Pre – Analysis Plan

Adolescent Girls Initiative for Learning and Empowerment: Impact Evaluation of a Safe Space-Based Life Skills Training and Digital Literacy Training in Rural Nigeria

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Abstract

The study conducts a cluster randomized controlled trial among secondary schools in Nigeria to evaluate the impact of school-based life skills training delivered in safe spaces with and without digital literacy training. It aims to estimate the causal impacts of these trainings on adolescents' school performances and retention, socio-emotional skills, digital skills, health, marriage, fertility, and labor market outcomes.

1. Introduction

In Nigeria today, 34% of women aged 15 to 49 remain without any formal education, a figure that has changed little since 2018, while only 55% have attained some secondary education (National Population Commission (NPC) [Nigeria] and ICF 2019; Federal Ministry of Health and Social Welfare, National Population Commission, and ICF 2024). Secondary school completion amongst the poorest quintile of women is as low as 3 percent (National Population Commission (NPC) [Nigeria] and ICF 2019). Perceptions of poor quality of schooling conflated with low returns to education drive low school retention for girls in Nigeria, which then steers parents to marrying off young girls instead of investing in their schooling (Perlman et al. 2017). In Kaduna, Katsina, and Kano states of Northern Nigeria, nearly one in four women aged 15 to 49 were married before age 15. Further, one in five adolescent girls between 15 and 19 are married (National Bureau of Statistics (NBS) and United Nations Children's Fund (UNICEF) 2022). Therefore, education, marriage, and childbearing are closely intertwined with economic outcomes in this setting. A crucial pathway to increasing school retention and improving socio-economic outcomes for girls in Nigeria is to improve social and economic competencies through school systems (Perlman et al. 2017). One way these competencies can be improved is by equipping girls with school-based socio-emotional skills (SES) and providing training relevant to income generation after graduation.

Life skills training through girls' clubs or "safe spaces" is a popular approach in low-and-middle-income countries (LMICs). Globally, life skills programs, defined as "training interventions with psychosocial or soft skills at their core, sometimes paired with other forms of hard skills training, which strengthen an individual's ability to make critical decisions in their life", have shown consistently positive impacts on agency and education, but their impacts on labor, child marriage and pregnancy, and gender-based violence are mixed (Mortara, Adjepong, and Gopalan 2024). In addition, there is a lack of evidence on life skills training's impact on later-life outcomes, such as autonomy in marriage or labor force participation (Kwauk et al. 2018).

In sub-Saharan Africa, the evidence on the effectiveness of life skills programs is largely mixed, partially due to the heterogeneity of program design and implementation challenges (Ajayi and Koussoubé 2024). These programs have led to the development of more equitable attitudes toward gender norms (Özler et al. 2020; Buehren et al. 2024; Bandiera et al. 2020; Boulhane et al. 2024), fostered greater sense of self-efficacy (Austrian et al. 2020; Cohen, Abubakar, and Perlman 2023), enhanced socio-emotional skills (Boulhane et al. 2024), and strengthened girls' social ties (Buehren et al. 2024; Bandiera et al. 2020; Stark et al. 2018; Austrian et al. 2020; Cohen, Abubakar, and Perlman 2023). However, most life skills programs show no effect on employment (Berge et al. 2022; Buehren et al. 2024; Melnikas et al. 2023; Buehren et al. 2017; Boulhane et al. 2024), and their impact on delaying marriage and childbearing is inconclusive (Melnikas et al. 2023; Özler et al. 2020; Buehren et al. 2024; Bandiera et al. 2020; Berge et al. 2022; Cohen, Abubakar, and Perlman 2023; Boulhane et al. 2024; Kangwana et al. 2022). In addition, the effectiveness of girls' groups is often affected by factors such as the quality of implementation and local context, including conflicts and epidemics (Buehren et al. 2017; Bandiera et al. 2020; Buehren et al. 2024).

Life skills programs for adolescent girls have primarily been community-based, with limited evidence of their integration into school settings. School-based life skills training programs could address topics that extend beyond the standard curricula, offer a safe space for girls to form bonds beyond regular classroom interactions, and potentially be implemented at scale. Such safe spaces could foster social-emotional support and reduce school dropout, as evidenced by a life skills program in India aimed at boosting aspirations and challenging gender norms (Edmonds, Feigenberg, and Leight 2023). However, to our knowledge, only five studies have rigorously assessed the effectiveness of school-based life skills training

programs in sub-Saharan Africa (SSA) (Decker et al. 2018; Ashraf et al. 2020; Berge et al. 2022; Baiocchi et al. 2017; Mensch et al. 2021). Among these, two programs focused on self-defense skills and led to a reduction in sexual assaults in Kenya and Malawi (Decker et al. 2018; Baiocchi et al. 2017).

The content of skills training is a crucial factor for its effectiveness. For example, a school-based program that offered negotiation training to Grade 8 girls in Zambia improved enrollment and reduced dropout compared to offering a safe space alone without intentional life skills component (Ashraf et al. 2020). Another safe-space program in Zambia focused on schooling and provided information on sexual and reproductive health (SRH) had no effect on literacy or non-verbal reasoning, except when e-readers were incorporated into the programming (Mensch et al. 2021). Similarly, a school-based program in Tanzania offered different skills training for young women in their last year of secondary school. While the training on SRH had no effect on girls' economic outcomes and even increased fertility, an economic empowerment program, which included entrepreneurship training, resulted in a substantial increase in self-employment and income (Berge et al. 2022).

In addition to life skills, digital literacy can empower adolescent girls by offering access to information that might not be covered in standard school curricula. In LMICs, interventions that provide mobile phones, access to the internet, and social media are effective in improving adolescent girls' access to SRH services (Meherali et al. 2021). In Nigeria, many adolescent girls in urban settings use the internet for information on SRH and gender-based violence as they prefer the privacy and abundance of information it offers (Ibegbulam et al. 2018). However, no study has yet evaluated the impact of school-based training specifically aimed at improving the digital literacy of adolescent girls in low-resource settings such as rural Nigeria.

Digital literacy training also has the potential to enhance education outcomes, promote financial inclusion, strengthen social ties, and improve employment opportunities. Higher levels of digital literacy are associated with improved financial behaviors in savings and borrowing, based on the Intermedia Financial Inclusion Insights surveys from seven countries in South Asia and SSA (Kass-Hanna, Lyons, and Liu 2022). In addition, greater digital literacy and skills might translate into increased job opportunities in higher-earning sectors. For example, female entrepreneurs working in male-dominated sectors, such as information technology, tend to generate greater profits compared to those who remain in traditionally female-concentrated sectors (World Bank, 2022). However, evidence on effective approaches in education and labor market outcomes is limited and inconclusive in LMICs (Meherali et al. 2021).

In addition to improving specific skills, the implementation of skills training programs in schools could signal an overall improvement in school quality to parents and potentially shift the perception of limited returns on girls' education, thereby addressing crucial factors that contribute to low secondary school attendance among girls in LMICs (Psaki et al. 2022). In SSA, promising evidence suggests that supply-side interventions within schools, including improvements in school infrastructure and the quality of instruction, effectively improve educational outcomes for girls. Examples include remedial support initiatives in Ghana, the provision of digital devices in Zambia, and the construction of girl-friendly schools in Burkina Faso (Duflo, Kiessel, and Lucas 2020; Mensch et al. 2021; Kazianga et al. 2013).

Digital literacy training provided in conjunction with life skills training may not only have the potential to amplify the effects of life skills training on health and well-being outcomes but also enhance economic well-being. There is a need for rigorous impact evaluations of digital literacy training programs for adolescent girls in Nigeria to build evidence on the impact of this training on economic outcomes such as employment opportunities, income generation and occupational choice.

In this impact evaluation (IE), we aim to fill the evidence gap by evaluating the impact of a school-based life skills training program on the empowerment and skills development of adolescent girls in Nigeria, focusing on outcomes related to education, health, socio-emotional skills, agency, marriage, and labor market engagement. Furthermore, we explore whether the inclusion of a digital literacy component in the life skills training program provides any complementary benefits for adolescent girls. The skill training program we evaluate is part of the World Bank's Adolescent Girls Initiative for Learning and Empowerment (AGILE) project, implemented in senior secondary schools across Kaduna, Kano and Katsina states in Nigeria.

2. Research Design

2.1. Methodological Framework

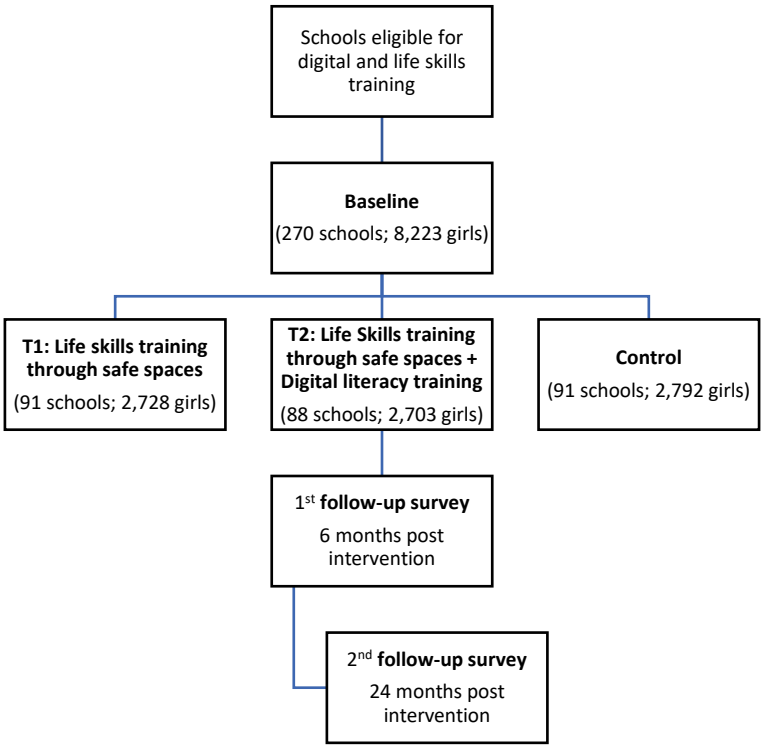
The study follows a randomized controlled trial (RCT) design whereby the study participants will be randomly allocated to three groups – the first treatment group, which will deliver a life skills training program, a second treatment group which will deliver both life skills and digital literacy training program and a control group which will not receive any of the two interventions until after the evaluation period is over. The random assignment of the students to these groups enables the study to establish a causal relationship between the interventions and the outcome variables. The random assignment will be at school level in the states selected for the impact evaluation.

Eligible schools in the selected states for the IE will be randomly allocated to three groups consisting of two treatment arms (T1 and T2) and one control arm.

- Treatment 1 schools will be offered a safe space-based life skills training program.
- Treatment 2 schools will be offered both a safe space-based life skills training program and digital literacy training.
- Control group will receive the safe space-based life skills intervention and the digital literacy intervention after the endline data collection is completed.

The IE design is depicted in Figure 1 below:

Figure 1: Randomization Design



2.2. Research Questions and Hypotheses

The objective of this study is to contribute to the evidence base on the impact of school-based safe-space-based life skills training programs on learning, earnings, and sexual and reproductive health outcomes of adolescent girls. In addition, it aims to document the impact of layering a digital skills training program to be delivered in combination with the life skills training program on these outcomes. The study documents the impact of the interventions on adolescent girls enrolled in secondary school in rural, semi-urban and urban areas in Nigeria. This impact evaluation will build much-needed evidence on (i) the impact of delivering life skills and digital literacy trainings in school settings; (ii) the impact of life skills trainings on long-term economic empowerment of women, and (iii) their scalability for future education policies in the country.

The study will answer the following research questions:

(1) What is the impact of delivering safe space-based life-skills training in secondary schools on adolescent girls' educational and economic outcomes, sexual and reproductive health knowledge and behaviors other empowerment indicators?

(2) What is the impact of combining safe spaces-based life-skills training and digital literacy interventions within secondary schools on adolescent girls' educational and economic outcomes, sexual and reproductive health knowledge and behaviors and other empowerment indicators?

Hypotheses 1: The school level safe space-based life skills training program does not have an impact on adolescent girls' educational and economic outcomes, sexual and reproductive health knowledge and behaviors and other empowerment outcomes.

Hypotheses 2: The combination of the school level safe space-based life skills training program and the digital skills training program does not have an impact on adolescent girls' educational and economic outcomes, sexual and reproductive health knowledge and behaviors and other empowerment outcomes.

Hypotheses 3: There is no effect of adding digital skills training to the safe space-based life skills training program on adolescent girls' adolescent girls' educational and economic outcomes, sexual and reproductive health knowledge and behaviors and other empowerment outcomes.

2.3. Outcomes

The primary and secondary outcomes as well as the relevant mediator variables of the study are presented in Appendix A. The table also provides a description of the variable construction and the follow up survey round at which the variables will be reported.

The primary outcomes include education (high school graduation and school retention) and economic outcomes (engagement in non-farm activities). Additionally, the primary outcomes will include marital status, and measures of socio-emotional skills and digital literacy, which are skills directly targeted by the intervention.

The study will also examine the impact of the interventions on a wider pool of secondary outcomes. The study will capture impacts on secondary economic outcomes such as number of days worked, income and savings. The secondary outcomes will also consist of education variables such as school engagement, school absenteeism, enrollment in tertiary education. Further, the study will explore impacts on knowledge and practice outcomes that the life skills and digital skills training programs aim to influence. For the life skills program, these include goal setting capacity, knowledge of climate change, knowledge and experience of school-based gender-based violence and intimate partner violence, gender attitudes and beliefs, knowledge of SRH, drug use, sexual behavior, sexual violence and bullying. For digital skills, the study measures secondary outcomes on digital skills and knowledge, knowledge of productivity programs, engagement in the Information and Communication Technology (ICT) sector. Lastly, pregnancy and perceived social support will also be measured as a secondary outcome.

2.4. Interventions

The study will include two treatment groups. Schools in the first treatment group will be offered a safe space-based life skills training program. Schools in the second treatment group will be offered both a life skills training program and a digital literacy training program.

2.4.1 Safe space-based life skills training program

The safe spaces for adolescent girls in schools will provide a school-based platform for them to interact with their peers and mentors, participate in recreative activities, and develop life and health skills during a critical development period. The life skills training program delivered in these safe spaces aims to empower adolescent girls and facilitate their transition into the labor market by improving their self-confidence, decision-making abilities, and socio-emotional skills. These skills are anticipated to enhance the utilization of SRH services, reshape attitudes towards early marriage and childbearing, elevate aspirations, and bolster school retention rates.

The life skills curriculum is developed collaboratively by implementing partners (the Society for Women Development and Empowerment of Nigeria for Kano and the Centre for Girls Education for Katsina and Kaduna), state ministries of education, and the Abdul Lateef Jameel Poverty Action Lab. It covers modules on the value of education, empowerment, nutrition, reproductive health, gender-based violence, and climate change. A training-of-trainer model is used, wherein senior civil servants are trained as master trainers, who then train schoolteachers as mentors to deliver life skills training.

All girls in Senior Secondary 1 and Senior Secondary 2 will have the opportunity to enroll in the program on a first-come, first-served basis. Safe space groups are formed with 25 to 60 girls, the number varying by state. Sessions are held two to three times per week, each lasting one hour, either during or immediately after school hours. The program is designed to span 10 calendar months throughout the academic year.

2.4.2. Digital literacy training program

The digital literacy training program aims to develop the digital literacy for accessing information, employment, networking, and online safety. The curriculum integrates the National Education Resource Development Centre's Computer Studies curriculum with UNESCO's Digital Literacy Global Framework, contextualized for each state by the Centre for Information Technology and Development in Kano, Lexington Technologies in Kaduna, and the National Teachers Institute in Katsina.

Combining theoretical instructions with practical sessions, the digital literacy training program covers foundational computer skills, internet navigation, multimedia services, productivity programs, computer security, and networking. Each level of the curriculum extends over a one-year period, equating to approximately 10 months of class work for each class level from SS1 to SS3. One to three teachers per school are trained to deliver this curriculum.

Training sessions take place in computer classrooms and laboratories equipped with necessary digital infrastructure, including solar power backups and internet connectivity, to support uninterrupted learning. All schools participating in the digital literacy program receive computer equipment, unless they already have the necessary equipment. Class sizes vary from 40 to 100 students. Digital literacy classes are held two times per week independent of life skills sessions, each session lasting one hour during school hours.

2.5. Sample

The study population consists of girls living in rural, semi-urban and urban areas in Katsina, Kaduna and Kano states who are currently enrolled in year one of the senior secondary public schools. The study randomizes and compares outcomes at the school level. Schools will be eligible to receive the life skills and the digital literacy training interventions if they fulfill the following screening criteria:

- Have a source of power (selecting those with more stable power) or can fix power facilities in the two months ahead of the baseline survey.
- Have space and facilities for a computer laboratory where digital literacy intervention can occur. In the presence of broken equipment, the schools should commit to repairing the equipment two months ahead of the baseline survey.
- Have a minimum of 30 adolescent girls attending per classroom in Senior Secondary School

To ensure that the three groups of schools have comparable background characteristics on average, we stratify the sample based on the following dimensions:

- Location of school – the sample is stratified by location of the schools which could be rural, semi-urban or urban.
- Type of school (co-ed or girls only) – the sample is stratified by whether the school is co-ed (including boys and girls) or a girl-only school.
- Having a pre-existing computer lab – some schools have a fully operational pre-existing computer lab while others have a pre-existing computer lab with faulty equipment. There are also schools that do not have an existing computer lab but have found a space that will be converted into one. We stratify schools based on this dimension as this could be indicative of the level of experience and preparedness to deliver the digital literacy training program.

Initial administrative data from the study schools showed that most of the girls were between the ages of 15 and 20. The study sample was limited to girls within this age group.

2.6. Power Calculation

We first conducted power calculations to estimate the minimum detectable effect (MDE) size before the baseline, using the means, standard deviations, and intra-cluster correlations coefficients computed from the Nigeria DHS 2018 data for available outcome variables (Appendix B). We restricted the analysis to women from Kaduna, Kano, and Katsina states in Nigeria aged 18 to 24, with at least 7 years of schooling.[1] After the baseline survey, we used the baseline data to calculate MDE on our primary outcome variables that were not available in the Nigeria DHS 2018. Assuming a total sample of 270 schools, 30 girls per school, 30% of attrition at follow-up surveys, and a significance level of 0.05 and 80% power, we calculated the MDE with and without attrition (Appendix B). The power calculation based on the baseline survey data suggests that this study has adequate statistical power to detect changes in commonly accepted effect sizes for primary outcomes.

[1] We can expect that standard deviation (sd) will be lower in our study sample than in the DHS sample since we will be focusing on in-school girls only, and hence on a more homogeneous sample. Consequently, MDEs presented here are probably an upper bound.

2.7. Data Collection and Processing

The study collects data from the adolescent girls, their caregivers and schools. The adolescent questionnaire collects data on demographic characteristics, school enrollment and performance, aspirations and the social behavior of the girls, attitudes and expectations, sexual and reproductive health, experience of gender-based violence, marriage, economic activities, digital literacy, and access to finance. The caregiver questionnaire collects data on caregiver and household characteristics, attitudes and expectations, expenditure, and food security. The school questionnaire gathers data on school facilities and intervention implementation.

Data collection takes place in schools participating in the IE for the adolescent girl's interviews. The caregiver interviews are conducted at their respective households. There are three data collection rounds: (i) baseline survey, (ii) midline survey, and (iii) endline survey.

- ***Baseline survey****:* a baseline survey is conducted ahead of the implementation of the program to capture the pre-intervention status of the adolescent girls, their households and schools.
- ***Midline survey****:* the respondents of the baseline survey will be interviewed 10 months after completion of the life skills program to measure the short-term impacts of the interventions. The midline survey will have the same structure as the baseline survey, except exclusion of time-invariant characteristics. The short-term impacts of the interventions will be measured using the midline survey data thereby informing stakeholders about the effectiveness of the project. The school survey will also be conducted at midline.
- ***Endline survey****:* the respondents will be interviewed again two years after the completion of the interventions. This survey will also be structured in the same way as the midline survey and will be used to measure and assess the long-term impacts of the interventions.

3. Empirical Analysis

3.1. Statistical Methods

We will estimate the intention-to-treat impacts using an analysis of covariance estimator. This approach will allow us to assess the impact of the life skills training and any additional effects of incorporating digital literacy training on outcomes of interest, utilizing the baseline and follow-up data. Specifically, we will estimate the treatment impact for girls using the following regression specification:

$$Y_{ist} = \beta_0 + \beta_{1t} T1_s + \beta_{2t} T2_s + \beta_3 X'_{is0} + \beta_4 Y_{is0} + \sum_{j=1}^{k} \lambda_{ij} + \epsilon_{it}$$

$Y_{is,t}$ is the outcome measure for individual *i* at school *s* measured at time point *t* (t = 1 at midline post-intervention and t = 2 at endline post-intervention). T1 is a dummy variable equal to 1 if individual *i* was in a school randomly assigned to the life skills training group. T2 is a dummy variable equal to 1 if individual *i* was in a school randomly assigned to the life skills plus digital literacy training arm. $\beta_{1,t}$ and $\beta_{2,t}$ will measure the treatment effects relative to those assigned to the control group at time *t*. $X'_{i,0}$ is a vector of controls that are unbalanced at baseline. We also plan to select controls using the double-LASSO methods as an alternative approach (Belloni, Chernozhukov, and Hansen 2014). $Y_{is,0}$ is baseline value of outcome

variables at baseline (if measured). λ_{ik} is a vector of fixed effects for the *k* strata used in the randomization. Standard errors will be clustered at the school level.

We will report the estimates and significance for $\beta_{1,t} = \beta_{2,t}$ to test the null hypothesis that offering digital literacy training does not result in any additional effect beyond that of life skills training alone.

3.2. Heterogeneity Analysis

We will test for heterogeneity across the following dimensions based on the baseline data:

- Adolescent level: literacy, socioemotional skills score, digital literacy score, experience of violence
- Household level: wealth index, caregiver's education
- School level: girls-only school, rural/peri-urban, an index of school quality (e.g., WASH facility, computers, class size)

We will encode these heterogeneity variables as binary variables. For those not already binary, we'll convert them to binary based on whether their values are above or below the median.

3.2.1. Multiple Hypotheses Testing

Since we expect the skills trainings to affect many outcomes and dimensions of welfare, we will account for multiple hypotheses by using outcome variable indices and adjusting for multiple hypothesis testing. We will report sharpened False Discover Rate q-values to compute the minimum level of significance to reject the null hypothesis (Benjamini, Krieger, and Yekutieli 2006).

3.2.2. Testing for Differential Attrition

We will test whether survey attrition is related to treatment status using the specification below:

$$A_{is,t} = \beta_0 + \beta_{1t} T1_s + \beta_{2t} T2_s + \beta_3 X'_{is0} + \sum_{j=1}^{k} \lambda_{ij} + \epsilon_{it}$$

$A_{is,t}$ represents whether individual *i* in school *s* is lost to follow-up in the midline or endline surveys. $\beta_{1,t}$ and $\beta_{2,t}$ will reflect whether assignment to treatment T1 and T2 significantly affects the likelihood of attrition compared to the control group. In addition, we will report the estimates and significance for $\beta_{1,t} = \beta_{2,t}$ to test if attrition is different across treatment arms.

If treatment status has a statistically significant effect on survey attrition, we will estimate the likelihood of a participant remaining in the study based on baseline characteristics and using inverse probability weights to make the retained sample reflective of the original population (Kling, Liebman, and Katz 2007).

Appendix A: List of Primary and Secondary Outcomes

An outcome is measured during both midline and endline follow-up surveys, unless specified otherwise in the "Definition" column.

Primary Outcomes

Primary Outcome	Definition
School retention	a binary indicator coded to 1 if a girl is still in school (at midline)
Secondary education	a binary indicator coded 1 if adolescent girl that has completed secondary education and 0 otherwise
Digital financial literacy	a composite score based on 30 items that measure respondent's digital financial literacy and access to digital tools, with a higher score indicating greater literacy and access (Kass-Hanna, Lyons, and Liu 2022)
Socio-emotional skills index	a composite score based on indices that measure different socio-emotional skills, e.g., personal initiative, negotiation, decision-making, and communication
Engagement in non-farm income generating activities	a binary indicator coded 1 if a girl engaged in any paid non-farm activity in the last completed month and 0 otherwise
Economic empowerment index	a composite score based on two outcomes related to labor market and economic outcomes that include number of days worked and income
Marriage	a binary indicator coded 1 if adolescent girl has ever been married (including cohabitation) and 0 otherwise (at midline). a binary indicator coded 1 if adolescent girl was married before the age of 18 (at endline)

Secondary Outcomes

Secondary Outcome	Definition
Agency and aspirations	
Agency	a composite score based on 21 items that measure different aspects of agency, including freedom of movement, voice, behavioral control and decision making, adapted from the Agency Scale from the Global Early Adolescent Study (Zimmerman et al. 2019)
Goal setting capacity	a composite score based on 8 items that measure respondent's ability to set goal
Aspirations - education attainment	a variable that indicates the level of formal education the respondent would like to complete
Knowledge	
Knowledge of climate change	a composite score calculated based on the correct answers to a list of questions related to climate change (midline-only)
Knowledge of Sexual and Reproductive Health (SRH)	a composite score for correct answers on knowledge of SRH
Knowledge of menstruation & puberty	a composite score for correct answers on knowledge of menstruation and puberty

Secondary Outcome	Definition
Knowledge of hygiene & nutrition	a composite score for correct answers on knowledge of hygiene and nutrition
Knowledge on school-related gender-based violence	the fraction of correct responses to 12 questions that ask whether an act is considered violence
Digital literacy	
Digital skills and knowledge	a composite score based on 31 items that measure respondent's technical and operational skills, information navigation and processing skills, communication and interaction skills, and content creation and production skills (Helsper et al. 2020)
Knowledge of productivity program	a composite score of items developed based on the digital literacy training curriculum
Education	
School engagement	a composite score based on 8 items that measure respondent's school engagement (midline-only)
School absenteeism	number of school days a girl missed in the last completed month (midline-only)
Enrollment in tertiary education	a binary indicator coded to 1 if a girl is enrolled in tertiary education (endline-only)
School-related gender-based violence and intimate partner violence (IPV)	
School-related sexual violence	a composite score based on the frequency of different types of sexual violence reported by the respondent (Dexis Consulting Group 2020)(midline-only)
School-related bullying	a composite score based on the frequency of different types of bullying reported by the respondent (Dexis Consulting Group 2020) (midline-only)
Emotional IPV	a composite score based on the frequency of different types of emotional violence from an intimate partner reported by the respondent (National Population Commission of Nigeria, United Nations Children's Fund (UNICEF), and Centers for Disease Control and Prevention (CDC) 2014)
Physical IPV	a composite score based on the frequency of different types of physical violence from an intimate partner reported by the respondent (National Population Commission of Nigeria, United Nations Children's Fund (UNICEF), and Centers for Disease Control and Prevention (CDC) 2014)
Sexual violence	a composite score based on the frequency of different types of sexual violence reported by the respondent (National Population Commission of Nigeria, United Nations Children's Fund (UNICEF), and Centers for Disease Control and Prevention (CDC) 2014)
Health behavior	
Sexual behavior	a binary indicator coded 1 if adolescent girl has ever had sex and 0 otherwise (at midline) a binary indicator coded 1 if adolescent girl had sex before the age of 18 (at endline)
Used appropriate materials during last menstruation	A binary indicator coded 1 if adolescent uses appropriate material during menstruation (disposable pad, tampons, or menstrual cup) and 0 otherwise

Secondary Outcome	Definition
Drug use - ever used drug	a binary indicator coded 1 if adolescent girl has ever used drugs and 0 otherwise
Labor market/Economic outcomes	
Sector - ICT	a binary indicator coded 1 if a girl engages in income generating activities related to ICT (endline-only)
Number of days worked	Number of days a girl was engaged in paid work in the last complete month (endline-only)
Income	aggregate income earned in the last completed month (winsorised) (endline-only)
Savings	amount saved in the last completed month (winsorised) (endline-only)
Other outcomes	
Gender attitudes and beliefs	a composite score for (a) gender equality beliefs based on frequency of the different types of favorable gender equality beliefs, and (b) acceptability of IPV based on frequency of the different types of violence girls find acceptable (Dexis Consulting Group 2020)
Pregnancy	a binary indicator coded 1 if adolescent girl has ever been pregnant and 0 otherwise (at midline) a binary indicator coded 1 if adolescent girl has ever been pregnant before the age of 18 (at endline)
Perceived social support	mean score of the Multidimensional Scale of Perceived Social Support (Zimet et al. 1990)

Appendix B: Power Calculation

We first conducted power calculation using data from the Nigeria Demographic and Health Survey (DHS) conducted in 2018, restricting the analysis to female respondents who are 18 to 24 years, have completed at least seven years of education, and reside in rural areas within the three study states.

Summary statistics			270 clusters x 30 girls per cluster		270 clusters x 21 girls per cluster	
Indicators	**mean**	**ICC**	**MDE**	**% change**	**MDE**	**% change**
Respondent completed secondary education	0.53	0.21	0.10	19%	0.10	19%
Current marital status is married/cohabit	0.59	0.14	0.08	14%	0.09	15%
Respondent is currently working	0.49	0.01	0.04	8%	0.05	10%

For primary outcomes not captured by the DHS, power calculation is based on the baseline survey data with adolescent girls conducted in 2023.

Indicators			270 clusters x 30 girls per cluster		270 clusters x 30 girls per cluster - with 30% attrition	
Variables	**Control mean (baseline data)**	**ICC**	**MDE**	**% Change**	**MDE**	**% Change**
Multidimensional digital-financial literacy index (Range: 0 – 100)	18.03	0.22	3.28	18%	3.30	18%
SES skills index (Range: 0 – 1)	0.82	0.19	0.01	2%	0.01	2%

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