



# Effects of economic support, comprehensive sexuality education and community dialogue on sexual behaviour: Findings from a cluster-RCT among adolescent girls in rural Zambia

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## ABSTRACT

Adolescent girls in Sub-Saharan Africa are at high risk of poor sexual and reproductive health outcomes. We present findings from a cluster-randomised trial in rural Zambia on the effects of economic support, comprehensive sexuality education (CSE) and community dialogue on sexual activity, contraceptive use and beliefs among adolescent girls. We recruited 157 schools in 2016, and all girls in grade 7 were invited to participate. Schools were randomised to either economic support, combined economic support, CSE and community dialogue, or control. Economic support consisted of unconditional cash transfers to girls and their guardians, and payment of school fees for girls continuing to grades eight and nine. CSE and community dialogue meetings focused on practices around girls' fertility, marriage and education. The interventions lasted two years from 2016 to 2018, with follow-up for another two years. The effects on outcomes were measured in 2018 and 2019 and compared using generalised estimating equations. We found that economic support lowered sexual activity (risk ratio (RR) 0.70; 95% C.I. 0.54 to 0.91), with a small added benefit of CSE and community dialogue. Economic support and the additional CSE and community dialogue were effective in lowering unprotected sexual activity (RR 0.53 for combined support vs. control; 95% C.I. 0.37 to 0.75). There was no evidence of intervention effects on contraceptive use among those ever sexually active, but the addition of CSE and community dialogue improved contraceptive use among those recently sexually active (RR 1.26; 95% C.I. 1.06 to 1.50) and knowledge regarding contraceptives (RR 1.18; 95% C.I. 1.01 to 1.38) compared to economic support alone. Perceived community support regarding contraceptives was lower in both intervention arms compared to the control. These findings indicate that economic support in combination with CSE and community dialogue can improve the sexual and reproductive health of adolescent girls.

## 1. Introduction

Adolescents in Sub-Saharan Africa face great challenges concerning their sexual and reproductive health (SRH). The incidence of adolescent pregnancy and HIV in the region is high (Kassa et al., 2018; Maulide Cane et al., 2021). Data from the Global Burden of Disease Study (2019) show that for women aged 15–19 years in Sub-Saharan Africa, maternal disorders combined was the second most important cause of death (Global Burden of Disease Network, 2020). Furthermore, adolescent pregnancies are associated with increased risk of

preeclampsia/eclampsia, prematurity and low birth weight (Grønvik and Sandøy, 2018). Coupled with an HIV prevalence among girls and young women that is more than double that of young men (Hegdahl et al., 2016; UNAIDS, 2019), adolescent girls are particularly vulnerable to adverse SRH outcomes, especially if they have dropped out of school.

Early marriage, low socioeconomic position, school drop-out, gender inequality, and lack of comprehensive SRH knowledge constitute important determinants of poor SRH among adolescent girls (Guna-wardena et al., 2019; Pradhan et al., 2015). A key driver for many of these factors is poverty, especially as a reason to marry off girls at a

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young age and as a barrier to sending girls to school, but also as an incentive to engage in sexual relationships with boys (Austrian et al., 2019). Premarital sexual relationships are common, also among the less poor, and data from several Sub-Saharan African countries indicate that the median age at sexual debut for unmarried adolescent girls is 16 (Amo-Adjei and Tuoyire, 2018). Despite the potential of contraceptives in reducing both unintended pregnancies and transmission of sexually transmitted infections (STIs) such as HIV, contraceptive use among young people is low and a recent study estimated the unmet need among girls 15–19 years in Sub-Saharan Africa to be 72% (Li et al., 2020). Major barriers to their use are social and religious norms emphasising that unmarried young women should be sexually abstinent, misconceptions related to side-effects, limited access and availability, negative attitudes of healthcare workers towards adolescents seeking contraceptives, as well as perceptions that contraceptive use is linked to promiscuity (Blackstone et al., 2017; Silumbwe et al., 2018; Williamson et al., 2009; Zulu et al., 2019).

For the last two decades, cash transfer (CT) programs have become increasingly popular as a means to reduce complex health and social problems where poverty is thought to be an important driver. Several randomised controlled trials (RCTs) have been conducted in Sub-Saharan Africa to assess the effectiveness of CTs and other types of economic support in increasing school completion and improving the SRH of adolescents, but findings have differed between contexts and intervention designs. A trial from Malawi, a high-poverty setting, found that for adolescent girls enrolled in school at baseline, both conditional and unconditional CTs reduced the prevalence of HIV and HSV-2, as well as the proportions having older sexual partners and having sexual intercourse at least once per week (Baird et al., 2012). The trial found that unconditional CTs were also effective in reducing pregnancy rates among girls who dropped out of school after the start of the intervention, whereas no evidence of such an effect was found for girls who remained in school, regardless of CT type (Baird et al., 2011). These findings indicate that unconditional CTs may be more effective in reducing pregnancies than conditional CTs when the target population is particularly vulnerable. Another trial, conducted in South Africa, studying the impact of a CT conditional on secondary school attendance among girls, found no effect on the incidence of HIV, HSV-2, pregnancy, or risky sexual behaviours, although it did reduce the likelihood of unprotected sex (Pettifor et al., 2016). The authors explained this lack of effect with a surprisingly high school enrolment in the area and the existence of other social protection programmes, also benefitting those in the control arm. In Kenya and Zimbabwe, two trials assessing the effect of payment of school fees and uniforms for orphans found limited effects on HIV and HSV-2 among adolescent girls, partly due to HIV incidence being lower than expected (Cho et al., 2018, 2019; Hallfors et al., 2015). There were also limited effects on outcomes such as pregnancy, age at sexual debut, number of sex partners, and condom use, although the trial in Kenya did find that the support reduced the likelihood of transactional sex. Cho et al. (2019) mentioned peer pressure and more liberal sexual beliefs among school girls as possible explanations for the limited effect on sexual behaviour. There have also been quasi-experimental evaluations of government-run CTs to poor and vulnerable households (i.e., not specifically targeting adolescent girls) in several Sub-Saharan African countries, which found some reductions in adolescent pregnancy rates and sexual debut, but no evidence of effect on condom use (Dake et al., 2018; Handa et al., 2014, 2015; Heinrich et al., 2017).

Educational interventions have also shown promising results in reducing risky sexual behaviour, but the bulk of the evidence comes from North-America. In these settings, comprehensive sexuality education (CSE) tends to reduce risky sexual practices and pregnancy rates, whereas abstinence only programmes have not been found to affect behavioural outcomes (Chin et al., 2012; Oranganje et al., 2016). In line with this, a trial from Kenya found that training teachers in the national HIV/AIDS curriculum, which mainly promotes sexual abstinence, did not appear to reduce teen pregnancies or the risk of HSV-2 (Duflo et al.,

2015; Dupas, 2011). However, when pupils were provided with additional information on the risk of HIV infection increasing with the partner's age, teen pregnancy decreased with 28 percent compared to the control, and girls seemed to substitute older sexual partners with younger ones (Dupas, 2011). However, evidence on school-based CSE programs from Sub-Saharan Africa thus far point to limited effects on behaviour (Shangase et al., 2021). Contextual barriers may explain the lack of effects. In South Africa, two trials of school-based CSE interventions found improvements in SRH knowledge, attitudes, and other theoretical constructs but no effect on sexual behaviour (Mathews et al., 2012, 2016), whereas in Tanzania, similar interventions delayed sexual initiation (Mathews et al., 2012; Mmbaga et al., 2017). The authors mentioned preexisting HIV prevention programmes and unsafe social environments in South Africa as possible explanations for the lack of behaviour change there. Other trials from Sub-Saharan Africa also indicate that CSE interventions are generally more effective in improving determinants of sexual behaviour such as intentions, attitudes and knowledge, than in changing behaviour (Kemigisha et al., 2019; Taylor et al., 2014). Both of these had relatively short follow-up periods (two to eight months), which may be too short to observe behaviour change. Furthermore, a very young sample in the study by Kemigisha et al. might have precluded measurement of sexual behaviour outcomes, whereas high levels of forced sex in South Africa was suggested by Taylor et al. as a potential explanation for the lack of effect on sexual activity in their study. A multicomponent intervention in Tanzania, which included a school-based CSE programme, found improvements in SRH knowledge, self-reported condom use and postponement of sexual debut, especially among males, but no effects on biological outcomes such as HIV, HSV-2 or pregnancy (Ross et al., 2007). The authors explained these findings with limited sexual decision-making power among females and that the interventions only focused on the adolescents themselves, not on contextual factors such as social norms and this may have made it difficult for the youths to act on the knowledge they had acquired. A trial from Uganda, which evaluated vocational and life skills training for adolescent girls, including sessions on contraceptives, SRH, negotiation skills, and issues such as child marriage and gender-based violence, found reductions in early child-bearing and unwanted sex (Bandiera et al., 2020), which may support the conclusion of a systematic review by Haberland that programmes addressing gender and power might be more effective in reducing SRH risks than programmes without such a focus (Haberland, 2015).

In Zambia, the prevalence of HIV among women aged 15–24 years is estimated to be 5.6%, and 35% of girls aged 18 have had a live birth (Zambia Statistics Agency, Ministry of Health Zambia, and ICF, 2020). Pregnancy-related deaths constitute a significant proportion of total female deaths in this age group, and the numbers are particularly high for girls in rural areas (Banda et al., 2015; Zambia Statistics Agency, Ministry of Health Zambia, and ICF, 2020). Peer pressure to engage in relationships as well as having sex with a boyfriend with the motivation of being given money or gifts, is not uncommon and increases the risk of pregnancy (Austrian et al., 2019; Svanemyr et al., 2021). Expenses to cover school uniforms and writing materials combined with school fees at secondary school level, result in secondary schooling being inaccessible to many poor families (Verspoor & the SEIA Team, 2008). Girls who drop out of school are more likely to get pregnant, and pregnancy is also a cause of girls dropping out (Blystad et al., 2020; Zambia Statistics Agency, Ministry of Health Zambia, and ICF, 2020). Although the SRH curriculum introduced in Zambia in 2013 is extensive on paper, its quality was for several years limited by lack of teaching materials and teacher training, and it was in practice dependent on teacher discretion on what to give priority to among numerous topics that should be covered. The focus therefore has tended to be on abstinence, which is considered socially acceptable (Zulu et al., 2019). Combined with limited parental communication about contraceptives and expectations that unmarried girls should not be sexually active, particularly if they are in school, adolescent sexuality remains a highly sensitive topic

(Svanemyr et al., 2021) and myths regarding fertility and contraceptives are prevalent (Silumbwe et al., 2018). These challenges are not particular to the Zambian context, but also exist in other countries in the region (Kassa et al., 2018; Majaagaard and Mingat, 2012; Williamson et al., 2009).

According to the Theory of Planned Behaviour (TPB), intentions and behaviours are influenced by behavioural, control and normative beliefs regarding a specific behaviour (Ajzen, 1991; Albarracin et al., 2001). Behavioural beliefs are expectations about the outcomes of behaviours, whereas normative beliefs are perceptions of how important others consider the behaviour. Control beliefs concern perceived control over resources and obstacles related to performing a specific behaviour. A recent meta-analysis assessing the predictive ability of the individual TPB constructs among adolescents in Sub-Saharan Africa, found that all three types of beliefs influence condom use intentions and behaviour (Protogerou et al., 2018), indicating that the TPB is a relevant tool for studying SRH behaviour among adolescents. Changes in behaviour may be achieved by altering one or more of these beliefs, such as more realistic behavioural and control beliefs regarding sexuality, and more positive normative beliefs regarding contraceptive use following SRH education and community dialogue, or more positive control and normative beliefs regarding contraceptive use due to economic support.

Considering the complexity of determinants of poor SRH among adolescent girls, interventions combining multiple approaches will likely be more effective in improving the SRH of adolescent girls than single-component interventions (Shackleton et al., 2016). Economic support can allow girls to complete school and avoid relationships with boys, and CSE can give adolescents skills and knowledge to avoid STIs and pregnancy. And since SRH behaviours are influenced by social norms (Ross et al., 2007; Sedlander and Rimal, 2019), involving the community around adolescent girls as part of a broad empowerment intervention could potentially create an environment supportive of taking measures to prevent unwanted pregnancy and focusing on school. However, there is a dearth of evidence on multicomponent school-based interventions that seek to prevent early childbearing in Sub-Saharan Africa (Shackleton et al., 2016), and from the description of trials above, it is clear that, although promising in some settings, the effects of economic support and educational interventions have differed greatly between contexts. This paper is based on data from a randomised controlled trial in Zambia on the effectiveness of economic support, CSE and community dialogue on adolescent childbearing and basic school completion. Given the importance of sexual behaviour as a determinant of both unintended pregnancies and HIV/STIs, we wanted to understand how these interventions would affect unprotected sexual activity in this setting. In order to better explain any observed behavioural effects due to the interventions, or lack thereof, the paper is guided by the TPB. The objectives of this study are to measure the effectiveness of economic support, alone and in combination with CSE and community dialogue, on recent sexual activity, use of modern contraceptives, and beliefs about modern contraceptives among adolescent girls in Zambia.

## 2. Materials and methods

### 2.1. Study design and participants

The analyses were based on data from the Research Initiative to Support the Empowerment of Girls (RISE). Details of the trial have been described elsewhere (Sandøy et al., 2016), but are briefly presented here. RISE is a cluster-RCT conducted in 12 districts in Southern and Central provinces of Zambia. The randomisation units were rural schools, and the selected schools were at least 8 km apart from each other. Recruitment was conducted from March to July 2016 and all girls who were enrolled in grade 7 in the selected schools were eligible to participate. Only schools where >80% of the eligible participants and their guardians consented/assented, were included in the trial.

### 2.2. Interventions

The trial had three arms; economic support arm, combined intervention arm and control arm. The interventions were offered for approximately two years, from September 2016 to November 2018. The economic support arm consisted of a monthly CT of ZMW 30/month (USD 3 at the time of intervention) to the participating girls, an annual CT of ZMW 350 (USD 35) to their parents/guardians, as well as payment of school fees for girls continuing to grades 8 and 9. For the disbursement of cash to the girls and their guardians, CT committees consisting of one teacher and two parent-teacher-association (PTA) members were created. Payment of school fees was done directly to the school bank accounts. Girls who dropped out of school could continue to receive the economic support until age 18.

In the combined intervention arm, economic support was combined with six community and parent meetings per year on the benefits of girls' education and postponement of early marriage and childbearing; and youth clubs every second week (36 in total) providing CSE for the participants and boys in the same class. The youth clubs also included life skills training with the aim of increasing learners' ability to resist peer pressure, solve conflicts, set goals and make decisions, among others. The meetings were led by a teacher and a community health worker who had received a 5-day training in 2016 and a 3-day refresher training in 2017 focusing on SRH education and facilitation techniques. They were provided with a manual with detailed descriptions of class activities for every meeting, which included interactive discussions and role plays. Two films were also produced for the youth clubs and community meetings. The facilitators were instructed to moderate discussions rather than to teach, and most of the sessions touched on gender dynamics and power relations, in line with recommendations for CSE programmes. More than a third of the youth club meetings and all the community meetings were monitored by project staff. In addition, healthcare workers in the catchment area of these schools were offered a half-day orientation about youth-friendly health services in October 2016.

Girls in all study arms were offered writing materials as an incentive to participate and were given compensation for interviews, but apart from this, girls in the control arm received only standard school and health services.

### 2.3. Randomisation and masking

Randomisation took place in July 2016 after recruitment was completed, and was stratified by district. Schools were randomly allocated to one of three arms at six randomisation ceremonies where tickets with numbers corresponding to a specific allocation of all schools, were drawn from a box. Officials from the study districts, chiefs, head teachers and PTA members of the selected schools were invited to attend the different ceremonies.

Due to the nature of the interventions, there was no blinding of participants, but the field teams conducting the follow-up interviews were independent from the intervention delivery team.

### 2.4. Data collection

Immediately after recruitment was done, a baseline interview was conducted face-to-face, and included questions on previous childbearing, marital status, household assets and contact information. During the trial period the participants were interviewed twice per year with questions similar to the baseline interview. In the fifth follow-up, questions on sexual behaviour, knowledge regarding SRH and contraceptives, and perceived community norms, were also included. In the seventh follow-up, we included questions about control beliefs in relation to contraceptives. All the interviews were conducted by trained research assistants using structured questionnaires. The questionnaires were translated into the four major local languages of the study districts

(Tonga, Nyanja, Lenje and Bemba), and back-translated into English to ensure content was maintained. Interviews were conducted in English or one of the four local languages, depending on the participant’s preference. The follow-up interviews were either face-to-face or through phone for those who had moved. Face-to-face interviews were combined with Audio-Computer Assisted Self Interviews (ACASI) since 2018. Follow-up ended in December 2020.

In order to examine potential mechanisms of behaviour change, several of the questionnaire items aimed to measure behavioural beliefs, normative beliefs and control beliefs, as guided by the TPB. In the RISE protocol paper, the first two terms correspond to the secondary outcomes “knowledge of modern contraceptives among adolescent girls”

and “perceived community norms regarding modern contraceptive use among unmarried adolescent girls”, respectively.

2.5. Outcomes

Our outcomes of interest in this paper were i) sexual activity in the previous four weeks, ii) recent use of modern contraceptives among those reporting ever having been sexually active (as defined in our data analysis plan, abbreviated as “recent contraceptive use”), iii) current use of modern contraceptives among those who were sexually active in the previous four weeks (abbreviated “current contraceptive use”; this outcome was not included in the data analysis plan), iv) sexual activity

**Table 1**  
Description of outcomes.

| Outcome  | Questions   | Scoring of responses  | Definitions   | Denominator   | Measurement point |
|--|---|---|---|---|-------------------|
| Sexual activity in the previous four weeks (O1)  | a: “Have you had sexual intercourse in the past 4 weeks?” (F2F or ACASI); b: “Are you married or living with a boyfriend?” (F2F)  | “Yes” = 1, “No” = 0   | (yes to a) OR (yes to b)  | All participants in 5th follow-up   | Aug–Dec 2018      |
| Recent use of modern contraceptives* among those who reported ever being sexually active (O2)              | c: “In the last 3 months, have you used any hormonal contraception/family planning such as pills or injections?” (F2F or ACASI); d: “The last time you had sexual intercourse, did you or your partner use a male or female condom?” (F2F or ACASI); e: “The last time you had sexual intercourse, had you recently taken family planning pills or injections?” (F2F or ACASI)  | “Yes” = 1, “No” = 0   | (yes to c) OR ((yes to a OR yes to b) AND (yes to d OR yes to e)) | Girls who reported ever being sexually active in 5th follow-up                          | Aug–Dec 2018      |
| Current use of modern contraceptives* among those who were sexually active in the previous four weeks (O3) |   | “Yes” = 1, “No” = 0   | (yes to a OR yes to b) AND (yes to c OR yes to d OR yes to e)     | Girls who reported having been sexually active the previous four weeks in 5th follow-up | Aug–Dec 2018      |
| Unprotected sexual activity (O4)   |   | “Yes” = 1, “No” = 0   | (yes to a OR yes to b) AND no to O2                               | All participants in 5th follow-up   | Aug–Dec 2018      |
| Knowledge of modern contraceptive methods* (O5)  | “Can family planning pills and injections make young girls never be able to conceive?” (F2F)<br>“Can family planning pills and injections cause miscarriages or deformed children?” (F2F)   | “No” = 3, “Don’t know” = 2, “Yes”/“In some cases” = 1                                   | 1-4 = poor knowledge; 5-6 = good knowledge                        | All participants in 5th follow-up   | Aug–Dec 2018      |
| Perceived community norms regarding contraceptive use (O6)   | Responding It’s ok to “What do your parents or guardians think if a young girl who has reached puberty, is out-of-school and is sexually active but not married, uses contraceptives to prevent pregnancy, for example injections/pills or condoms?” (F2F)<br>Responding It’s ok to “What do your parents or guardians think if a grade 8 or 9 girl who has reached puberty, is sexually active but not married, uses contraceptives to prevent pregnancy, for example injections/pills or condoms?” (F2F)<br>Responding no to “Do your parents or guardians think it is harmful for a young girl who has reached puberty and who is sexually active but not married to use hormonal contraceptives, for example injections/pills?” (F2F)<br>Responding no to “Do your parents or guardians think it is harmful for a young girl who has reached puberty and who is sexually active but not married to use condoms to protect herself against sexually transmitted infections and pregnancy?” (F2F) | “It is ok” = 1 (acceptable), “It is not ok” = 0<br><br>“Yes” = 0, “No” = 1 (acceptable) | 0-1 = not acceptable; 2-4 = acceptable                            | All participants in 5th follow-up   | Aug–Dec 2018      |
| Control beliefs regarding obtaining contraceptives (O7)  | Responding yes to “If you needed a condom, family planning pills or injection, and the clinic was nearby, would you be able to obtain it?” (F2F interviews)   | “Yes” = 1, “No” = 0   | yes = high control  | All participants in 7th follow-up   | Aug–Dec 2019      |
| Control beliefs regarding condom use (O8)  | Responding yes to “If you wanted to use a condom during sexual intercourse, would you be able to ask your sexual partner to use one?” (F2F interviews)  |   | yes = high control  |   |                   |

Notes: Modern contraceptives were defined as female or male condom, hormonal pills, injections, implants, and intrauterine devices. F2F = face-to-face.

in the previous four weeks without using modern contraceptives (i.e., unprotected sexual activity), v) knowledge of modern contraceptive methods, vi) perceived community norms regarding contraceptive use, and vii) control beliefs regarding contraceptive use (Table 1). All outcomes were captured as binary variables and measured as proportions. Cronbach alpha for the four items measuring perceived community norms was 0.74. The responses to these four questions were summarised, resulting in a total score of 0–4. The variable was then dichotomised with the median value (1) as the cut-off between “not acceptable” and “acceptable” norms. The responses to the two knowledge questions were also summarised. A score of 5–6 was categorised as good knowledge, whereas 1–4 was categorised as poor knowledge. For control belief questions, responding “yes” was defined as having high perceived control. Most of the outcomes were listed as secondary outcomes in the published protocol and were measured in the 5th follow-up (second half of 2018), except for control beliefs which was omitted in the protocol but added in the 7th follow-up (second half of 2019) because we realised it could help explain the effects on the behavioural outcomes.

## 2.6. Sample size

Two of the primary outcomes of the RISE trial are “Incidence of births within 8 months of the end of the intervention period” and “Incidence of births before girls’ 18th birthday” (Sandøy et al., 2016). We assumed an average incidence rate of childbearing in the control arm of 6 and 8 per 100 person-years, average person-years per cluster of 56 and 84, respectively, and an intraclass correlation coefficient (ICC) of 0.00737. With 31 clusters in the control and 63 in each of the intervention arms, we could detect a 40% decrease for both outcomes in the combined arm versus the control arm with 90% power, and for childbearing before 18th birthday we could detect a 25% decrease in the economic arm versus the control arm with 80% power.

## 2.7. Statistical methods

The data was analysed using Stata statistical software (StataCorp) and the analyses were adjusted for the clustered design using robust standard errors and for the stratified randomisation. As stated in the protocol, we conducted pairwise comparisons (combined vs the control, economic vs the control, and combined vs the economic) using generalised estimating equations with the binomial family, a log link and an exchangeable correlation matrix. Due to diverging estimates in the estimation of risk ratios (RR) for the outcome *current contraceptive use*, we used Poisson regression for this outcome. Poisson estimates for the outcome *recent contraceptive use* can be found in Table S1. Baseline characteristics with relative and absolute differences between the arms of  $\geq 5\%$  and  $\geq 2.5\%$ , respectively, were adjusted for in the analyses if their inclusion in the model changed the RR for an outcome with  $\geq 5\%$  or substantially improved its statistical precision (evaluated separately for each outcome). The ICC was calculated for each outcome using a logistic regression random effects model. Participants  $\geq 20$  years at the time of the 5th follow-up interview were excluded from the analyses. All analyses were by intention-to-treat (ITT).

We decided to conduct posthoc analyses to assess the presence of effect measure modification, and an interaction term was included for SES by intervention group and for orphan by intervention group for the outcomes of primary interest in this paper: sexual activity previous four weeks, recent contraceptive use, and knowledge of modern contraceptive methods. Interaction was assessed on an additive scale using the relative excess risk due to interaction (RERI) (Rothman et al., 2008).

## 2.8. Ethical considerations

The trial was approved by the the University of Zambia Biomedical Research Ethics Committee (ref. number 021- 06–15) and by the Regional Ethical Committee of Western Norway (ref. number 2015/

895). Girls who did not assent/consent and those whose parents/guardians did not consent, were not included in the study. All interviews were conducted in privacy and strict confidentiality was kept. The trial is registered at [clinicaltrials.gov](https://clinicaltrials.gov) (NCT02709967) and ISRCTN (ISRCTN 12727868).

## 3. Results

Of 164 schools invited to participate in the project, seven were dropped before randomisation (in one community consent was not obtained, and in six schools  $<80\%$  of guardians and girls consented/assented). The 157 included schools had 5107 eligible girls of whom 4922 assented. No clusters were lost to follow-up and participation at the end of the intervention period in 2018 was 91%, 90% and 86% for the combined, the economic and the control arms, respectively (Fig. 1).

Overall, the three arms were well balanced with respect to socio-demographic and behavioural characteristics at baseline (Table 2, Table S2). The mean age at baseline was 14.1 years (SD 1.34) and the majority of participants had some knowledge about SRH issues. Less than two percent of all participants had ever used contraceptives, and perceived ability to obtain and buy contraceptives was relatively low in all arms. Guardian’s highest level of school was found to be a confounder for the outcome unprotected sexual activity, and was adjusted for in the effectiveness analysis for this outcome.

At the end of the intervention period, the proportion of girls who reported being sexually active the previous four weeks was markedly lower in the economic support arm compared to the control (RR 0.70; 95% C.I. 0.54 to 0.91), and in the combined arm compared to the economic arm (RR 0.84; 95% C.I. 0.66 to 1.08). A higher proportion of girls reported current contraceptive use in the combined than in the economic support arm (RR 1.26; 95% C.I. 1.06 to 1.50) and in the control (RR 1.14; 95% C.I. 0.95 to 1.37), whereas the proportion of girls reporting recent contraceptive use was similar across the three groups, and no evidence of an intervention effect was found for this outcome. The proportion of girls reporting unprotected sexual activity was lower in the economic arm compared to the control (adjusted RR 0.80; 95% C.I. 0.56 to 1.16) and substantially lower in the combined intervention arm compared to the two other arms (adjusted RR 0.65; 95% C.I. 0.46 to 0.92 and adjusted RR 0.53; 95% C.I. 0.37 to 0.75 for combined vs economic and control, respectively) (Table 3).

Knowledge of modern contraceptive methods was similar in the control and economic arms at the end of the intervention period. Compared to economic support alone, a higher proportion had good knowledge among those in the combined intervention (RR 1.18; 95% C.I. 1.01 to 1.38). Interestingly, both the economic and the combined arms had lower scores for perceived community norms regarding contraceptive use than the control group, indicating lower acceptance (Table 3).

One year after the intervention period ended, we found no important differences in the control beliefs regarding condom use and regarding obtaining contraceptives (Table 3). A posthoc analysis among those who reported being sexually active the previous four weeks indicated that the economic intervention improved control beliefs regarding condom use compared to the control (RR 1.13; 95% C.I. 1.03 to 1.23), whereas the addition of CSE and community dialogue reduced the proportion reporting high control (RR 0.86 for the combined vs economic arm; 95% C.I. 0.78 to 0.96) (Table S3).

The ICC was relatively low for all the outcomes (range 0.000–0.079) (Table S4).

The posthoc subgroup analysis indicated that the combined intervention was more effective in increasing knowledge of modern contraceptive methods among participants with higher SES than among those with lower SES. Further analysis confirmed the presence of effect measure modification between intervention group and SES for the comparison of the combined and control arms (RERI 0.43; 95% C.I. 0.08 to 0.77), with a similar tendency for economic support vs control (RERI 0.30; 95% C.I.  $-0.02$  to 0.62). There was no evidence of effect measure

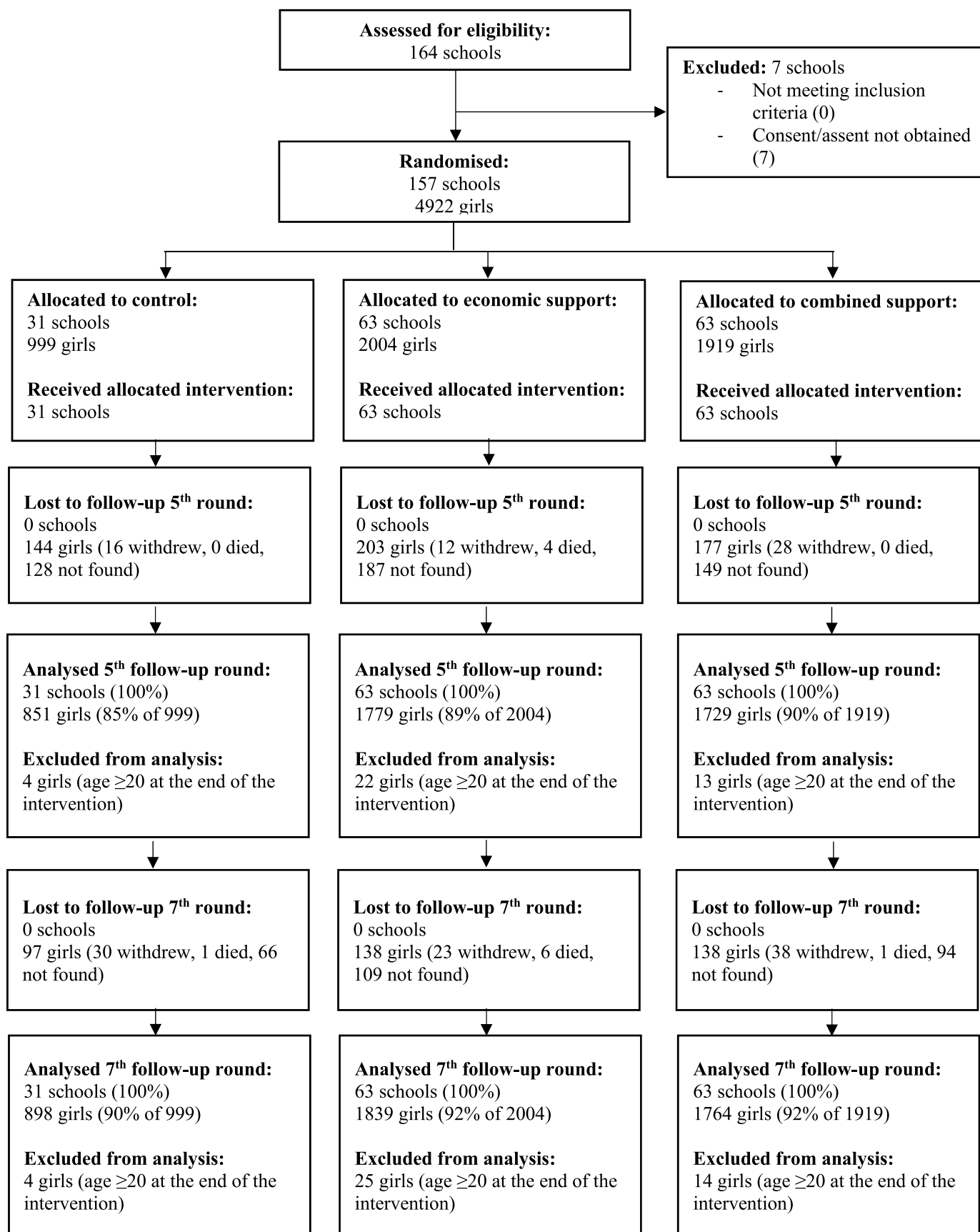


Fig. 1. Trial profile.

**Table 2**  
Baseline characteristics.

|  | Total          | Control        | Economic      | Combined      |
|--|----------------|----------------|---------------|---------------|
| <b>Clusters</b>                                | 157            | 31             | 63            | 63            |
| <b>Participants</b>                            | 4922           | 999            | 2004          | 1919          |
| <b>Age</b>                                     | 14.1<br>(1.34) | 14.1<br>(1.29) | 14.1 (1.38)   | 14.0 (1.32)   |
| <b>Highest level of school parent/guardian</b> |                |                |               |               |
| Lower primary or less                          | 988<br>(20%)   | 210 (21%)      | 372 (19%)     | 406 (21%)     |
| Upper primary                                  | 1835<br>(37%)  | 410 (41%)      | 742 (37%)     | 683 (36%)     |
| Junior secondary                               | 1121<br>(23%)  | 198 (20%)      | 455 (23%)     | 468 (24%)     |
| Senior secondary or more                       | 968<br>(20%)   | 176 (18%)      | 432 (22%)     | 360 (19%)     |
| <b>Living with biological parents</b>          | 3644<br>(74%)  | 777 (78%)      | 1433<br>(72%) | 1434<br>(75%) |
| <b>Repeated any grade</b>                      | 2076<br>(42%)  | 450 (45%)      | 818 (41%)     | 808 (42%)     |
| <b>Distance to school, minutes</b>             | 49 (36.9)      | 52 (37.9)      | 49 (35.7)     | 48 (37.5)     |
| <b>Married</b>                                 | 6 (0.1%)       | 1 (0.1%)       | 4 (0.2%)      | 1 (0.1%)      |
| <b>Ever given birth</b>                        | 20 (0.4%)      | 3 (0.3%)       | 10 (0.5%)     | 7 (0.4%)      |
| <b>Ever pregnant</b>                           | 26 (0.5%)      | 5 (0.5%)       | 12 (0.6%)     | 9 (0.5%)      |
| <b>Ever had boyfriend</b>                      | 438<br>(8.9%)  | 105<br>(10.5%) | 185 (9.2%)    | 148 (7.7%)    |
| <b>SRH knowledge (some/good)</b>               | 3214<br>(65%)  | 647 (65%)      | 1322<br>(66%) | 1245<br>(65%) |

Notes: Figures are mean (SD) or n (%).

modification by SES on sexual activity or recent contraceptive use, and there were no signs of effect measure modification for orphanhood on any of the outcomes (Table S5).

#### 4. Discussion

This study indicates that economic support was effective in lowering recent sexual activity among adolescent girls when compared to the control. The addition of CSE and community dialogue appeared to have a small added benefit (16% reduction) on sexual activity overall, but the CSE and community dialogue provided a valuable added benefit (35% reduction) on the proportion of adolescent girls who reported unprotected sexual activity and on the proportion *currently* using modern contraceptives (26% increase), compared to economic support alone. There was no evidence of intervention effects on *recent* contraceptive use. The addition of CSE and community dialogue also improved knowledge (behavioural beliefs) regarding modern contraceptives

compared to those only receiving economic support, and there were indications of a stronger effect among those with higher socioeconomic status. No important overall effects were found on control beliefs regarding condom use and obtaining contraceptives, whereas perceived community norms (normative beliefs) regarding contraceptive use was surprisingly less acceptive in both intervention arms compared to the control. Both the economic support and the CSE and community dialogue package reduced the overall risk of SRH problems because of reductions in self-reported unprotected sexual activity and improvements in current contraceptive use, and, in a setting where preventing unintended pregnancies and HIV is crucial, such findings are of potential importance.

Gender inequality in relationships is a central factor limiting girls' agency regarding their own SRH, and there is substantial evidence from Sub-Saharan Africa of males being the ultimate decision makers in SRH matters, including contraceptive use (Blackstone et al., 2017; Gunawardena et al., 2019). Additionally, girls may feel pressured to accept a partner's rejection to use condoms if they feel indebted to him because he has provided money or gifts (Austrian et al., 2019). The findings that the economic support reduced the risk of being sexually active and increased control beliefs regarding condom use among the sexually active, suggest that such support may, as anticipated, reduce the incentive to engage in unsafe or asymmetrical sexual relationships for economic or materialistic gain, and that economic empowerment may contribute more to control beliefs regarding condoms than CSE. The reduction in sexual activity is likely to also be partially mediated through effects on secondary school enrolment (unpublished findings). This is in line with findings from similar interventions, which have found reductions in sexual activity and unprotected sex among girls receiving CTs (Baird et al., 2012; Pettifor et al., 2016). The youth clubs aimed to address gender inequality by including sessions on gender roles and by also inviting boys to the youth club meetings, and the finding that CSE and community dialogue improved current contraceptive use compared to economic support alone suggests that sexually active girls were empowered to make decisions in their relationships. However, there were some mixed effects, as the addition of CSE and community dialogue also appeared to lower control beliefs regarding condom use among sexually active girls. These findings are in contrast to a couple of other Sub-Saharan African studies of CSE interventions, which found increases in sexual self-efficacy and action planning to use condoms (a term incorporating both control beliefs and intentions) but no effects on condom use (Jemmott et al., 2015; Mmbaga et al., 2017). A potential explanation for the apparent lower perceived control over condom use in the combined arm, may be that girls in this arm were made aware of

**Table 3**  
Intervention effects on study outcomes.

|  | n/N (%)          |                    |                    | Economic vs Control RR (95% CI) |                     | Combined vs Control RR (95% CI) |                     | Combined vs Economic RR (95% CI) |                     |
|--|------------------|--------------------|--------------------|---------------------------------|---------------------|---------------------------------|---------------------|----------------------------------|---------------------|
|  | Control          | Economic           | Combined           | Crude                           | Adjusted            | Crude                           | Adjusted            | Crude                            | Adjusted            |
| Sexually active last 4 weeks   | 115/851<br>(14%) | 166/1772<br>(9.4%) | 143/1721<br>(8.3%) | 0.70<br>(0.54–0.91)             | N/A                 | 0.59<br>(0.46–0.75)             | N/A                 | 0.84<br>(0.66–1.08)              | N/A                 |
| Recent contraceptive use   | 80/319<br>(25%)  | 141/566<br>(25%)   | 138/545<br>(25%)   | 0.99<br>(0.80–1.23)             | N/A                 | 1.00<br>(0.80–1.23)             | N/A                 | 1.00<br>(0.81–1.24)              | N/A                 |
| Current contraceptive use  | 66/115<br>(57%)  | 87/166<br>(52%)    | 92/143<br>(64%)    | 0.90<br>(0.74–1.11)             | N/A                 | 1.14<br>(0.95–1.37)             | N/A                 | 1.26<br>(1.06–1.50)              | N/A                 |
| Unprotected sexual activity  | 49/851<br>(6.0%) | 77/1772<br>(4.4%)  | 51/1721<br>(3.0%)  | 0.75<br>(0.52–1.08)             | 0.80<br>(0.56–1.16) | 0.50<br>(0.35–0.71)             | 0.53<br>(0.37–0.75) | 0.66<br>(0.47–0.93)              | 0.65<br>(0.46–0.92) |
| Good knowledge of modern contraceptive methods                       | 177/851<br>(21%) | 368/1771<br>(21%)  | 433/1719<br>(25%)  | 0.99<br>(0.80–1.22)             | N/A                 | 1.16<br>(0.94–1.43)             | N/A                 | 1.18<br>(1.01–1.38)              | N/A                 |
| Perceived community norms regarding contraceptives (high acceptance) | 415/846<br>(49%) | 732/1760<br>(42%)  | 737/1703<br>(43%)  | 0.88<br>(0.77–1.00)             | N/A                 | 0.89<br>(0.78–1.02)             | N/A                 | 1.01<br>(0.91–1.12)              | N/A                 |
| Control beliefs regarding contraceptives (high perceived control)    |                  |                    |                    |                                 |                     |                                 |                     |                                  |                     |
| Obtaining contraceptives   | 589/819<br>(72%) | 1184/1723<br>(69%) | 1207/1663<br>(73%) | 0.96<br>(0.89–1.04)             | N/A                 | 1.00<br>(0.93–1.08)             | N/A                 | 1.04<br>(0.98–1.11)              | N/A                 |
| Condom use   | 655/818<br>(80%) | 1400/1720<br>(81%) | 1380/1657<br>(83%) | 1.03<br>(0.97–1.08)             | N/A                 | 1.05<br>(0.99–1.11)             | N/A                 | 1.02<br>(0.98–1.06)              | N/A                 |

the gender imbalances that often exist in a relationship, and consequently may have felt less confident in their ability to negotiate condom use.

One possible explanation for community support for adolescent contraceptive use appearing to be lower in both of the intervention arms at the end of the intervention period, may be that the economic intervention increased expectations from guardians and community members that the participants would complete grade 9 and, in doing so, led to lower acceptance of anything that could potentially interfere with education, such as having boyfriends. We had expected discussions of gender norms in the youth club and community dialogue meetings to create increased tolerance for girls using various means to prevent unwanted pregnancy. However, although the facilitators who led the youth clubs were observed during monitoring visits to cover the sessions on modern contraceptives, qualitative interviews suggest that this was overshadowed by a primary focus by teachers and guardians throughout the youth club and community meetings, respectively, on sexual abstinence as the best way to prevent early pregnancies (Chirwa-Kambole et al., 2020; Svanemyr et al., 2021).

The disparity between the two outcomes measuring contraceptive use reflect that the proportion of girls who were currently sexually active was lower in the intervention arms and those who were no longer sexually active were not in need of contraceptives. The finding that current contraceptive use improved following the combined intervention, indicates that the combined intervention helped those in highest need of contraceptives to overcome barriers to contraceptive use. This could be due to more positive behavioural beliefs regarding contraceptives as a result of the CSE, but it is also possible that the short orientation about youth friendly health services and the involvement of community health workers in the youth club may have made some of them less skeptical to providing contraceptives to sexually active young girls.

Our findings are likely to be generalisable to similar contexts where there are economic barriers to sending girls to secondary school, where poverty increases the need to have a boyfriend, where both teachers and parents encourage abstinence until marriage, and where access to contraceptives is poor. However, despite using robust study methods and having high follow-up rates, this study has some limitations. First of all, our data on behaviour is self-reported and may have been affected by social desirability bias, especially given the sensitive nature of our questions. We tried to minimize such bias by using ACASI for the most sensitive questions such as sexual activity and contraceptive use. Secondly, we did not measure actual social norms in the community, but rather the participants' perceptions of such norms, thus we cannot determine whether social norms in the communities really were affected by the interventions. Lastly, given the qualitative process evaluation indicating that some teachers promoted abstinence over contraceptive use in the youth club meetings (Chirwa-Kambole et al., 2020), it is possible that stronger effects may have been observed if they had spent more time on value clarification during the trainings.

## 5. Conclusion

There was an unexpected negative effect of the interventions on perceived community norms, but given the economic intervention's effectiveness in reducing sexual activity among adolescent girls, and thus potentially in reducing pregnancies and STIs, our findings indicate that economic support programmes could benefit the SRH of adolescent girls. Adding CSE and community dialogue improved knowledge of modern contraceptives and use of modern contraceptives among those who were sexually active, and appeared to further reduce unprotected sexual activity. Based on existing evidence and findings from our study, CSE and community dialogue appear to be worthwhile investments to reduce the risk of unwanted pregnancy in these settings.

## Credit author statement

**Hanne Keyser Hegdahl:** Conceptualisation, Data collection, curation and analysis, Writing – original draft, Project administration. **Patrick Musonda:** Conceptualisation, Data collection and analysis, Writing – revision, Project administration. **Joar Svanemyr:** Writing – revision. **Joseph Mumba Zulu:** Conceptualisation, Writing – revision. **Taran Grønvik:** Data collection, Writing – revision. **Choolwe Jacobs:** Conceptualisation, Writing – revision. **Ingvild Fossgard Sandøy:** Conceptualisation, Data collection, curation and analysis, Writing – original draft, Project administration.

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## Appendix A. Supplementary data

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