difference between HIV testing and risky sexual behaviour.

Conversely, the findings further indicated that among respondents who had safe sexual behaviour, 29.8% received SINOVUYO and 17.7% did not (p-value=0.007), while 20.7% received SASA methodology & 25.9% did not (p-value =0.304). Statistically insignificant difference was observed between SINOVUYO, SASA methodology and RSBs among AGYW. On the other hand, AGYW who had safe sexual behaviour (24.5%) belonged to a group and 24.4% did not (p-value=0.673), 21.7% received DREAMS services in a group and 21,1% did not receive services in a group (p-value= 0.841). There was statistically insignificant difference observed between belonging to a group, receiving services in a group and RSBs. Additionally, AGYW who had safe sexual behaviour, 21.4% received HTS screening and 25% did not receive (p-value=0.568) and difference was insignificantly associated with RSBs.

Furthermore, we observed that attending school and outcome after graduation were significantly associated with RSBs. According to table 3, AGYW who had safe sexual behaviours, 86% were still attending school and 10.7% were not (p<0.001). Similarly, 35.8% stayed at home after graduation from the program, majority (85.5%) continued with studies, 25% dropped out of school, 6.1% got employed, 1.4% got married and 2.7% started own business (p<0.001). Attending school or graduation from the program had differences significantly associated with RSBs. Finally, AGYW, who had safe sexual behaviour, 21.2% revealed that the program had changed their life and 26.7% responded that the program did not change their life (p-value=0.402). There was statistically insignificant difference observed between change in life attributed to DREAMS and risky sexual behaviours.

Table 3. Association between Predictor Variables and Risky Sexual Behaviours Among Adolescents Girls and Young Women (AGYW) in Bivariate Analysis, 2025

Variable	**Categories**	**Sexual Behaviour**		**Chi-square**	**df**	**p-value**
A: Socio-Demographics		**Safer**	**Risky**			
Age group	15-17years	51(79.7	13(20.3)	154.809	2	0.000
	18-24years	30(13.3)	195(86.7)			
	25+years	3(3.1)	93(96.9)			
Gender	Other					
	Female					
Marital Status	In union	6(2.6)	224(97.4)	123.585	1	0.000
	Not in union	78(50.3)	301(49.7)			
Education Status	Never been in school	0(0.0)	9(100.0)	223.492	3	0.000
	Out of school	23(8.8)	239(91.2)			
	In school	58(93.6)	4(6.4)			

	Completed School	3(5.8)	49(94.2)			
Pregnancy status	No	81(22.9	272(77.1)	6.795	2	0.003
	Yes	0(0.0)	22(100.0)			
	Not sure	3(30.0)	7(70.0)			
Employment status	Unemployed	47(24.1)	148(75.9)	77.777	3	0.000
	Part time	32(62.8)	19(37.2)			
	Full time	1(5.6)	17(94.4)			
	Self employed	4(3.3)	117(96.7)			
Employment status of caregiver	Unemployed	69(19.7)	281(80.3)	9.99	1	0.002
	Employed	15(42.9)	20(57.1)			
B: Reach with DREAMS						
Heard of DREAMS	No	5(50.0)	5(50.0)	4.78	1	0.000
	Yes	79(21.1)	296(78.9)			
How you heard about DREAMS	CBO/NG O	8(25.8)	23(74.2)	17.018	4	0.002
	LC	4(10.3)	35(89.7)			
	VHT	15(18.5)	66(81.5)			
	Word of mouth	37(19.7)	151(80.3)			
	Other	20(43.5)	26(56.5)			
Ever been invited to DREAMS	No	8(40.0)	12(60.0)	4.088	1	0.043
	Yes	76(20.8)	289(79.2)			
Ever been enrolled on DREAMS	No	8(27.6)	21(72.4)	0.612	1	0.434
	Yes	76(21.4)	280(78.7)			
Year of Enrolments	No	10(30.3)	23(69.7)	12.421	8	0.133
	2016-2017	0(0.0)	12(100.0)			
	2017-2018	0(0.0)	8(100.0)			
	2018-2019	0(0.0)	12(100.0)			
	2019-2020	1(33.3)	2(66.7)			
	2020-2021	1(8.3)	11(91.7)			
	2021-2022	8(22.9)	27(77.1)			
	2022-2023	38(23.7)	122(76.3)			
	2023-2024	26(23.6)	122(76.4)			
Age at Enrollment	10-14years	32(86.5)	5(13.5)	129.215	2	0.000
	15-19years	36(25.4)	106(74.7)			
	20-24years	6(3.5)	167(96.5)			
Know your DREAMS IDs	No	33(27.1)	89(72.9)	3.515	1	0.061
	Yes	43(18.5)	190(81.6)			
C: Exposure to DREAMS interventions						
C 1. HIV and violence prevention (Journey Plus)	No	47(15.6)	254(84.4)	31.125	1	0.000
	Yes	37(44.1)	47(55.9)			
C2. Stepping stones	No	41(50.0)	41(50.0)	48.512	1	0.000
	Yes	43(14.2)	260(85.8)			
C3. No means No -	No	14(8.4)	152(91.6	30.648	1	0.000
	Yes	70(32.0)	149(68.0)			
C4. SINOVUYO	No	45(17.7)	209(82.3)	7.362	1	0.007

	Yes	39(29.8)	92(70.2)			
C5. SASA	No	22(25.9	63(74.1)	1.056	1	0.304
	Yes	62(20.7)	238(79.3)			
C6. Apprenticeship	No	31(47.7)	34(52.3)	30.692	1	0.000
	Yes	53(16.6)	267(83.4)			
C7. Education support	No	49(16.2)	254(83.8)	26.59	1	0.000
	Yes	35(42.7)	47(57.3)			
C8. Belonging to a group	No	10(24.4)	31(75.6)	0.178	1	0.673
	Yes	74(21.5)	270(78.5)			
C9. Received DREAMS services in a group	No	9(23.1)	30(76.9)	0.04	1	0.841
	Yes	75(21.7)	271(78.2)			
C10. HTS screening	No	12(25.0)	36(75.0)	0.326	1	0.568
	Yes	72(21.4)	265(78.6)			
C11. HIV Testing	No	21(41.2)	30(58.8)	12.915	1	0.000
	Yes	63(18.9)	271(81.1)			
SECTION E: Impact						
Currently Attending School	No	35(10.7)	293(89.3)	161.394	1	0.000
	Yes	49(86.0)	8(14.0)			
After graduation	Nothing	19(35.8)	34(64.2)	185.692	1	0.000
	I continued with my studies	47(85.5)	8(14.6)			
	I dropped out of school	11(25.0)	33(75.0)			
	I got employed	3(6.1)	46(93.9)			
	I got married	1(1.4)	70(98.6)			
	Started own business	3(2.7)	110(97.4)			
DREAMS changed my life	No	12(26.7)	33(73.3)	0.702	1	0.402
	Yes	72(21.2)	268(78.8)			

Source: *Field survey, October 2025*

Multivariate Logistic Regression Analysis

Multivariable logistic regression analysis was performed to determine the variables independently associated with risky sexual behaviors among AGYW while statistically controlling influence of potential confounders simultaneously in the model. The Computed Adjusted Odds Ratio (AOR) with 95% Confidence Interval (CI) and conventional p-value of 0.05 to determine whether to reject or fail to reject the null hypothesis. Marital status, education status (in school), Age at enrollment, Journeys plus and graduation status (Employment, marriage and starting own business) were the independent variables identified in the logistic regression model significantly associated with RSBs. Marital status had influence on RSBs as those AGYW that were not in union were significantly less likely (AOR = 0.17, 95% CI [0.04-0.67], p-value=0.010) to engage in RSBs compared to those that were in union and this was true in both bivariate and multivariable logistic regression analysis. Relatedly, AGYW that were in school were significantly less likely (AOR=0.001,95% CI [0.000-0.003], p<0.001) to engage in RSBs compared to those that had never been in school. While AGYW out of

school had 1.25 times more likely to engage in RSBs, this was statistically insignificant (p-value=0.803) compared to those who had never been to school.

Conversely, Age at enrollment was a significant predictor for RSBs as those AGYW who were enrolled in the age band of 20-24 years had 49.5 times more likely (AOR = 49.52,95% CI [1.24-1981.93], p-value= 0.038) while who were in the age band of 15-19 years were 42.7 times more likely (AOR = 42.69, 95% CI [1.40-1301.27], p-value= 0.031) to engage in RSBs compared to AGYW in the age band of 10-14 years and this was statistically significant. In addition, AGYW who received Journeys plus were 28.6 times more significantly likely (AOR = 28.59, 95% CI [1.32-618.40], p-value=0.033) to engage in RSBs compared to those who did not receive the intervention. Graduation from the program was significantly associated with RSBs except for those who dropped out of school which was not significant. AGYW who started their own business Started own business (AOR = 17.645, 95% CI [1.799-173.067], p-value= 0.014), got employed (AOR= 18.989, 95% CI [1.416-254.561], p-value = 0.026), and those who got married (AOR=22.392, 95% CI [1.445-346.960], p-value = 0.026) were more likely to engage in risky sexual behavior compared to AGYW without graduation outcome and this was statistically significant. In contrast, AGYW who dropped out of class after graduation had twice the likelihood (AOR = 1.838, 95% CI [0.331-10.189], p-value = 0.486) to engage in RSBs compared to those without graduation outcome and this was statistically not significant.

Finally, pregnancy status (p-value = 0.852), Part time employment (p-value = 0.974), full time employment (p-value = 0.888), self-employment (p-value = 0.872), employment status of care (p-value = 0.609), the way AGYW heard about the program from Local council (p-value = 0.064), VHT (p-value = 0.482), Word-of-mouth (p-value = 0.096) and other sources (p-value = 0.467) Stepping Stones (P-value = 0.144), No means No – Female curriculum (p-value = 0.087), SINOVUYO (p-value = 0.634), Apprenticeship (p-value = 0.770), Education support (p-value = 0.056) and HIV Testing (p-value = 0.574) and currently attending school were all insignificantly associated with risky sexual behaviours (Table 4).

Table 4. Multivariate Logistic Regression Showing Association between Predictor Variables and Risky Sexual Behaviours among Adolescent Girls and Young Women

Variable	**Categories**	**Adjusted Odds Ratio (AoR), [CI]**	**p-value**
A: Social Demographics			
Age group	15-17years	1	1
	18-24years	2.197[0.199-24.222]	0.520
	25+years	1.764[0.096-32.413]	0.702
Marital status	In union	1	1
	Not in union	0.167[0.043-0.647]	0.010
Education Status	Never been in school	1	1
	Out of school	1.246[0.222-7.001]	0.803
	In_school	0.001[0.000-0.003]	0.000
	Completed School		
Pregnancy status	No	1	1
	Yes		

	Not sure	1.303[0.081-20.940]	0.852
Employment status	Unemployed	1	1
	Part time	0.967[0.126-7.426]	0.974
	Full time	1.275[0.044-37.029]	0.888
	Self employed	0.849[0.115-6.270]	0.872
Employment status of caregiver	Unemployed	1	1
	Employed	0.684[0.160-2.926]	0.609
B: Reach of DREAMS			
Heard of DREAMS	No	1	1
	Yes		
How you hear about DREAMS	CBO/NGO	1	1
	LC	14.239[0.854-237.341]	0.064
	VHT	2.405[0.208-27.774]	0.482
	Word-of-mouth	6.194[0.724-52.972]	0.096
	Other	2.689[0.187-38.655]	0.467
Ever been invited to DREAMS	No	1	1
	Yes		
Age at Enrollment	10-14years	1	1
	15-19years	42.688[1.400-1301.273]	0.031
	20-24years	49.521[1.237-1981.930]	0.038
C: Exposure to DREAMS interventions			
HIV and violence prevention (Journey Plus)	No	1	1
	Yes	28.593[1.322-618.402]	0.033
Stepping Stones	No	1	1
	Yes	0.1769[0.0173-1.810]	0.144
No means No -	No	1	1
	Yes	0.243[0.048-1.228]	0.087
SINOVUYO	No	1	1
	Yes	0.745[0.222-2.499]	0.634
Apprenticeship/vocational skills	No	1	1
	Yes	1.453[0.119-17.694]	0.770
Education support	No	1	1
	Yes	5.364[0.960-29.981]	0.056
HIV Testing	No	1	1
	Yes	0.484[0.039-6.080]	0.574
SECTION E: Impact			
Currently Attending School	No	1	1
	Yes	840000000[.-.]	.
After graduation	Nothing	1	1
	I continued with my studies	3350000000[.-.]	.
	I dropped out of school	1.838[0.331-10.189]	0.486
	I got employed	18.989[1.416-254.561]	0.026
	I got married	22.392[1.445-346.960]	0.026
	Started own business	17.645[1.799-173.067]	0.014

Source: *Field survey, October 2025*

Summary of Participants' Perceptions on Multifaceted Interventions and Risky Sexual Behaviours

Results from quantitative analysis indicated some variations from results of FGD and KII interviews related to MIs and variables of impact associated with RSBs. The findings from qualitative analysis revealed major outcomes in nine (9) themes which had influence on risky sexual behaviours and these included, HIV prevention and sexual health, economic empowerment and livelihood, behaviour change, protection from sexual exploitation and risky sexual relationships, program accessibility and employment opportunity, inclusion of partners and community, family planning services and prevention of pregnancy. During the interviews, respondents were asked questions about their experience on DREAMS and how the program impacted their lives and different responses were highlighted below.

In this present study, it was observed that AGYW were equipped with knowledge and skills in HIV prevention and understood the benefits of testing for HIV every three months and sexual wellbeing.

> "*DREAMS has transformed my life, as I am no longer the same person I was when I first joined. Initially, I had not considered getting tested for HIV, nor was I aware of the comprehensive information regarding it. However, with the arrival of DREAMS, I learned how to safeguard myself against HIV. This knowledge was life-changing, as I discovered the importance of getting tested every three months to understand my status",* (FGD Female respondent, Kafundezi).

Likewise, AGYW highlighted that those who had multiple sexual partners reduced them to remain with only one partner as a measure of preventing HIV.

> *"DREAMS changed my life, before it came I had about 5 boyfriends, but when I joined DREAMS and they asked us to bring our boyfriends so that they are tested, I had to drop all the others and remain with one",* (FGD Female respondent, Kitenga).
>
> *"In my experience, I had numerous boyfriends. Whenever a man would call out to me while I was on my way, I would immediately approach him. If that man or boyfriend requested to engage in sexual intercourse, I found it difficult to decline and would often acquiesce without hesitation. However, upon joining the DREAMS programme, everything changed",* (FGD Female participant, Kitenga).

In addition, AGYW received vocational skills training in different trades to enable them to start their own businesses for economic empowerment.

> *"The programme skilled the AGYWs so that they can be able to start up their own businesses* ", (FGD Female participant, Ssekanyonyi).

It was further emphasized that they became economically empowered when they started earning their own money from their businesses.

> "*DREAMS has helped me because I am able to make shs10,000 on my own other than asking someone",* (FGD participant, Kitenga).

Furthermore, AGYW were equipped with knowledge and skills in financial literacy and learnt how to save money as a way of eradicating poverty.

> "*DREAMS taught us how to save money so that we can use that money later and avoid poverty at home. If I save money, I am able not to beg for money from the male partner. From my experience with DREAMS, I realized that I was unable to save even shs500. Whenever I received shs 500, my only thought was to spend it on food. Yet DREAMS educated us on the value of saving. If you earn Shs 500, you can*

either save it or set aside a portion. Similarly, if you have shs1000, you can also save some, and when you eventually withdraw it, you can purchase something of value instead of consuming it all at once. This way, you avoid the situation where you find yourself wanting something later but lacking the funds, which could lead to engaging in prostitution, (FGD respondent, Kafundezi).

Conversely, AGYW changed their behaviour which was attributed to Curriculum Based Interventions (CBIs) received on the program.

"What I like about the DREAMS project, there are so many, but I am going to highlight a few. First, it is about the interventions, mainly the curriculum for the AGYW. This is No Means No and stepping stones. These curricula have supported girls to change their behaviours. They bring awareness for the girls to know how the world is moving. You know these girls are from the villages, they do not know how HIV spreads. But using these curriculums, these girls have gained knowledge with my assessments to know how HIV is spread and how they can prevent themselves from acquiring the diseases" (Social worker KII participant, Kibalinga- Mubende).

Similarly, AGYW were empowered with life skills of assertiveness from CBI training and learnt to be determined and resilient.

"Determination, I would have feared beginning with something small because I was concerned that my colleagues, or even society, would ridicule me. However, I found the courage to believe that I can achieve this. Furthermore, it is not accurate to assume that every man who stands before you and professes love truly means it. When we enrolled in DREAMS, we held the belief that when a girl says 'NO,' she means 'YES.' However, through the training we received in DREAMS, I learned to assign true meaning to my words; when I say 'NO,' I genuinely mean it. I am no longer shy as a young girl; I can now stand in the community and advocate for myself". (FGD participant, Ssekanyonyi).

Conversely, Adolescent girls (10-14 years) were empowered with skills in re-usable pad making during Journeys plus training which enhanced menstrual hygiene management.

" It is true the programme changed the girls. School dropouts were reduced because if a child could not be able to complete primary seven and yet the programme has facilitated her with the school fees, with the scholastic materials the girls will be able to complete at least primary level. Then missing school was also reduced because they used to miss because they lacked sanitary pads. But at least they can make their own reusable pads. Then there are also change makers in their communities", (FGD participant, Mityana).

AGYW became engaged in constructive work in the community and were no longer idle and this prevented them from being sexually abused by men.

"*The few activities that I saw is that the programme taught the AGYWs the skills of tailoring, plaiting hair, baking specifically making cakes is it what they call cookery, it was my first time to see one of the groups making books, this made me happy in that instead of the girl child moving around the community and get involved into relationships with the male counter parts, the programme instead made the AGYWs to meet in one place and do something constructive other than*

moving aimlessly in the community", (KII LC1, Ttamu Division, Mityana).

It was highlighted that the number of girls dropping out of school reduced attributed to DREAMS initiative hence improving education retention**.**

'The DREAMS project has reduced the number of school dropouts. Because it has been providing scholastic materials and school fees for these girls so that they can sustain in schools. They have been paying for a full year. For a girl and provide scholastic material", (FGD Female Participant, Wabigalo).

On the other hand, the program supported AGYW who were on the verge of dropping out of school to continue schooling.

"Yes, she possesses the necessary skills, and we were inclined to send one of my daughters as well. She became involved in the DREAMS programme in a different community, specifically Kabulamuliro, which is situated in Busunju. Our daughter has actively participated in the programme, which evidently indicates its value. Even now, she continues to attend the DREAMS programme while also managing her school commitments. The changes are there, since we are not the ones who are staying with her right now, but the change is there and she is still going to school. Right now, she is in senior two", (KII Male, Partner, Ttamu).

The program enabled the beneficiaries to gain employment, acquire property and become popular in the community.

*"In a way that, for me, when the project came, I had no job. By then, I was selected by the chairperson of my village to mobilize fellow girls. So, after mobilizing my fellow girls, I was selected to be a facilitator for my fellow girls and being a facilitator, I had to be facilitated for delivering the intervention among the AGYWs. So, it became like I had gotten a job, and I got a chance to be known by the community. Because in some areas, I wasn't known, but because of the DREAMS project, I am known everywhere, even at the district level. I have become popular because of the DREAMS project. And there are some good things I have achieved. I managed to buy plots of land because of the DREAMS project. And I managed to build my house where I am now because of that project. So, they met my expectations. I didn't expect that one day I would also have my own house as a result", (*FGD Female participant, Wabigalo**).***

The theory of Social-Ecological Model (SEM) was employed during service delivery which acknowledges that behavior change is influenced by the environmental factors (external and internal). DREAMS partnership did not only empower the primary beneficiaries but also provided contextual services to male partners to prevent HIV among AGYW and household empowerment as revealed by participants from FGDs and KIIs.

*"The project did not aim only at the AGYWs, but also their partners. So, there were even some services that were provided to the AGYW partners, mostly the married and those who were in the transactional sex workers. So, they were tracking their partners and partners tracked were provided with services like VSLA, HPS and condom provision and promotion. And sensitized about GBV and family planning services ", (*Female Participant, FGD Wabigalo).

The participants highlighted that the program was about provision of family planning services to prevent them from getting unintended pregnancies.

"Yes, I have also gained significant advantages from the programme, as I was previously unaware of how to safeguard myself against contracting the HIV virus, how to prevent unintended pregnancies, and how to avoid giving birth to children whom I would be unable to care for. However, with the advent of the programme, I received assistance; through such training, my understanding was greatly enhanced, and I received substantial support. I was once an individual who lacked knowledge about family planning, but since that time, I have acquired valuable insights on the subject. Currently, my child is seven years old. Furthermore, another benefit of the programme is that all my children are now able to attend school. Prior to the programme, I faced financial constraints, but through the training provided by DREAM regarding HIV protection and family planning, I have learned a great deal, and I am immensely grateful to DREAMS for the assistance it has provided me", (FGD Female participant, Kafundezi).

Social Asset building was among the primary interventions provided to the AGYW when they convened at safe spaces to receive services in a group and support each other through peer networks as emphasized by the key informant and had this to say,

*"They stay in group, so they have learned from each other", (*KII, Social worker-Mityana).

Finally, girls who graduated from the program were transformed and became role models in the community

*"Very many. For instance, let me illustrate with my wife, who is close to me. When I enrolled her in the DREAMS program to acquire new skills, even though I did not establish a tailoring business for her, she adopted a different approach compared to those in our neighborhood who did not participate in the DREAMS program. Their skepticism was evident as they questioned, "Will she learn the skills, and once she acquires them, will she be able to apply what she has learned?" Now, she stands out as she has gained numerous skills that they currently lack. She can approach her colleagues who were also involved in the project and inquire, "What are you learning now? I struggled with this and that." Moreover, when she gets an opportunity to bake for a small event, such as a birthday, she can prepare the cake for that occasion. Do you not recognize that she is entirely different from those who did not undergo the training.", (*KII, Male partner Ttamu Division).

Discussion

Risky sexual behaviour (RSB) among AGYW continues to be global health challenge resulting into new cases of HIV infections, other Sexually transmitted diseases (STDs), unintended pregnancies and unsafe abortions. Despite the efforts to avert new HIV infections in Uganda, studies have shown that AGYW (15-24 years) continue to engage in RSBs increasing their risk to acquisition of new HIV infections. In addition, there is scanty or no evidence in literature to show impact of the MIs on addressing RSBs among AGYW post-graduation. Failure to address RSBs will hamper the ongoing efforts to achieve epidemic control and Sustainable Development Goal 3 to end AIDS as a public health threat by 2030. This study aimed to investigate the effectiveness of MIs on reduction of risky sexual behaviours among adolescent girls and young women in Mubende region, Uganda. The main specific objectives of focus were 1) to assess the Reach of MIs among AGYW and 2)

to investigate the influence of MIs on risky sexual behaviors among AGYW. We conducted a survey on 385 respondents with an attempt to establish the relationship between MIs and risky sexual behaviours among adolescent girls and young women.

In this study, we observed that 58% of the participants were in the age group (18-24 years) indicating that the younger age group (15-17 years) was still in school and the older age could have relocated to other places either for marriage or better employment opportunities. The majority (60%) were in union reflecting the true picture of Ugandan girls in that age category after dropping out of school are married off. Large proportion (68.1%) were out of school since the girls who had dropped out of school upon screening were eligible for enrollment on the program due to their level of vulnerability and were at substantial risk for acquisition of HIV infection. Half of the respondents (50.7%) were unemployed and 31.5% were in self-employment. Majority of the respondents' care givers (90.9%) were unemployed but earning a living as peasants and doing small businesses in their communities.

In addition, the results from the current study showed that almost all the participants (97.4 %) had heard about DREAMS program. Large proportion of the participants (94.8%) were invited to the program and 92.5% were enrolled on the program and these findings were not in agreement with the program results where implementing partners had reached 85% of AGYW in their SNUs with core services and of those, 86% received specific services based on their unique needs [12]. It was observed that (41.6%) were in the cohort (2022-2023), perhaps AGYW who had graduated in the first cohorts matured and shifted from their areas of residence either for marriage or better employment opportunities. Almost half (49.2%) were in the age band (20-24 years) at enrollment this is because majority were in committed relationships and had dropped out of school. Furthermore, 40.3% were in the age band of 15-19 years and (10.5%) were in the age band of 10-14 years.

Majority (83.1%) received Vocational skilling, this supports the finding in this study that majority were in the age category (15-24 years) and were out of school. This was the eligibility criteria for provision of Vocational skills training. Majority of the participants (78.7%) did not receive education support and these results are consistent with the findings in this study that the majority of the participants were out of school at the time of enrolment and the services targeted the most vulnerable girls to enable them stay in school Conversely, 87.5% received HTS screening and of those who were screened (86.8%) received risk based HTS which implied that the category of AGYW (15-24years) were enrolled with risk factors of HIV infection and had to be tested for HIV. This finding resonates with UNAIDS update which revealed that globally the prevalence of HIV among AGYW (15-24 years) globally was higher compared to that of the adolescent boys and young men in the same age band [5]. The finding was synonymous with similar study which indicated that adolescent girls and young women from SSA aged (15-24 years) remain at substantial risk of acquiring HIV infection [15]. Additionally, we observed that large proportion of respondents (85.2%) were not attending school and this was not surprising because dropping out of school is a structural driver that increases the level of vulnerability for acquisition of HIV infection.

Furthermore, results in this study revealed that marital status, Education status (being in school), age at enrollment, Journeys plus, gaining employment, marriage & starting own business after graduation were the major determinants significantly associated with risky sexual behaviours. Marital status was found to be significantly associated with RSBs in both bivariate and multivariate analysis whereby AGYW that were not in union were significantly less likely (AOR=0.17, 95% CI:

0.04-0.64) to engage in RSB compared to those that were in union. This observation resonates with the finding in Nigeria which revealed that AGYW cohabitating and those who ever married engaged more in risky sexual behaviours than those who have never married [7]. Contrary to the current research, the findings in Uganda by [16] revealed that married or cohabiting was associated with a lower likelihood of risky sexual behaviors.

Relatedly, AGYW that were in school were significantly less likely (AOR=0.001, p-value=0.000) to engage in RSBs compared to those that had never been in school. While AGYW out of school had 1.25 times more likely to engage in RSBs and this was statistically insignificant (p-value=0.803) compared to those who had never been to school**.** The finding in this current study could be attributed to the school programs which do not give room for the learners to have a lot of free time to engage in risky sexual behaviours. A case in point is during the pandemic of COVID 19 and country wide lockdown as well as long closure of schools, countries registered many teenage pregnancies attributed to RSBs. This is supported by [17] observation in Uganda which revealed that during the peak of the pandemic and extended countrywide lockdown, there were over 60 girls who got pregnant because of the extended closure of schools.

Additionally, girls who are in school receive sex education which enables them not to engage in RSBs unlike those out of school. This observation is further substantiated in the previous study in Nigeria [7] which revealed that as the level of education increases the risky sexual behaviour reduces, this could be because sex education and adolescents´ access to adequate information increase as they get more education.

Conversely, Journeys plus curriculum was significantly associated with risky sexual behavior as AGYW who received Journeys plus were 29 times more significantly likely p=0.033) to engage in RSBs compared to those who did not receive the intervention. This observation is not congruent with the previous study in south Africa [18] which revealed that curriculum-based interventions are perceived to be effective way of preventing HIV and AIDS among the target population. Similarly, the findings in the previous research further revealed that the students have a need to attend life skills workshops because they believe that life skills training will assist them to be assertive and practice behaviors which reduce their level of vulnerability to HIV acquisition [18]. Likewise, the quantitative results in this study indicated significant association between Journeys plus and risky sexual behaviours which were reinforced by qualitative themes from FGDs and KII highlighting behaviour change.

Additionally, Age at enrollment was a significant predictor for risky sexual behavior as those AGYW who were enrolled in the age band (20-24 years) had 49,5 times more likely (AOR= 49.52,95% CI [1.24-1981.93], p-value= 0.038) as those who were in the age band of 15-19 years were 42.7 times more likely (AOR= 42.69, 95% CI [1.40-1301.27], p-value= 0.031) to engage in RSB compared to those in the age band of 10-14 years. The findings in this study are consistent with [5, 15] which indicated that AGYW in the age category (15-24 years) are sexually active and at higher risk of acquisition of HIV infection.

We observed that AGYW who started their own business after graduation from the program had 18 times higher likelihood of engaging in risky Sexual behaviours compared to those who did nothing after graduation. While the association was statistically significant, the high odds suggest that for this sample of AGYW who started their own business were more likely to engage in RSBs. Whereas theory and empirical evidence from previous studies [19] elsewhere in the world revealed that economic empowerment among AGYW had significant impact of girl empowerment on

risky sexual behaviours and adolescent pregnancy, this was not consistent in this current study. The findings in this study might have alternative explanations. The sample size of AGYW who started their own business after graduation and engaged in RSBs might be small or highly unpredictable risk. Starting business requires initial capital and after starting the business the profits may not be enough for household income and this might have forced the AGYW to engage in transactional sex either to get initial capital or to supplement on household income. Though there has been less rigorous research done to explore the strength of linkage between economic empowerment and risky sexual behaviours among AGYW. The finding in this study was synonymous with the results from the qualitative study in Tanzania by [20] that providing economic resources to AGYW through cash transfers without ensuring self-agency is unlikely to be an effective long-term intervention for economic empowerment.

In contrast, the findings in the previous study in Uganda by [21] examined the effect of economic assets on sexual risk-taking intentions, the results indicated that having access to economic assets plays an important role in influencing adolescents' sexual risk-taking intentions. It was further observed that AGYW who got employed after graduation had 19 times higher likelihood of engaging in risky sexual behaviours compared to those who did nothing after graduation. While the association was statistically significant, the high Adjusted Odds Ratio suggests that for this sample of AGYW who got employment were more likely to engage in RSB as opposed to safe sexual behaviours. This area requires further research. The finding in this study is surprising because employment can result into financial independence and disposable income reducing dependence on men and vulnerability for HIV infection. However, employment can have negative impact to increase opportunities of travel to socialize and engage in social activities leading to risky sexual behaviours. In addition, another explanation for the inconsistency in the findings could be the small sample of AGYW who got employed after graduation from the program and engaged in RSB or the risk which is highly unpredictable. This observation was consistent with the results in the previous research by [7] in Nigeria.

Furthermore, the finding in this study indicated that getting married after graduation from the program had 22 times likelihood of engaging in RSB than those who did not get married. This was Substantiated by [7] in Nigeria whereby adolescent who are married had the highest percentage (42.8%) of risky sexual behaviours, while cohabiting young women had the highest percentage (30.1%) of the risk among their cohort.

Conversely, girls who dropped out of class after graduation in this study had twice the likelihood (AOR=1.89, p-value= 0.486) to engage in risky sexual behavior compared to those who had not dropped out of school. This finding is consistent with [22] in Uganda which revealed that the adolescents had 1.3 times high likelihood to engage in RSBs compared to those who were not dropouts. Similarly in another previous study in selected secondary schools in Uganda, the results also showed that about 50.1% prior engagement in sexual behaviours was associated with school dropouts. A significant association between school dropout and engagement in sexual risky behaviours was confirmed ($p = 0.001$).

On the other hand, Employment status was not significantly associated with RSBs in this study, and this was surprising because poverty is a structural driver for acquisition of HIV infection. This observation was consistent with the finding in previous study in Uganda by [23] which revealed that female adolescents who were working but received no pay, self-employed in agriculture and who did manual jobs, whether skilled or not had significantly higher odds of reporting STIs compared to female adolescents who were not employed.

Conversely, female adolescents who had two or more lifetime sexual partners had significantly higher odds of reporting STIs than those who had only one lifetime sexual partner [23]. This area requires further research.

Furthermore, employment status of care givers had no significant relationship with RSBs in this study. However, household income can influence risky sexual behaviors because AGYW in poor families find it difficult to attain education and therefore tend to engage in transactional sex or commercial sex to look for survival and sometimes they are married off early by their care givers. The observation in this current study is consistent with the findings in the previous study by Ewemooje [7] which revealed that employment status was not associated with RSBs.

Finally, Curriculum based interventions (CBIs) except Journeys plus were independently not associated with RSBs. This finding could have been affected by the fact that services were tailored to age band and the participants who were not eligible for that service could have been considered not to have received the intervention during analysis. Although stepping stones methodology aims at promoting sexual health, improve communication skills, address issues of gender inequality and prevent HIV the results in this current study were not comparable with the findings in India [24] which revealed that there were significant changes in their relationships after training, benefit from discussion of gender, sexuality, condom use and HIV vulnerability issues.

Conclusion

The current study assessed the Reach of multifaceted interventions and investigated the influence of multifaceted interventions on risky sexual behaviors among adolescent girls and young women. The study revealed that 92.5% of the target population were reached by DREAMS programme. Multifaceted interventions had influence on reduction of risky sexual behaviours in this study. Uptake of multifaceted interventions was average across the different interventions in the region. There was evidence of behaviour change attributed to DREAMS interventions. In addition, marital status, education status (in school), Age at enrollment, Journeys plus, gaining employment, marriage and starting own business after graduation were the major determinants significantly associated with risky sexual behaviours. HIV prevention and sexual health, economic empowerment, behaviour change, employment opportunity, reduced unintended pregnancies, retention in school and asset building were identified as the major outcomes achieved by the program. Furthermore, skilling girls in apprenticeship and providing startup kits does not immediately translate into behaviour change, there is need for the implementers and different stakeholders to follow up the AGYW after graduation and continue with business coaching for sustainable and better health outcomes. Finally, findings in this study provided insights to develop strategies for school retention, sustainable skilling model, risk reduction measures among young women in union and policy development.

Strengths and Limitations

This study encountered several shortcomings and strengths. The study employed mixed-methods design combined with quantitative and qualitative data collection and analysis for triangulation. The relatively large sample size of 385 respondents strengthened reliability of quantitative findings. In addition, the use of multivariate analysis allowed identification of independent association between variables. Language barrier was addressed through translation of the questionnaires and interview guides in local language and were administered by research assistants. The inclusion of program officers, district community development officers and social workers as key informants and

Facilitators in FGDs provided in-depth perspectives from those that directly implemented the program. The cross-sectional study design which hampers causality and restricts findings on association and none-response on sensitive questions on sexual activity, but this was minimized by recruiting same gender as research assistants though not all were females. Finally, the small samples for the previous cohorts limited comparison of risky sexual behaviours between different cohorts of enrollment.

Competing Interests

The authors have declared that no competing interests exist.

Ethical Approvals

The Investigator maintained Ethical practices and principles of research ethics recommended in research involving humans as research subjects throughout the entire research process. Permission was sought from all relevant bodies and institutions prior to data collection. Introductory letter was obtained from Texila American University to seek for permission to carry out research in Mubende region. Administrative clearance was sought from Baylor Foundation Uganda to conduct the study. Ethical approval was sought from Gulu University Research Ethics Committee (GULU-REC, REF GUREC-2025-867) and Uganda National council for science and Technology (UNCST-REF-HS6319ES) to conduct the study. Clearance from District Health offices to conduct the study from the sub counties of Mubende and Mityana districts was obtained prior to data collection. Information was provided to the sub counties before data collection. Participants' rights were respected to make their own informed decision to participate in the study by providing full information about the study.

Authors Contributions

MI was involved in conceptualization, design, data curation, formal data analysis, investigation, supervision, methodology, validation, drafting original paper, reviewing and editing and final approval for publication. Both NG and SO were involved in conceptualization, design, investigation, reviewing and editing, supervision and final approval of the manuscript for publication.

Recommendations

This study is the first of its kind in Uganda and Mubende region, therefore further research that employs Randomized Control Trial (RCT) study design and the use of RE-AIM framework to evaluate the effectiveness and efficiency of MIs on RSBs. There is need for the implementers and different stake holders to follow up the AGYW after graduation for sustainable and better health outcomes. Involvement of adolescent boys and young men in the provision of secondary and contextual services can facilitate behaviour change among AGYW. There is need for the Government of Uganda to address the issue of school dropouts and ensure the AGYW given education support are monitored to complete the education cycle. The Ministry of Education and District education offices should come up with better and sustainable strategies to minimize dropouts of students.

To address the vice, there is need to ascertain individual, family and school based contributing factors to this surge and ensure strategies are put in place along those lines. Startup kits should be for the individual girl and not for the group and mechanisms should be put in place to ensure the girls are supported to start up their own businesses. Furthermore, involvement of male partners and care givers to form VSLA groups can create a more sustainable approach which can enable AGYW to save and pool their own resources to start their own businesses to improve their household income. There is need to district to continue engaging mentors for business coaching to enable AGYW to perfect their businesses. Additionally, there is need for the

government of Uganda to integrate DREAMS interventions in schools, health facilities and youth groups, for strengthen partnerships with all stakeholders in the ministry of health, Ministry of education, Ministry of gender, Labour and social development, civil society organizations, DHTs, community leaders, religious leaders and cultural leaders for multi-sectoral approach, efficient and sustainable AGYW programming. Finally, social media such as twitter, Facebook, WhatsApp, Tiktok among others, considering their influence in society should be adopted by implementing partners and health authorities to disseminate accurate information and address RSBs among AGYW.

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Data Availability

The data set related to this study has been published in Texila International Journal of Public Health.

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