On the doorstep of adulthood: Entrepreneurship and fertility of young women in Tanzania *

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Abstract

We report from a large-scale randomized controlled trial aimed at empowering young women in their transition from secondary school to adulthood, involving important decisions on work and relationships. We use a factorial design, with four arms implemented in schools: economic empowerment, reproductive health empowerment, the combination of the two, and control. The analysis builds on a rich dataset, including survey and lab evidence, collected over more than five years. We find that the economic empowerment program caused an increase in self-employment and income, while the reproductive health program led to a stronger sense of self control and an increase in committed relationships. Both interventions increased early pregnancy, which we ascribe to a positive income and relationship effect in a context of high fertility and self-employment. Our findings offer new insights into the economics of fertility and the factors that can explain the persistence of high birth rates in Africa.

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1 Introduction

Adolescence is a critical period in life. It is a time for decisions with potentially lifelong consequences for education and employment [Aizer et al., 2020, Bailey, 2006, Goldin and Katz, 2002, Miller, 2010]. Young women in low-income countries are in a particularly vulnerable situation, and an important ambition of governments, donors, and nongovernmental organizations is to empower them and expand their opportunities, as reflected in the Sustainable Development Goals of the United Nations.

We study economic and reproductive health empowerment programs in Tanzania, implemented in schools and targeting young women who at the time of the intervention were in their final year of secondary school. Our study involves almost 3,500 participants over a period of more than five years. We analyze the two programs one by one and combined, allowing us to directly compare the impacts of economic and reproductive health empowerment on mindsets, early careers, relationships, fertility, and happiness and shed light on channels of change.

We find that the economic empowerment program has a large positive effect on employment and income. The women offered this program are more likely to be self-employed, their long-term incomes increase by about 27 percent and the probability that they are below the poverty line decreases by about four percentage points. We also find that economic empowerment causes an increase in early pregnancy (defined as a mother younger than 20 years old), from 9.5 to 18 percent, and a five to eight percentage point increase in overall childbearing compared with the control group.

Turning to reproductive health empowerment, we find that it strengthened the women's sense of self control, caused an increase in the number of committed relationships, and ultimately also increased early pregnancy (but did not affect incomes). For those receiving only this program, we estimate an increase in pregnancy and childbearing of around six percentage points. Women offered both the reproductive health program and the entrepreneurship programs experience an increase in both income and fertility.

There is a large literature evaluating the effectiveness of economic empowerment programs and of sexual and reproductive health programs.[1] The studies of reproductive health programs focus on family planning, sexual behavior and fertility but generally do not investigate effects in the economic domain. Likewise, the studies of economic empowerment programs have only to a limited extent studied the effect of women's empowerment on fertility, and the findings are ambiguous. In particular, we know of only three studies that estimate effects both on fertility and income [Bandiera et al., 2020, Donald et al., 2024, Jensen, 2012], and thus most of the existing literature cannot speak to how income changes affect fertility. We discuss the relationship between our findings and these studies in Section 5.

We enrich this literature by reporting from a randomized controlled trial that contains separate empowerment programs in the economic domain and in the reproductive health domain and a combined program, with long-term data on the effects on both income and fertility. This research design allows us to shed light on how economic and fertility choices interact in shaping the lives of young women.

We also provide strong evidence of the economic empowerment program having a lasting income effect for these women, in contrast to many of the existing studies that largely find modest and transitory economic effects [Blattman and Ralston, 2015, Card et al., 2018, McKenzie, 2017, McKenzie and Woodruff, 2014]. A plausible explanation for the strong long-term income effect, in line with recent evidence from vocational training programs for youth in Uganda [Alfonsi et al., 2020], is that we target women not yet constrained by family obligations [Berge et al., 2015, Bjorvatn et al., 2022, Karlan and Valdivia, 2011].

The findings in this paper are also relevant for the literature on how to understand and model fertility choices. They are consistent with the evolution of fertility in many low-income countries [Donald et al., 2024, Vogl, 2016], and they complement recent evidence from high income countries showing that stylized facts both at the macro and micro level suggest a positive relationship between income and fertility [Doepke et al., 2022]. A growing literature has emphasized how social norms [Beach and Hanlon, 2022, Diebolt and

[1] See Ashraf et al. [2020], Bandiera et al. [2020], Berge et al. [2015], Buchmann et al. [2018], Buehren et al. [2017], Dhar et al. [2022], Duflo [2012], Dupas [2011], Dupas et al. [2018], Edmonds et al. [2023], Field et al. [2010], Karlan and Valdivia [2011] and Appendix C.

Perrin, 2013, Fernández and Fogli, 2009, Jensen and Oster, 2009, La Ferrara et al., 2012, Manski and Mayshar, 2003, Munshi and Myaux, 2006, Spolaore and Wacziarg, 2022] and women's flexible occupations on the labor market [Bandiera et al., 2022, Doepke et al., 2022, Zipfel, 2022] contribute to explain why an increase in income may lead to an increase in fertility. We provide suggestive evidence of how these mechanisms can explain the effects on fertility observed in the present study.

The remainder of the paper is organized as follows. Section 2 introduces the background to the study and the research strategy. In Section 3, we report the main results and discuss the mechanisms. Section 4 discusses in more detail how the empowerment programs affected the well-being of the women in terms of happiness and health. Section 5 concludes. Supplementary analysis and material are provided in the Appendix.

2 Background and research design

This section describes the participants, the randomization, the interventions, the timeline of the study, and the empirical approach. The pre-analysis plans for the different rounds of the study are registered with the American Economic Association Randomized Controlled Trials Registry. In Appendix B, we list and define all the variables used in this paper and identify whether they were listed in the pre-analysis plans. The complete set of pre-specified analyses is included in Appendix F, where we also provide an overview of how we deviate from the pre-analysis plan in the main analysis.

2.1 Participants and randomization

In Tanzania, to continue studying at an advanced level of secondary education, students must pass a national exam called the Certificate of Secondary Education Examination at the end of Form IV. Typically, many students from rural public schools fail this exam

and therefore need to make important decisions about how to progress in life.[2] We timed the study so that the interventions were implemented close to when the women started making consequential livelihood and fertility decisions.

We selected four regions in central Tanzania (Tabora, Singida, Morogoro and Dodoma) and sampled 20 public schools in each region (excluding boys-only schools). The schools were part of the network of the implementing partner, Femina HIP, a leading nongovernmental organization with a mission of empowering youth.[3] In each school, all women in Form IV were invited to take part in the study, and everyone present when we conducted the baseline survey joined: 3,483 women in total. Following the baseline survey, we randomly allocated the 80 schools between a control group and three arms: economic empowerment (Economic), sexual and reproductive empowerment (Health), and both empowerment programs (Combined: Econ. & Health). The randomization was blocked by school size (less than or more than 40 women in Form IV) and by region.[4]

Table 1 provides an overview by treatment of the baseline variables pre-specified to be used as covariates in the estimation of the treatment effects. These variables capture important individual, household, and school characteristics. The individual characteristics are the women's age, proxies for cognitive ability, health and business knowledge, and a measure of risk aversion. The first row in Table 1 shows that about half of the women were aged 17 years or younger at the baseline (see Appendix A.1, Figure A1, for the full distributions of age at baseline). "Cognitive ability" is an indicator variable equal to one if the participant performed at least as well as the median on a short cognitive ability test, which amounts to about 60 percent of the participants. "Health knowledge" and "Business knowledge" are

[2]The proportion of youth enrolled in secondary school in Tanzania has increased dramatically from about 5 percent in the early 2000s, to about 30 percent in recent years (source The World Bank, `https://data.worldbank.org/indicator/SE.SEC.ENRR?locations=TZ`). At the national level, the press reported a pass rate of 27 percent when the present study was implemented [Jumanne, 2017]. Note that our study focuses on girls in public schools, where pass rates are substantially lower than in private schools and lower for girls than for boys.

[3]Femina HIP organizes discussion clubs in more than two thousand schools across Tanzania. More information is available on its website: `http://www.feminahip.or.tz/`.

[4]The intra-cluster correlation of our main outcomes by school is very low and this sample size gives us sufficient power to detect relatively small effects. For instance, at the 80 percent power and a 5 percent level of significance, and without taking into account the potential gains in precision from the covariates, we can detect a minimum effect of +5 percentage points in early pregnancy if the intra-cluster correlation is 0.01 (the actual, ex-post, intra-cluster correlation in the control group is 0.006). In Appendix D, we provide ex post calculations of intra-cluster correlations and minimum detectable effects for all our primary and secondary outcomes.

the shares of correct answers on a set of health and business questions. We observe that the participants performed better on the health questions than on the business questions at baseline ($p < 0.01$). "Risk aversion" is an indicator variable equal to one if the participant made the safe choice in a hypothetical risky investment question, which about 47 percent of the participants did.

Table 1: Baseline summary statistics by treatment arm.

	Control Mean (s.d.)	Health Mean (s.d.)	Economic Mean (s.d.)	Econ. & Health Mean (s.d.)	p-value (F-stat)
			Individual level		
Age > 17	.475	.505	.475	.516	0.76
	(.5)	(.5)	(.5)	(.5)	
Cognitive ability	.62	.557	.661	.652	0.07
	(.486)	(.497)	(.474)	(.476)	
Health knowledge	.563	.582	.557	.572	0.42
	(.215)	(.206)	(.214)	(.221)	
Business knowledge	.449	.457	.458	.481	0.62
	(.257)	(.258)	(.264)	(.277)	
Risk aversion	.482	.438	.455	.52	0.33
	(.5)	(.496)	(.498)	(.5)	
			Household level		
Wealthy household	.509	.538	.474	.471	0.79
	(.5)	(.499)	(.5)	(.499)	
Woman headed household	.183	.198	.223	.192	0.31
	(.387)	(.399)	(.416)	(.394)	
Household owns a business	.282	.243	.243	.226	0.78
	(.45)	(.429)	(.429)	(.418)	
			School level		
Remote school	.49	.464	.507	.506	0.99
	(.5)	(.499)	(.5)	(.5)	
N girls	55.014	59.291	66.275	58.444	0.39
	(14.971)	(15.979)	(22.145)	(11.003)	
Obs.	869	853	938	820	

Note: The Table reports the means and the standard deviations of the background variables at baseline. We have background information for 3,480 out of 3,483 individuals in the sample. To test whether the background variables correlate with treatment assignment, each background variable is regressed on the treatment assignment dummies, with the p-value of the F-test of overall significance reported in the last column.

The household characteristics include the wealth of the household, whether the household head owns a business, and whether a woman heads the household. The variable "Wealthy household" is an indicator variable equal to one if the participant's household is above the median on a wealth index determined by whether the household owns a television, has access to electricity, and the number of days per week they eat meat for dinner. Most households did not have a television or access to electricity at baseline, and had meat only twice a week or less. "Household owns a business" and "Woman-headed household" are indicator variables equal to one if the household head owns a business and is a woman, respectively, which applied to only a minority of the households at baseline.

The school characteristics are the location of the school and school size. "Remote school" is an indicator variable equal to one if the school is located more than 25 minutes by car away from the district headquarters (the median distance in the sample). "N women" captures school size in terms of the number of women in Form IV. On average, the schools had 56 women students in Form IV, with a range from 22 to 106.

The final column in Table 1 reports an F-test of whether the treatment indicators predict the baseline characteristics. The test is not significant for any of the variables, except for "Cognitive ability", which is slightly lower in the Health treatment. We control for these baseline variables in all the main estimations.

The baseline survey also contains a range of other questions that shed light on the sample and the context. The participants were asked what they would like to do if they could not continue secondary school after having completed Form IV. Only 14 percent listed starting a business as their preferred choice. The most common plans were to seek salaried employment or start vocational training, while few wanted to work as a domestic or in farming. The least desired option was starting a family and staying at home. Most of them, about 80 percent, believed that their parents would be unhappy if they became pregnant in the coming year, but they were less sure that a pregnancy would be perceived negatively by a boyfriend or society. On perceptions about sexual practices among Tanzanian women their age, 52 percent believed that they had experienced sexual intercourse, 54 percent believed that they sometimes received money or gifts for having sex with older men, and around 40 percent believed that they were often sexually harassed.

2.2 The empowerment programs

The programs were developed specifically to support young women while they transition out of school. In the public schools where this study is implemented, even though the large majority of students hope to pursue their education, most will fail the national exam at the end of lower secondary school, and will have to look for economic opportunities. The aim of the programs was to empower the women in the transition from childhood

to adulthood by increasing their *opportunities* and strengthening their *decision-making power*. The economic empowerment program (Economic) aimed to increase opportunities and decision-making power in the economic domain by providing them with entrepreneurship training on how they could establish and run their own business and by providing perspectives on women's potential for making economic choices. The reproductive health empowerment program (Health) aimed to increase opportunities and decision-making power in the reproductive health domain by providing them with training that enabled them to take control of and protect their own body, health, and fertility.

Our main hypotheses when designing the programs were that early pregnancies could reflect both, a lack of relevant information and personal control or a lack of better economic opportunities. Testing the separate programs and their combination allows us to provide novel insights into the relative importance of providing health information, empowerment, and economic opportunities to adolescent girls.

The schools assigned to the Economic or Health arms offered eight weekly sessions of about two hours in the respective empowerment program, one session per week, while the schools assigned to the treatment arm with both the economic empowerment program and the reproductive health empowerment program (Combined) offered 16 biweekly sessions that covered both empowerment programs. The sessions were offered to all the Form IV female students at the treated schools and took place in a classroom setting during regular after-school hours. The control group carried on with their normal after-school activities of sports and games. The participants attended on average 83 percent of the sessions in the Economic arm and 86 percent of the sessions in the Health arm. In the Combined arm, they attended 89 percent of the reproductive health sessions and 88 percent of the economic sessions. In the short term follow-up, the treated women reported that the programs had been well organized, were very useful, and had provided them with new information.

The economic empowerment program started with a session discussing the challenges and opportunities that young women face in Tanzania, including that they are often expected to take care of younger children in the family and do the household chores. It then highlighted that both men and women have the same abilities, and that there are many

opportunities for women, even though they have to overcome more challenges than men to succeed. The second session focused on how to be entrepreneurial in life and the attitudes and soft skills needed to be successful in business, including being self-confident, willing to take risks, and having a long-term orientation. This session also highlighted some of the benefits of being an entrepreneur in terms of earnings potential, independence, and contribution to society. The remaining sessions provided more specific training on how to identify a good business idea and run a business, and covered topics such as marketing, customer care, record keeping, product pricing, and business financing. Many of the discussions were illustrated with the experiences of young women who had succeeded in business and served as role models. Taken together, the economic empowerment program aimed at both giving the young women new opportunities (by providing them with knowledge about how to start a business) and greater decision-making power (by building self-confidence and awareness of women being as capable as men in the economic domain).

The reproductive health empowerment program started with a session focusing on how the body changes as women move from childhood to adulthood, and the accompanying feelings in this transition. It provided detailed knowledge on puberty and menstruation, and discussed how this affected their body image and made sexuality an important part of their identity. The second session focused on how to establish a healthy relationship and the rights and responsibilities that come with having a partner. The following sessions focused on sexual practices, the risks of teenage pregnancy, the use of contraception, and sexually transmitted infections. The final sessions discussed different types of violence directed against women, including physical, emotional, sexual, and economic abuse, and provided guidance on how women could seek help and protect themselves against such violence. Taken together, the reproductive health empowerment program aimed at both giving the young women new opportunities (by providing them with knowledge about how to protect themselves in sexual practices and relationships) and greater decision-making power (by making them more confident in their own sexuality and aware of their right to control their own body). Importantly, the program also stressed the importance of avoiding having multiple partners or a series of monogamous relationships.[5]

[5]Traditional initiation groups, generally known as unyago, can still play an important role in young women's life in Tanzania. Such initiations normally happen at or soon after menarche, commonly around 11–15 years of age. The training in the Health treatment therefore supplemented rather than displaced such sources of advice.

To strengthen the external validity and scalability of the interventions [Al-Ubaydli et al., 2017], the empowerment programs were implemented by local teachers at the schools. We took great care in the selection and training of the teachers. We asked the women at baseline to name two teachers they trusted and were comfortable talking with, and then the school principals appointed teachers for the program based on these recommendations. The selected teachers attended a one-week instructor session organized by Femina HIP (two weeks for teachers involved in the Combined arm). Both empowerment programs were accompanied with a booklet designed specifically for this training, *Build your life* and *Protect your life*, that also provided homework asking the participants to relate the training to their own life situation, and a facilitator guide for the teachers. The facilitator guides and the booklets are included in the replication package for this article. We further discuss the potential for scaling-up in Appendix E.[6]

2.3 Data

We here provide an overview of the follow-up data used in the main analysis, collected across the three rounds (short, medium and long term); see also Appendix B for a complete list of variables.

Figure 1 shows the timeline of the data collection. The baseline survey was conducted in the second quarter of 2013, and the interventions were implemented in the third quarter of 2013. We implemented a short-term follow-up survey and a lab-in-the-field experiment a few weeks after the empowerment programs ended. The medium- and long-term data follow-up, which included the collection of the survey data, the incentivized experimental data, and medical data, were implemented one year and three to four years later, with the data collection ending in the third quarter of 2017.[7] In all the follow-up rounds, we

[6]Díaz-Martin et al. [2022] argue that group-based programs can function as platforms for input provision or for building social networks. While we cannot rule out that the programs generate lasting network effects that create future business opportunities, our data do not allow us to examine this channel.

[7]The short-term data collection was implemented at the schools. The medium-term data collection was implemented by phone interview, given that most women were out of school at that time. The long-term data collection was implemented in two steps in collaboration with the data collection company EDI Global, which organized the surveys and the medical testing. First, the participants were contacted by phone to obtain information about their new place of residence and to administer an initial interview by phone. Second, based on the initial interviews, we selected 21 sites and invited the participants to a

collected data on the main outcome variables in the economic and health domains and additional variables that could shed light on behavioral changes and their impact on the well-being of the women. Overall, we surveyed 98.88 percent of the participants at least once after the interventions (3,444 out of 3,483 participants). In Table A4, we show that the rates of attrition in the different follow-up rounds do not differ significantly across treatments, and in Tables A5 and A6 we provide Lee-bound estimates of the treatment effects on the main outcomes.

Importantly, and to reduce the risk of experimenter demand effects, the data collection was carried out independently from the implementation of the programs. The implementation was carried out by the NGO Femina HIP. They trained the teachers, who then introduced the programs in class. The participants (the students) were never in contact with the implementing organization. The Economic and Social Research Foundation, an independent research organization, implemented the baseline, short-term and medium-term surveys. EDI Global, a professional data collection company, administered the long-term follow-up.

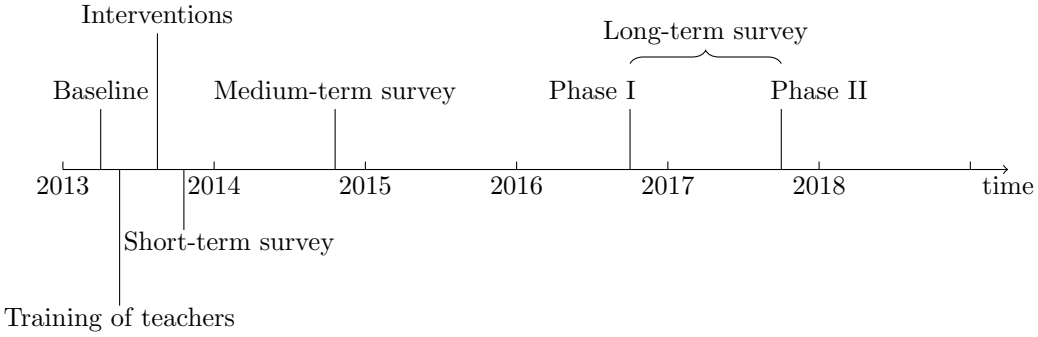


Figure 1: Timeline of the study

The main outcome variables are *Self-employment*, *Business income*, and *Total income* in the economic domain, and *Early pregnancy* and *Started childbearing* in the reproductive health domain. A participant is self-employed if she reports having her own income-generating activity, which includes cultivating her own plot of land, rearing poultry or

face-to-face interview and the medical testing (rapid diagnostic tests of pregnancy, syphilis and malaria) at the site closest to their location. Each site was staffed by a team consisting of a supervisor, two interviewers, two nurses and a lab technician. The National Institute of Medical Research of Tanzania approved the medical testing procedures. By the end of 2016, we were able to interview 88 percent of the baseline sample on the phone and 72 percent face to face. To reduce the attrition rate further, we organized a second phase in the third quarter of 2017 to find and meet the participants that we missed in 2016. We interviewed 391 additional participants in this second phase, which implies that we reached 83 percent of the women in a face to face interview in the long-term follow-up and 93 percent on the phone.

livestock, or other businesses. Business income is measured as the reported sales from these activities in a normal week, while total income also includes weekly earnings from all other economic activities (mostly work in the family business or other salaried employment).[8] Unless otherwise stated, the income measures are winsorized at the 95th percentile. Early pregnancy is defined as a participant giving birth before she is 20 years old, corresponding to the World Health Organization's definition of "teenage pregnancy". A participant has started childbearing if she is pregnant at the time of the survey or already has a child. Deliveries and pregnancies are self-reported in the medium- and long-term surveys, but we also performed a medical test of pregnancy in the long-term follow-up.

When analyzing the mechanisms, we start by studying the short-term effects of the interventions on the participants' knowledge, preferences, and decision-making power. In the short-term survey, we measured knowledge in the economic domain (*Business Knowledge*) and the health domain (*Health Knowledge*), using incentivized multiple choice questions where the participants earn 100 Tanzanian shillings (TZS) for each correct answer.[9] In terms of preferences, we measured risk aversion (*Risk Averse*) using a survey question about the general willingness to take risks in life [Dohmen et al., 2011], time preferences (*Patience*) by asking participants hypothetically to choose between waiting for one month and receiving TZS 20,000 or receiving TZS 10,000 today, and competitiveness preferences (*Competitiveness*) by whether they chose competition or a fixed payment in an incentivized lab-in-the-field tournament [Niederle and Vesterlund, 2007]. Decision-making power was measured both in terms of self-control and gender equality attitudes. The self-control measure (*Self-control*) is an index based on seven different questions selected from the "psychological coping resources measure" in Pearlin and Schooler [1978].[10] Gender equality attitudes (*Gender equality*) are measured in both the economic domain (the degree to which the participant finds it acceptable that the wife earns more money than the husband) and the health domain (the number of different situations in which the participant finds wife beating unacceptable, 0–5).[11] We also construct an overall index of

[8] In the medium-term, we also measured business profits. The estimated treatment effects on profits are very similar in size to the effects on sales.

[9] At the time of the baseline survey, the PPP conversion factor to one USD was equal to TZS 681.66 (The World Bank).

[10] We labeled this index "E2 Empowerment" in the pre-analysis plan.

[11] The gender equality measure in the health domain is taken from the Demographic and Health Surveys (DHS), and has been extensively used to measure women's empowerment and gender equality (see, for

decision-making power aggregating the responses on self-control and gender equality. Finally, we examine whether the interventions affected the participants' plans for the future by asking whether they planned to continue studying (*Keep studying*), had business plans (*Set up a business*), and at what age they would like to get married (*Age at marriage*) and have their first child (*Age at first birth*).

In the medium-term survey, we focused on the participants' behavior in the economic and health domains. In the economic domain, we asked what their main occupation was and code it in the following categories: attending school or training (*Student*); self-employed in non-agricultural business (*Non-agriculture*), land cultivation (*Land*), and livestock rearing (*Livestock*); formal employment or working informally for someone else (*Salaried employment*); helping out in the family business (*Family business*); domestic work at home (*Domestic chores*). In the health domain, we asked the participants if they were in a relationship, including being married or engaged, living together or having a boyfriend (*Relationship*), and if they received money from a boyfriend (*Money from boyfriend*). Finally, we measured whether they had migrated by recording their current place of residence and comparing it to their baseline location (*Migrated*).

In the long-term survey, we measured the participants' well-being in the health dimension by medically testing them for syphilis (*Syphilis*) and malaria (*Malaria*), and by using screening questions about symptoms of sexually transmitted diseases (*Health index*). The risk of contracting malaria or syphilis could be affected by the interventions because the participants' willingness to take risk (in the sexual health domain) may change or because they become more exposed to risk (e.g. by doing business and working or commuting at dusk). Further, to obtain a general measure of how the interventions affected the participants' well-being, we asked them in all follow-up rounds to respond to the statement "I am very happy with my life" (*Happiness*), on a scale from 1 (strongly disagree) to 5 (strongly agree).

instance, Ewerling et al. [2017, 2020]).

2.4 Empirical approach

We here provide an overview of the empirical approach used in the main analysis. To study the causal effect of the different interventions on outcome Y_{ij} for individual i from school j, we estimate the intention to treat estimators (ITT) using the following ordinary least squares (OLS) regression:

$$Y_{ij} = \alpha + \beta_1 E_j + \beta_2 H_j + \beta_3 EH_j + \gamma X_{ij} + \epsilon_{ij}, \tag{1}$$

where E_j, H_j, and EH_j are indicator variables equal to one if school j is assigned to the Economic, Health, or Combined arms, respectively. X_{ij} is a vector of pre-specified covariates from the baseline survey. Note that except for the health and business knowledge, for which we control for the baseline values, our outcomes were either unobserved or invariant at baseline. We cluster the standard errors at the school level.

In this analysis, the estimated values of β_1, β_2, and β_3 capture the causal effects of the different interventions. We test whether there is a (positive or negative) complementarity between the two empowerment programs by comparing the estimated causal effect of the Combined arm (β_3) with the sum of the estimated causal effects of the Economic and Health arms ($\beta_1 + \beta_2$). We further report tests of whether there are significant differences in the estimated causal effects of the different arms.

We test for heterogeneity across four dimensions: age and cognitive ability at the individual level, wealth at the household level, and remoteness at the school level.

The heterogeneous effects are estimated using the following OLS regression:

$$\begin{aligned} Y_{ij} =& \eta + \theta_1 E_j + \theta_2 H_j + \theta_3 EH_j + \lambda Z_{ij} \\ &+ \theta_4 E_j \times Z_{ij} + \theta_5 H_j \times Z_{ij} + \theta_6 EH_j \times Z_{ij} + \kappa X_{ij} + \zeta_{ij}, \end{aligned} \tag{2}$$

where Z_{ij} is an indicator variable for the respective heterogeneity (age, cognitive ability, wealth, remoteness) and $T_j \times Z_{ij}$ is the heterogeneity indicator variable interacted with the treatment indicator T_j=E_j, H_j, EH_j.[12] The estimated causal treatment effects for two subgroups characterized by $Z_{ij} = 1$ and $Z_{ij} = 0$ are given by $(\theta_1 + \theta_4)$ and (θ_1) for the Economic arm, $(\theta_2 + \theta_5)$ and (θ_2) for the Health arm, and $(\theta_3 + \theta_6)$ and (θ_3) for the Combined arm. The estimated differences in the treatment effects between two subgroups are given by θ_4, θ_5, and θ_6. This analysis is presented in Appendix A.5. Overall, we do not observe significant heterogeneous impacts of the programs.

We adjust the p-values for multiple hypothesis testing, following the procedure in Benjamini and Hochberg [1995] to control for the false discovery rate. We group the outcomes into coherent families and then adjust the p-values within each family. We adjust separately for each of the following three main questions that test conceptually distinct hypotheses:

1. Compared with the control group, does the treatment have an impact on outcome Y_{ij} (β_1, β_2, or β_3 different from zero)?
2. Does the treatment have differential impact (β_1 different from β_2, β_1 different from β_3, or β_2 different from β_3)?
3. Is the impact of the Combined treatment different from the sum of the impact of the Economic and Health treatments ($\beta_1 + \beta_2$ different from β_3)?

In the tables, we define the families and report the results of hypothesis tests using both unadjusted p-values (using the asterisk $*$ symbol) and p-values adjusted for multiple hypothesis testing (using the star $\star$ symbol). We also provide randomization inference p-values for the main results in Appendix A.4. The appendix also includes a duration analysis estimating how the treatment affects the occurrence of a birth during the study period (A.10).

Finally, in the mechanism discussion, we estimate and report the associations between the fertility outcomes and the individual measures of income, decision-making power and

[12] Age is also controlled for as a continuous variable in Appendix A.1, Table A1

relationship status. These associations are estimated by OLS regressions, controlling for treatment assignment and the same set of baseline covariates as in the main analysis.

3 Main results

This section presents the main findings from the study. To better understand how the empowerment programs affected the participants' economic outcomes and their fertility, we start by presenting the immediate effects of the programs on the participants' knowledge, preferences, decision-making power, and plans. We then report how the participants' behavior has changed a year later. Having established the short- and medium-term effects of the programs, we turn to their long term effects and how they affected the income and fertility of the participants over time.

3.1 Short-term impacts: Knowledge and mind-set

In Table 2 and Table 3, we provide evidence on how the interventions affected the women in the short term, measured a few weeks after the empowerment programs ended. In columns (1)–(2) in Table 2, we report the results from an incentivized test that we implemented to study whether the women had more business knowledge and reproductive health knowledge after having taken part in the programs. An aim of the economic empowerment program was to provide the women with more knowledge about how to identify business opportunities, the resources needed to operate a business, marketing, customer service, and various other aspects related to being self-employed.

As seen from column (1), we find evidence of an increase in business knowledge from the economic empowerment program: the share of correct answers increases by about three percentage points in the Economic arm and by about six percentage points in the Combined arm. The effect size is not large, but shows that the economic empowerment program indeed provided some new business knowledge to the women. As expected, there

is no effect on business knowledge from the reproductive health empowerment program, which did not cover the business topics.

Column (2) shows that there is no effect of any of the interventions on reproductive health knowledge. We note that the control group answered about 70 percent of the reproductive health questions correctly, which suggests that the women were quite informed about the health issues covered in the reproductive health empowerment program.

The empowerment programs might also affect the mindset of the participants, and in columns (3)–(6) in Table 2 we report the effects on their decision-making power, both in terms of perceived self-control and gender equality attitudes. We find strong evidence of the health program (alone or in the combined treatment) providing the women with greater perceived self-control and more gender equal attitudes, while the economic program only had a strong effect on gender equality attitudes in the economic domain. The bottom panel shows that the two types of programs had significantly different effects on gender equality attitudes in their respective domains. Moreover, the Combined arm had a stronger effect on perceived self-control than the Economic arm.

In columns (7)–(9), we consider whether the empowerment programs changed the women's risk, time, and competitiveness preferences. Column (7) shows a strong positive effect (around 0.3 standard deviations) of the economic empowerment program on the willingness to take risk, which likely reflects that the economic empowerment program focused on the role of calculated risk in self-employment. We do not find any effect on the risk preferences from the reproductive health empowerment program, and, as shown in the bottom panel, the estimated treatment effect on risk preferences for the Economic and Combined arms are significantly larger than for the Health arm. Finally, we do not find average treatment effects on the time and competitiveness preferences from the economic empowerment program or from the reproductive health empowerment program.

In Table 3, we report how the interventions affected the women's plans for the future. The empowerment programs had no significant effects on the plans for studying (column (1)), when to get married (column (3)) or when to have a first child (column (4)). As seen from the means for the control group, most women wanted to continue studying and

planned to get married and have a baby when they were around 26 years old. However, we find a large and highly significant effect of the economic empowerment program on the plans for setting up a business (column (2)). One way to interpret these plans is that the young women wish to continue with their education, moving on to the advanced level of secondary school, find a job, and only then get married and have children. However, as we will see in the next section, when reporting from the medium-term survey conducted one year later, very few of the young women are actually studying (only six percent passed the exam required to graduate to the advanced level of secondary school). Seen in this light, their plans made while still at school turned out to be rather unrealistic and should perhaps be interpreted as hopes rather than expectations. This interpretation is in line with similar findings from Tanzania and from Pakistan, where young women at college are overly optimistic about their own prospects on the job and marriage markets [Almås et al., 2025, Bandiera et al., 2025].

The last row in the bottom panels in Table 2 and Table 3 shows no evidence of a complementarity between the reproductive health empowerment program and the economic empowerment program on any of the dimensions. Hence, it appears that offering both programs to the women did not affect the effectiveness of either of the programs.

Table 2: Short term: impacts on knowledge, decision-making power, and preferences.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Knowledge		Decision-making power				Preferences		
	Business	Health	Self-control	Gender equality		Index	Willingness to take risks	Patience	Competitiveness
				Economic	Health				
Economic	$.031^{***}_{\star\star}$	.002	.061	$.291^{***}_{\star\star\star}$	-.092	$.076^{**}_{\star\star}$	$.304^{***}_{\star\star\star}$	-.028	.064
	(.011)	(.017)	(.042)	(.077)	(.07)	(.035)	(.063)	(.026)	(.048)
Health	0	.001	$.12^{**}_{\star\star}$	.124	$.264^{***}_{\star\star}$	$.115^{***}_{\star\star\star}$	-.016	.021	-.026
	(.012)	(.018)	(.047)	(.076)	(.097)	(.037)	(.07)	(.03)	(.057)
Econ. & Health	$.062^{***}_{\star\star\star}$	.018	$.187^{***}_{\star\star\star}$	$.304^{***}_{\star\star\star}$	$.323^{***}_{\star\star\star}$	$.189^{***}_{\star\star\star}$	$.256^{***}_{\star\star\star}$	.031	.01
	(.014)	(.017)	(.05)	(.076)	(.087)	(.038)	(.064)	(.027)	(.045)
Tests of equality of coefficients:									
Econ. - Health	$.032^{**}_{\star\star}$	.001	-.06	$.167^{**}_{\star\star}$	$-.355^{***}_{\star\star\star}$	-.039	$.32^{***}_{\star\star\star}$	$-.049^{*}$	.091
	(.013)	(.014)	(.051)	(.07)	(.091)	(.036)	(.076)	(.028)	(.062)
Econ. - Econ. & Health	$-.03^{**}_{\star}$	-.016	$-.126^{**}_{\star\star}$	-.013	$-.415^{***}_{\star\star\star}$	$-.113^{***}_{\star\star}$	.047	$-.059^{**}_{\star}$	.055
	(.014)	(.013)	(.055)	(.072)	(.086)	(.041)	(.067)	(.026)	(.049)
Health - Econ. & Health	$-.062^{***}_{\star\star\star}$	-.017	-.067	$-.18^{**}_{\star\star}$	-.059	$-.074^{*}$	$-.273^{***}_{\star\star\star}$	-.01	-.036
	(.015)	(.015)	(.056)	(.071)	(.106)	(.041)	(.076)	(.029)	(.06)
Health + Econ. - Econ. & Health	$-.031^{*}$	-.014	-.006	.111	-.151	.002	.031	-.038	.029
	(.018)	(.024)	(.072)	(.107)	(.131)	(.056)	(.097)	(.04)	(.075)
Mean Control	.38	.684	-2.477	3.817	3.578	.412	0	.383	.332
Obs.	2896	2896	2890	2893	2888	2885	2893	2893	2911

Note: The table provides OLS estimates of the treatment impacts ("Economic", "Health" and "Econ. & Health"), tests of equality of impacts between arms ("Econ. - Health", "Econ. - Econ. & Health" and "Health - Econ. & Health"), and a test of complementarity between the economic empowerment program and the reproductive health empowerment program ("Health + Econ. - Econ. & Health"). All the estimations include the covariates listed in Table 1. The standard errors, in parentheses, are clustered at the level of randomization, the schools. Statistically significant differences between the estimates and zero are indicated by $* \ p < 0.1$, $** \ p < 0.05$, $*** \ p < 0.01$ when the p-values are not corrected and by $\star \ p < 0.1$, $\star\star \ p < 0.05$, $\star\star\star \ p < 0.01$ when the p-values are corrected for multiple hypothesis testing. The multiple hypothesis testing correction considers all the outcomes in this Table to be part of three different families: (i) Knowledge, (ii) Decision-making power, and (iii) Preferences. The decision-making power index is a binary variable equal to one if the respondent is above the median in the sample on a principal component index based on the three decision-making variables (Self-control, Gender equality - Health/Economic). The Willingness to take risks variable is standardized.

Table 3: Short term: impacts on plans for the future.

	(1) Keep studying	(2) Set up a business	(3) Age at marriage	(4) Age at first birth
Economic	.046	.378***	.148	.179
	(.055)	(.038)	(.248)	(.247)
Health	-.028	.018	.16	.001
	(.055)	(.027)	(.215)	(.229)
Econ. & Health	.044	.435***	.089	.025
	(.049)	(.046)	(.227)	(.222)
Tests of equality of coefficients:				
Econ. - Health	.074	.36***	-.012	.177
	(.052)	(.039)	(.245)	(.26)
Econ. - Econ. & Health	.002	-.058	.059	.153
	(.047)	(.053)	(.246)	(.244)
Health - Econ. & Health	-.072	-.417***	.071	-.024
	(.047)	(.047)	(.223)	(.241)
Health + Econ. - Econ. & Health	-.026	-.039	.219	.155
	(.073)	(.06)	(.326)	(.338)
Mean Control	.694	.151	25.6	26.7
Obs.	2890	2892	2893	2861

Note: See the explanations in Table 2. The multiple hypothesis testing correction considers all the outcomes to be part of the same family.

3.2 Medium-term impacts: Occupations and relationships

In Table 4, we examine how the interventions affected the behavior of the women about one year after the empowerment programs ended. Column (1) shows that the economic empowerment programs increased their average number of occupations (most participants combine several occupations: 21% reported only one occupation, 33% reported 2, 28% reported 3, and the rest reported 4 or more). The most common occupations are (with the proportion of participants who report that occupation in parentheses): (i) unpaid domestic work (97%), (ii) education/training (30%), (iii) helping on the family farm (52%), (iv) helping in the family business (42%), (v) working in a non-family business (11%), (vi) working on a non-family farm (5%), (vii) formal wage employment (3%), (viii) own (non-agricultural) business (13%), (ix) working on own land (8%), (x) raising their own livestock (12%).

Columns (2)-(8) report which occupations were affected. Column (2) shows that there was no impact on the share of women studying, in line with the absence of an effect on study plans observed in Table 3. The share of women studying in the medium term is

significantly lower than that of women who stated that they planned to keep studying immediately after the programs, which reflects the limited educational opportunities for these women. Only six percent of the women passed the Form IV exam (a necessary condition to enter into higher secondary education), and we do not find any effect of the interventions on the likelihood of passing. The large majority of the women who reported studying in the medium term attended vocational training programs, while a minority repeated parts of secondary school or prepared for another attempt to pass the Form IV exam.

Both the Economic and the Combined arms had significant effects on non-agricultural and agricultural self-employment, but we do not find that the increase in self-employment crowds out salaried employment or involvement in the family business or domestic chores. The Health arm had no impact on the choice of occupation. This analysis shows that the positive effect of the Economic arm on self-employment comes in addition to other occupations and without significant displacement effects.

Columns (9)–(10) show that the Health arm, but not the Economic arm, affected the share of women being in a relationship and receiving money from a boyfriend. While we had not anticipated such effects, they are consistent with the content of the Health program and its focus on creating and maintaining healthy relationships, and in line with the findings of Duflo et al. [2015] in Kenya. We observe a 25 percent increase in the share of women having a partner in the Health arm and in the Combined arm, and a corresponding increase in the share of women receiving money from their boyfriend. The partners are 22 years old on average, but there is no treatment effect on the partner's age. Finally, we observe that none of the interventions affected the likelihood that the women had migrated one year after the programs.

In the bottom panel in Table 4, we show that the effects on the choice of occupation are significantly larger for the Economic arm than the Health arm, while the effects on being in a relationship and receiving money from a boyfriend variables are significantly larger from the Health arm than from the Economic arm. We find no evidence of a complementarity between the Health and the Economic arms in how they affected behavior in the medium term.

Table 4: Behavior in the medium term.

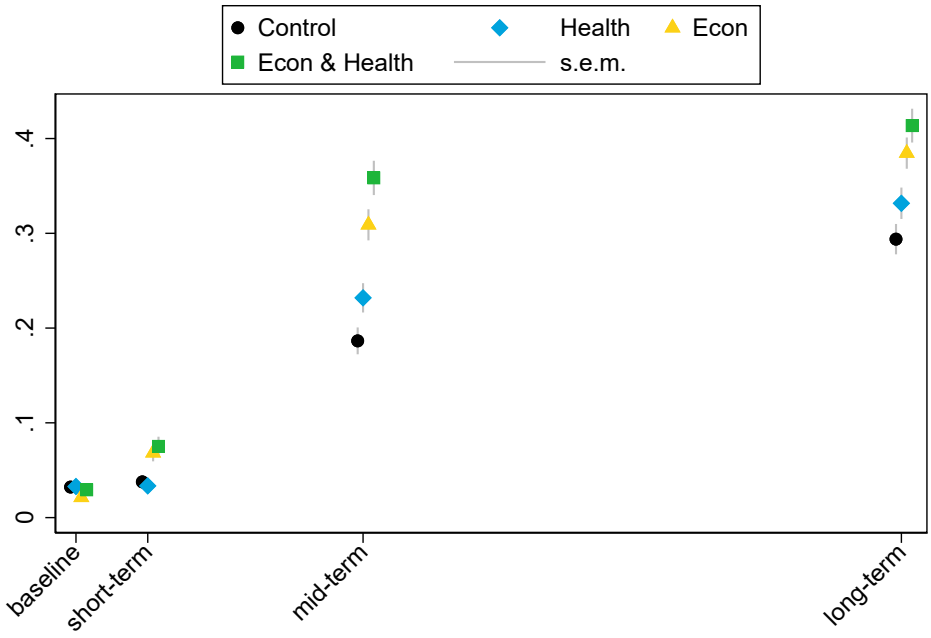
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Occupations								Relationship	Money from	Migrated
	# occupations	Student	Self-employed			Salaried employment	Family	Domestic		boyfriend	
			Non-agri.	Land	Livestock	worker	business	chores			
Economic	.234$^{***}_{\star}$	-.034	.064$^{**}_{\star}$	.029	.066$^{**}_{\star}$	-.014	.039	.002	-.008	-.007	.031
	(.084)	(.029)	(.025)	(.017)	(.029)	(.022)	(.029)	(.007)	(.024)	(.027)	(.046)
Health	.136	-.006	.017	.015	.024	-.012	.053	-.002	.083$^{**}_{\star}$	.069$^{**}_{\star}$	.012
	(.084)	(.032)	(.023)	(.017)	(.022)	(.025)	(.033)	(.009)	(.035)	(.031)	(.047)
Econ. & Health	.249$^{**}_{\star}$	-.002	.111$^{***}_{\star\star}$	.04$^{**}_{\star}$	.065**	-.029	.029	-.015	.084$^{***}_{\star\star}$	.057*	.035
	(.097)	(.039)	(.034)	(.017)	(.03)	(.025)	(.031)	(.011)	(.03)	(.031)	(.043)
Tests of equality of coefficients:											
Econ. - Health	.099	-.028	.047*	.014	.042*	-.002	-.014	.005	-.091$^{***}_{\star\star}$	-.076$^{**}_{\star\star}$	.02
	(.092)	(.029)	(.025)	(.022)	(.022)	(.021)	(.032)	(.009)	(.033)	(.033)	(.049)
Econ. - Econ. & Health	-.015	-.032	-.047	-.012	.001	.015	.01	.017	-.092$^{***}_{\star\star\star}$	-.063$^{*}_{\star}$	-.004
	(.109)	(.038)	(.037)	(.021)	(.029)	(.021)	(.03)	(.011)	(.028)	(.033)	(.046)
Health - Econ. & Health	-.113	-.004	-.094***	-.026	-.041*	.017	.025	.012	-.001	.013	-.024
	(.107)	(.04)	(.035)	(.021)	(.024)	(.023)	(.034)	(.012)	(.037)	(.036)	(.046)
Health + Econ. - Econ. & Health	.121	-.038	-.03	.003	.025	.003	.064	.015	-.009	.006	.007
	(.14)	(.05)	(.044)	(.027)	(.037)	(.032)	(.045)	(.015)	(.044)	(.045)	(.066)
Mean Control	2.266	.319	.079	.052	.086	.165	.655	.972	.34	.297	.316
Obs.	2989	2992	2993	2993	2993	2989	2993	2993	2992	2962	2993

Note: See the explanations in Table 2. The multiple hypothesis testing correction considers the outcomes in this table as three different families: (i) Occupations, (ii) Relationship and Money from a boyfriend, and (iii) Migrated.

3.3 Long-term impacts: Income and fertility

We now turn to the long-term treatment impacts on income and fertility. We first present the effects on income, and then on fertility in a following sub-section.

3.3.1 Income



Note: The figure shows the proportion of women who have their own income generating activity in each arm and over time.

Figure 2: Proportion of women who have their own income generating activity.

The main effects of the interventions in the economic domain are summarized in Figure 2: participants who are offered the economic empowerment program are more likely to have an activity that generates income in the short term, medium term, and long term. In Table 5, we also report the effects on self-employment, business income, and total income. Columns (1)–(3) show that the effect on self-employment is significant for both the Economic and the Combined arms in all follow-up rounds, while there is no significant effect on self-employment from the Health arm. Columns (4)–(6) show that, consistent with the patterns we observe for self-employment, the economic empowerment program resulted in a significant increase in business income in all follow-up rounds. The effects

on business income are substantial; we observe an increase in business income in both the Economic and Combined arms of about 27–36 percent in the long term.[13] We do not observe a statistically significant effect on business income in the Health arm.

In the medium and long term, we collected detailed data on the total income of the participants, including business income and all other sources of income. We observe in columns (7)–(8) that the effects on the total income mirror the effects on business income. The Economic arm and the Combined arm cause a large increase in total income of 27–42 percent, unlike the Health arm that results in no significant increase in total income. In the long term, the total weekly income of the participants in the control group is TZS 6,184 (winsorized at the 95th percentile), which is comparable to the average income per capita among the poorest 40 percent of the population in Tanzania.[14] The poverty line for Tanzania, based on household measures of income, is TZS 49,320 per adult per month (World Bank). Applying that measure to our individual level data implies that about 82 percent of the participants in the control group live in economic poverty. We observe a significant reduction of about four percentage points in the share of women living in economic poverty in the Economic arm ($p = 0.055$) and of about six percentage points in the Combined arm ($p = 0.011$), but no significant effect on the poverty rate in the Health arm.

[13]Percentage changes calculated as 1489/5455 and 1985/5455.

[14]The average income per capita of the poorest 40 percent in Tanzania is USD 1.18 PPP per day (World Bank, Global Database of Shared Prosperity, `worldbank.org/en/topic/poverty/brief/global-database-of-shared-prosperity`). If we use the 2016 conversion factor, this is equivalent to an average weekly income of TZS 6,076.

Table 5: Impact on economic outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Self-employment			Business income			Total income	
	short term	medium term	long term	short term	medium term	long term	medium term	long term
Economic	.032$^{**}_{**}$	.113$^{***}_{***}$	.091$^{**}_{**}$	29$^{**}_{**}$	1461$^{***}_{**}$	1489$^{**}_{**}$	1941$^{***}_{**}$	1673$^{***}_{**}$
	(.013)	(.032)	(.036)	(13)	(523)	(585)	(713)	(606)
Health	-.003	.042	.037	-3	877$^{**}_{*}$	658	981	835
	(.009)	(.026)	(.032)	(9)	(434)	(695)	(667)	(705)
Econ. & Health	.039$^{**}_{**}$	.163$^{***}_{***}$	.116$^{***}_{***}$	37$^{**}_{**}$	2591$^{***}_{***}$	1985$^{***}_{**}$	2922$^{***}_{**}$	2581$^{***}_{**}$
	(.017)	(.037)	(.032)	(16)	(718)	(739)	(956)	(822)
Tests of equality of coefficients:								
Econ. - Health	.036$^{**}_{*}$	.071$^{**}_{*}$	.054*	32$^{**}_{*}$	585	831	960	837
	(.014)	(.03)	(.031)	(13)	(554)	(577)	(804)	(610)
Econ. - Econ. & Health	-.007	-.05	-.025	-8	-1129	-496	-982	-909
	(.02)	(.04)	(.033)	(19)	(834)	(647)	(1095)	(761)
Health - Econ. & Health	-.042$^{**}_{*}$	-.121$^{***}_{**}$	-.079$^{***}_{*}$	-40$^{**}_{*}$	-1714$^{**}_{*}$	-1327*	-1942*	-1746**
	(.018)	(.036)	(.027)	(17)	(765)	(747)	(1048)	(831)
Health + Econ. - Econ. & Health	-.01	-.008	.012	-11	-253	162	-1	-73
	(.022)	(.048)	(.046)	(21)	(960)	(960)	(1300)	(1042)
Mean Control	.038	.187	.294	36	1891	5455	4432	6184
Obs.	2893	2993	3247	2893	2993	3247	2991	3250

Note: See the explanations in Table 2. The multiple hypothesis testing correction considers all the outcomes in this table to be part of the same family.

In the bottom panel in Table 5, we report tests on the differences in effects between the arms in the economic domain. In most comparisons, the effects on self-employment, business income, and total income are significantly larger in the Economic and Combined arms than in the Health arm. We do not observe any significant differences between the Economic and Combined arms, and no significant complementarities between the Health and Economic arms (comparing the sum of the effects from the Economic and Health arms with those of the Combined arm).

The findings in Tables 2–5 point to a consistent mechanism from the short-term impacts of the Economic program on knowledge, mindset, and business plans, to medium-term business startups and, finally, long-term impacts on income. Table 6 provides additional evidence for this mechanism. Panel A shows that there is a very strong and significant correlation between the plans to open a business and business knowledge, willingness to take risks, and progressive views of gender equality in the economic sphere. Panel B shows that having business plans in the short term strongly correlates with self-employment (having a business), business income and total income in both the medium and long term. Furthermore, as shown in Table 4, the increase in self-employment did not crowd out other occupations in the medium term, and thus likely increased their total income by causing an increase in income-generating activities. In the long term, the increase in self-employment is associated with a reduction in salaried employment and domestic chores, which likely reflects a profitable reallocation of occupations given that the average income from self-employment is around 50 percent higher than that of salaried employment in the control group.

3.3.2 Fertility

The changes in fertility are illustrated in Figure 3, which shows the proportion of women who have started childbearing, by age and treatment arm. Very few had a child when they were 16 or 17 years old, across all arms. At age 18, however, a gap starts to emerge between the treated groups and the control group, and this gap widens and persists over time. In the control group, 24 percent have started childbearing in the long-term phone

Table 6: Correlations between business knowledge, risk preferences, gender equality, plans to open a business, self-employment, and income.

A. Correlations between business knowledge, risk, gender equality, and business plans.

	(1) Business plans	(2) Business plans	(3) Business plans	(4) Business plans	(5)	(6)
Business knowledge	0.152***			0.137***		
	(0.043)			(0.043)		
Willingness to take risks		0.012***		0.011***		
		(0.003)		(0.003)		
Gender equality (economic)			0.032***	0.028***		
			(0.008)	(0.008)		
Observations	2882	2892	2892	2882		

B. Correlations between business plans, self-employment, and income.

	Self-employment		Business income		Total income	
	medium term	long term	medium term	long term	medium term	long term
Business plans	0.073***	0.102***	1444.088***	2460.689***	2026.412***	2959.907***
	(0.020)	(0.024)	(479.218)	(639.957)	(624.027)	(688.612)
Observations	2538	2730	2538	2730	2537	2733

Note: Panel A provides OLS estimates of the correlations between the participants' plans to start their own business and business knowledge, willingness to take risks and gender equality in the economic domain. Panel B provides OLS estimates of the correlations between the participants' plans to start their own business and the likelihood of being self-employed, business income, and total income in the medium and long term. All the estimations control for the covariates listed in Table 1 and for the treatment assignment. The standard errors, in parentheses, are clustered at the school level (the unit of randomization). Statistically significant differences between the estimates and zero are indicated by $* \ p < 0.1$, $** \ p < 0.05$, $*** \ p < 0.01$.

survey, compared to about 29 percent in the treatment groups.[15]

Table 7 reports the regression analysis of the treatment effects on early pregnancy and on having started childbearing in the long term. In column (1), we estimate a significantly higher prevalence of early pregnancy in all treatment arms compared with the control group: almost a doubling in the Economic arm, and about a 50 percent increase in the Health and Combined arms. In columns (2)–(3), we study the long-term effect on the overall share of women who started childbearing, separately for the phone survey and the face-to-face survey. For both surveys, we find an overall increase in fertility of about 20–30 percent for the Health and the Economic arms. The estimated effect of the Combined arm on childbearing is smaller in magnitude and not statistically significant. In the bottom part of Table 7, we show that there is a significant negative complementarity between the two empowerment programs on the fertility outcomes in the long term: the estimated causal effects for the Combined arm are significantly smaller than the sum of the estimated

[15]The women were still in school in the short term and had not started childbearing, and there are no treatment effects on fertility in the medium term, see Appendix Section A.2. We do not report any analysis of how the interventions affected the number of children, as only 0.7 percent of the women have more than one child in the long term.

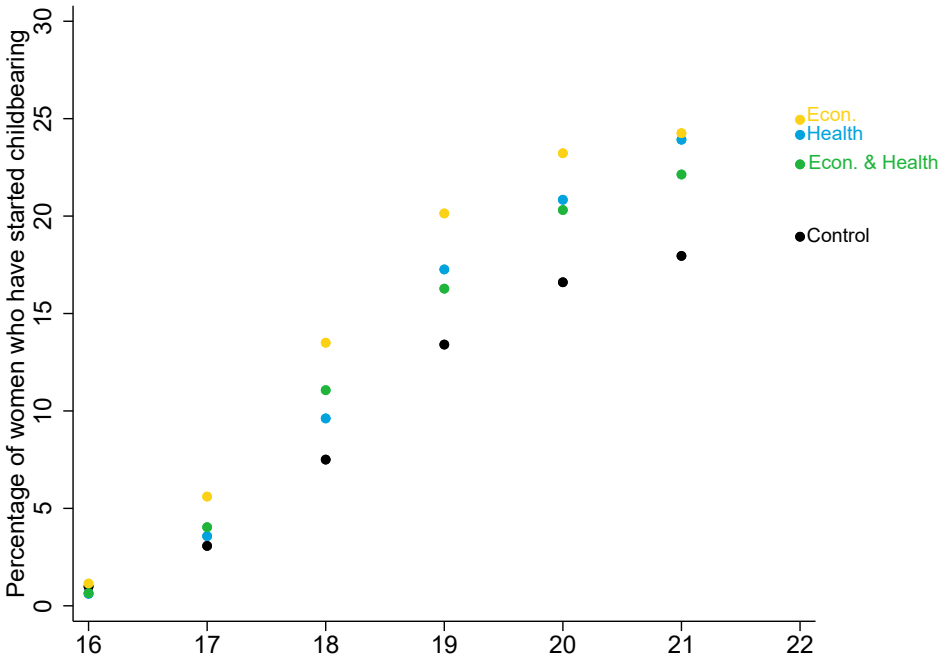


Figure 3: Proportion of women who have started childbearing by age and by treatment arm (%).

effects for the Economic and Health arms. We discuss this result in more detail in the Appendix, Section A.8.

In Table 8, we study how teenage pregnancy and having started childbearing in the long term relate to key variables that were moved by the treatments in the short and medium term: having an income, being in a relationship, and decision-making power. In columns (1)–(2), we show that long-term fertility is positively related to women having an income in the medium term. Columns (3)–(4) show that this association is driven by self-employed women and not by women in salaried employment: for self-employed women, there is a strong positive association between having income and fertility, both for early pregnancy and for having started childbearing. On average, women who are self-employed in the medium term are 9.5 percentage points more likely to have an early pregnancy (p-value < 0.001) and 7.1 percentage points more likely to have a child in the long term (p-value < 0.001). In contrast, we do not find any significant associations between having income from salaried work and fertility. Columns (5)–(6) show a strong and positive association between fertility and being in a relationship in the medium term, and columns (7)–(8) show that long-term fertility is negatively associated with girls reporting that they perceive

Table 7: Impacts on fertility.

	(1) Early pregnancy	(2) Started childbearing	(3) Started childbearing
		long-term phone survey	long-term face-to-face survey
Economic	.084$^{***}_{***}$	.051$^{**}_{**}$	.082$^{***}_{**}$
	(.019)	(.022)	(.028)
Health	.048$^{***}_{**}$	.051$^{**}_{**}$	.065$^{**}_{**}$
	(.018)	(.022)	(.027)
Econ. & Health	.05$^{***}_{**}$	.035	.029
	(.019)	(.026)	(.027)
Tests of equality of coefficients:			
Econ. - Health	.037*	0	.018
	(.02)	(.021)	(.027)
Econ. - Econ. & Health	.034	.016	.053*
	(.022)	(.025)	(.028)
Health - Econ. & Health	-.003	.016	.036
	(.021)	(.026)	(.027)
Health + Econ. - Econ. & Health	.082$^{***}_{***}$	.067$^{**}_{**}$	.118$^{***}_{***}$
	(.029)	(.034)	(.039)
Mean Control	.095	.238	.296
Obs.	3140	3247	2808

Note: See the explanations in Table 2. The multiple hypothesis testing correction considers all the outcomes in this Table to be part of the same family.

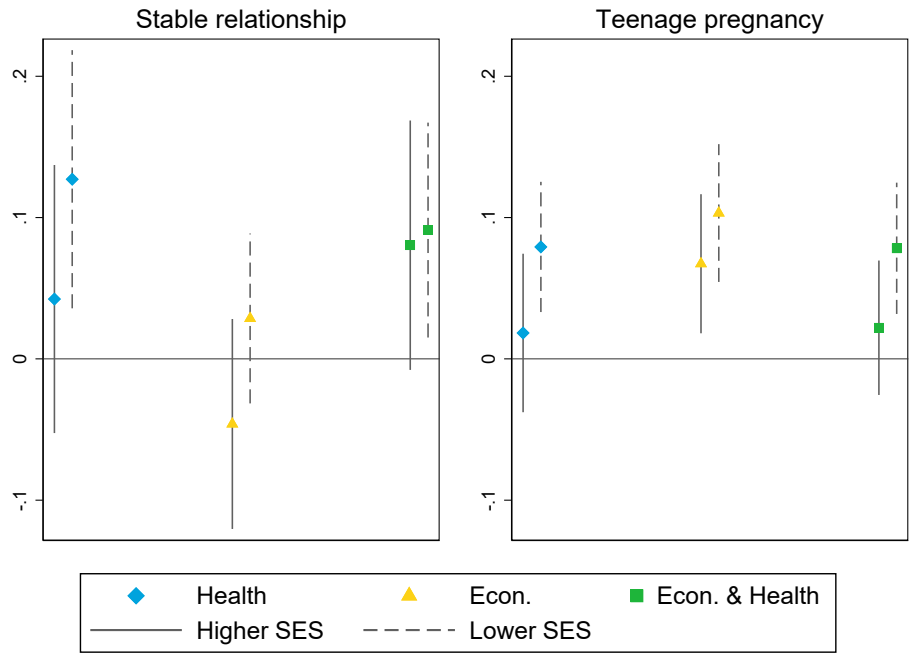
themselves as having decision-making power in the short term. In Appendix A.6, we show that the estimated treatment effects on long-term fertility are substantially reduced, and in most cases no longer significant, when we control for these three variables, suggesting that they are key mechanisms explaining the fertility results.

One way of interpreting the income effect on childbearing is through the lens of classical fertility models, which treat children as normal goods [Becker, 1960, Becker and Lewis, 1973]. Although this framework predicts a counteracting substitution effect, our findings align with Vogl [2016], who shows that the income effect tends to dominate at early stages of development. It may also reflect that the income from self-employment is more compatible with childcare than income from salaried work [Bandiera et al., 2022, Doepke et al., 2022]. In contrast to the classical models that treat the household as a single decision-making unit, collective household models recognize that men and women may have different preferences and bargaining power [Lundberg and Pollak, 1993, Manser and Brown, 1980, Thomas, 1990]. They therefore offer a more nuanced perspective on how fertility choices arise from intra-household negotiation and how outcomes depend on who controls resources. However, the income effect remains important in the collective house-

hold models and may be amplified if the mother —who typically bears most childcare responsibilities— has limited bargaining power. Moreover, in contrast to the potential strengthening of women's bargaining power from wage employment [Jensen, 2012], it is argued that self-employment, which is often home based, does not improve women's outside options and therefore shifts bargaining power less than salaried employment [Lundberg and Pollak, 1993]. In sum, the dominating income effect is consistent with both unitary and collective household models, and likely reflects that the income largely comes from self-employment.

The link between fertility and relationships can be explained by the lower cost of raising a child within a partnership and by social norms and expectations [Fernández and Fogli, 2009, La Ferrara et al., 2012, Munshi and Myaux, 2006], independent of the household model. It is interesting to note that the impact of the Health treatment on relationships and fertility is concentrated among girls from low-SES families. This can be seen from Figure 4 where we report the estimated treatment effects in "being in a relationship" and on "early pregnancy" separately for girls from the bottom and upper halves of the baseline wealth distribution. Combined with the evidence that partners often provide substantial financial support, this pattern suggests that entering a relationship functions as a survival strategy for many girls. The Health program places relationships on the agenda and teaches the girls how to succeed as a couple —much as the Economic program teaches them how to start and manage a business— and the poorer girls, who have fewer alternative options, are more likely to pursue this path. Indeed, 76% of the girls in a stable relationship receive money from their partner, compared to girls who are not in such a relationship, where only 7% of them report receiving money from boyfriends. The amounts received from partners are substantial: 9,400Tsh on average per week (for those who receive such support) and a median value of 5,000Tsh, compared to an average weekly income from work of 20,000Tsh (among those who work) and a median of 15,000Tsh. The treatment effect from the Health intervention on money from boyfriends is also concentrated among the poorer girls, not because they receive more conditional on having a partner, but because they are more likely to have a partner.

Finally, decision-making power may mediate both the income effect and the relationship effect, in a unitary as well as in a collective household model. In a unitary model, higher



Note: The figure shows the treatment effect estimates, and 95% confidence intervals, on "being in a stable relationship in the medium term" and on "having an early pregnancy", by baseline SES status. The SES status is a binary variable that indicates whether a participant is below or above the median value of household assets.

Figure 4: Treatment effects on relationships and early pregnancies by baseline SES.

decision-making power may make women less influenced by social pressure to have a child, as we discuss in more detail in Appendix A.9, while in a collective model it may reflect increased bargaining power for women. In line with this, we find that the estimated income and relationship effects on fertility are systematically smaller for women with high decision-making power than for women with low decision-making power: the estimated interaction effect between having income and decision-making power on long-term fertility is –0.074 (p-value = 0.027), and the estimated interaction effect between being in a relationship and decision-making power on fertility is –0.131 (p-value = 0.001).

Taken together, our analysis provides evidence suggesting that the increase in fertility may not fully reflect the preferences of the women, who both at baseline and in the short-term follow-up survey stated that they preferred, on average, to have children when they were about 26 years old. These stated preferences are also predictive of whether women have started childbearing: women who reported wanting children at an earlier age are more likely to have started childbearing in the follow-up surveys (on average, an incremental increase in the reported age at first birth is associated with a reduction in the likelihood of

an early pregnancy of 0.7 percentage points, p-value = 0.001), which mitigates concerns about social desirability bias in stated preferences [Stecklov et al., 2015]. At the same time, however, we cannot rule out that the increase in fertility partly reflects revealed preferences, where the treatments provide a change in the opportunity set in a way that makes it preferable for some women to have a child.

Table 8: Correlates of early pregnancy and started childbearing: Income, relationship, and decision-making power.

	Early (1)	All (2)	Early (3)	All (4)	Early (5)	All (6)	Early (7)	All (8)
Has income	0.070***	0.080***						
	(0.014)	(0.017)						
Has income from self-employment			0.095***	0.071***				
			(0.017)	(0.019)				
Has income from salaried employment			0.006	0.036				
			(0.019)	(0.022)				
In a Relationship					0.145***	0.219***		
					(0.014)	(0.018)		
Decision-making power Index							-0.024*	-0.071***
							(0.013)	(0.017)
Observations	2769	2858	2768	2857	2771	2860	2646	2724
R-sq.	0.03	0.03	0.03	0.02	0.06	0.07	0.02	0.03

Note: The table provides OLS estimates of the correlation between early pregnancy (Early) or started childbearing (All) and having income in the medium term, either from self-employment or salaried employment, and being in a relationship in the medium term. "Has income" is an indicator equal to one if the participant has her own income. "In a relationship" is an indicator equal to one if she is in a relationship. The estimations include the covariates listed in Table 1 and indicator variables for the treatment assignment. The standard errors, in parentheses, are clustered at the school level (unit of randomization). Statistically significant differences between the estimates and zero are indicated by $* p < 0.1$, $** p < 0.05$, $*** p < 0.01$.

We also examine whether the empowerment programs caused women to have different partners than the control group, which could have contributed to explain the income effect and the relationship effect [Ashraf et al., 2014, 2022, Doepke and Kindermann, 2019], see Table A13 in the Appendix. We find strong evidence of the age of the partner being predictive of the likelihood of having a child (p-value$<$ 0.001), but no evidence of the empowerment programs affecting the partner's age or other indicators of partner characteristics.[16]

[16]Alternative mechanisms explaining the increase in fertility could be inspiration from the teachers or the role models presented in the educational material (many of whom were young mothers) or, in the case of the Health program, facts about fertility (such as the menstrual cycle). Our data do not support these potential mechanisms, however, as we do not find any evidence of the interventions causing a change in the planned age of first birth (Table 3) or in health knowledge (Table 2).

4 Well-being

In this section we discuss in more detail how the interventions affected the well-being of the women in terms of happiness and health. Happiness is a complex concept that may be shaped by the circumstances and expectations of others, and may partly reflect hedonic adaptation that attenuates the long-term impact on happiness of favorable changes [Galiani et al., 2018]. Hence, it is interesting to examine how the happiness of the women developed over time and responded to the treatments.

Women in all the arms are happier with their lives than those in the control group in the short term, which likely reflects that the treatments offered them new opportunities and decision-making power. There is a negative trend in happiness in the all arms over time, and the happiness among the women in the Economic arm is indistinguishable from that in the control group in both the medium and long term. However, in the Health and Combined arms, we observe consistently higher levels of happiness than in the control group.

In columns (1)–(6) in Table 9, we report the regression analysis on happiness, for both a standardized measure and a binary measure (the share of participants who are happy with their life). We observe that there is a negative trend in happiness in the control group, as they move from being students into early adulthood. Nonetheless, most women in the control group report to be happy with their life in the long term, even though the situation is quite different from what they envisioned at baseline. Most are unable to continue studying and many of them have a child much earlier than what they indicated as their preferred age for their first child. The self-reported happiness in the control group thus suggests that the women adapt to their situation over time.

Table 9: Impacts on well-being.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Happiness						Health		
	Short term		Medium term		Long term				
	Std.	Binary	Std.	Binary	Std.	Binary	Syphilis	Malaria	Index
Economic	.179$^{**}_{\star}$	.084$^{**}_{\star\star}$	-.007	-.015	-.02	.012	-.003	-.022	0
	(.082)	(.032)	(.054)	(.027)	(.064)	(.035)	(.004)	(.025)	(.006)
Health	.154*	.091$^{***}_{\star\star}$	.125	.044	.105*	.082$^{**}_{\star\star}$	-.009**	.008	.001
	(.081)	(.032)	(.09)	(.034)	(.063)	(.031)	(.004)	(.025)	(.006)
Econ. & Health	.348$^{***}_{\star\star\star}$	.147$^{***}_{\star\star\star}$	.25$^{***}_{\star\star\star}$	.072$^{***}_{\star\star}$	.221$^{***}_{\star\star\star}$	.09$^{**}_{\star\star}$	-.003	-.018	-.007
	(.061)	(.024)	(.055)	(.026)	(.066)	(.039)	(.005)	(.022)	(.005)
Tests of equality of coefficients:									
Econ. - Health	.025	-.008	-.132	-.059	-.126*	-.07$^{**}_{\star}$	.006	-.03	-.001
	(.086)	(.037)	(.095)	(.037)	(.069)	(.033)	(.004)	(.029)	(.007)
Econ. - Econ. & Health	-.169$^{**}_{\star\star}$	-.063$^{**}_{\star}$	-.257$^{***}_{\star\star\star}$	-.088$^{***}_{\star\star}$	-.241$^{***}_{\star\star\star}$	-.079*	0	-.004	.007
	(.064)	(.028)	(.059)	(.029)	(.071)	(.041)	(.005)	(.026)	(.005)
Health - Econ. & Health	-.194$^{***}_{\star\star}$	-.056*	-.125	-.029	-.116*	-.008	-.005	.026	.008
	(.065)	(.029)	(.094)	(.036)	(.069)	(.038)	(.005)	(.027)	(.005)
Health + Econ. - Econ. & Health	-.015	.028	-.132	-.044	-.136	.003	-.009	.004	.008
	(.102)	(.041)	(.106)	(.045)	(.093)	(.052)	(.006)	(.036)	(.008)
Mean Control	.005	.721	-.012	.729	0	.658	.011	.154	.013
Obs.	2893	2893	2951	2951	3247	3247	2822	2734	2831

Note: See the explanations in Table 2. The outcomes in this table constitute two different families: Happiness and Health. All the estimations include the covariates listed in Table 1.

We observe for both measures that the women in the Combined arm are significantly happier than the women in the control group in all follow-up rounds. In the long term, there is a 9 percentage point increase in the share of women who are happy with their life in the Combined arm over the control group. We also observe an increase in happiness in the Health arm, but the estimated treatment effect is not always significant.[17] In the Economic arm, we do not observe any increase in happiness in the medium or long term. In the bottom panel, we observe that the effect on happiness is significantly higher in the Combined arm than in the Economic arm, but we do not find a significant difference in happiness between the Combined arm and the Health arm in the medium or long term. Overall, the evidence suggests that the reproductive health empowerment program caused a sustained increase in the happiness of the women, whereas the economic empowerment program only had a short-term positive effect on happiness. This suggests that an increase in income does not necessarily lead to an increase in happiness. In line with previous research, we also do not find any evidence of increased fertility causing an increase in happiness [Glass et al., 2016]. The correlational evidence instead suggests that decision-making power and being in a relationship, which were key elements in the reproductive health empowerment program, are important contributors to happiness.

Finally, we provide evidence of how the interventions affected the women's health. The increase in self-employment might have put the women in a more vulnerable position in terms of infections and social interactions, while the increase in the likelihood of being in a relationship might have affected the likelihood of being exposed to sexually transmitted diseases. In columns (7)–(9) in Table 9, we report treatment effects on different health measures in the long term, with a focus on sexual health, which was a key topic in the reproductive health empowerment program. Columns (7)–(8) show that the number of positive cases of syphilis and malaria was very low in the control group: just 1.1 percent tested positive for syphilis and 15 percent for malaria. In the Health arm, there was a significant decrease in the number of women with syphilis, but otherwise there were no significant treatment effects on syphilis or malaria. Column (9) shows that there is no treatment effect on an index that combines the test on syphilis with whether participants reported sexually transmitted diseases, experienced an abnormal discharge, or had a genital sore or ulcer in the last 12 months. The lack of strong effects on sexual health is in

[17] We do not rule out that there may be a decay effect in happiness due to hedonic adaptation that would make the effect on happiness disappear in the even longer run [Galiani et al., 2018].

line with responses to questions on sexual behavior in the long term, where we also do not find strong treatment effects. We do not observe any impact of the interventions on the number of sexual partners, while there is a tendency that the reproductive health empowerment program has increased condom use and the economic empowerment program has reduced exposure to unwanted sex.

5 Conclusion

The paper reports from a large-scale study of women empowerment in rural Tanzania. We implemented a factorial randomized controlled trial to study how opportunities and decision-making power shape the economic and fertility choices of young women when they transition into adulthood. The analysis builds on an unusually rich data set collected in three rounds over more than four years. The intervention used local resources, which strengthens its external validity and demonstrates scalability [Al-Ubaydli et al., 2017].

We find that the economic empowerment of young women leads to a large and enduring increase in their income. This is in contrast to much of the previous literature on economic empowerment that typically finds muted effects from such interventions [Blattman and Ralston, 2015, Card et al., 2018, McKenzie, 2017, McKenzie and Woodruff, 2014]. We argue that this may be because the economic empowerment program in our study targeted younger, unmarried women not yet restricted by family obligations. Hence, the analysis highlights the importance of providing young women with economic opportunities at an early age before they make important life choices, and we show that such interventions may cause a long-term reduction in poverty.

The present study further shows that economic opportunities have spillover effects to the reproductive health domain. The economic empowerment program causes an increase in early pregnancy and in the share of women having started childbearing. Our evidence suggests that the underlying mechanism is a positive income effect on fertility, in line with stylized facts from richer countries [Black et al., 2013, Brehm and Brehm, 2022, Doepke et al., 2022, Kearney and Wilson, 2018, Lindo, 2010], historical patterns [Ashraf and

Galor, 2011, Lagerlöf, 2015] as well as recent evidence from Sub-Saharan Africa [Donald et al., 2024, Garcia-Hernandez et al., 2025, Vogl, 2016]. In particular, Donald et al. [2024] show that increases in the profits of female business-owners in Ethiopia and Togo, and in household wealth in Benin and Ghana, led to higher fertility. Similar observations are made by Garcia-Hernandez et al. [2025], who find that an empowerment program for adolescent girls in rural Zambia led to higher rates of early marriage and teenage pregnancy. While potentially operating through different mechanisms, these new studies also document positive effects of empowerment programs on fertility.

We show that the positive income effect on fertility is specific to the women who have a flexible occupation, which may contribute to explain why our results differ from some other recent studies of how labor market opportunities shape fertility [Heath and Mobarak, 2015, Jensen, 2012]. Jensen [2012] finds that an increase in the likelihood of getting a job in the business outsourcing industry in India reduced the likelihood of young women in rural areas getting married and having a child, and Heath and Mobarak [2015] find that the growth in the Bangladeshi ready-made garments industry had a negative effect on fertility for women exposed to the garment sector. These findings are not necessarily in conflict with the finding of a positive income effect on fertility in the present study, since they consider increases in labor market opportunities that are hard to reconcile with taking care of children.

Our findings also compare interestingly to Bandiera et al. [2020], who report from a study of youth clubs in Uganda that provided a bundle of vocational training, reproductive health information, and a safe space to spend time. They find that teenage pregnancy falls and self-employment increases in communities with youth clubs. In contrast, we find that an increase in economic opportunities increases fertility, and particularly early pregnancy, but we also provide evidence of the positive income effect on fertility being smaller for women with greater decision-making power. Our findings may shed light on the reported effects in Bandiera et al. [2020], and are consistent with the youth clubs causing an increase in decision-making power that outweighed any positive income effect. In this respect, it should be noted that Bandiera et al. [2020] find a weaker income effect from the youth clubs than the present study establishes for the economic empowerment program, and the small income effect reported in Bandiera et al. [2020] also faded away

at the endline of their study.

The reproductive health empowerment program also caused an increase in fertility, and we provide evidence suggesting that the fertility effect is driven by the women entering into a committed relationship at an earlier age. This mechanism is in line with the fertility model proposed by Duflo et al. [2015], which builds on the idea that the cost of pregnancy is lower in a relationship. The fact that the women taking part in the reproductive health program are also happier than control group women, and show no worsening in terms of health outcomes, also suggests that these pregnancies were not the result of unwanted sex.

Women empowerment requires that women have both opportunities and decision-making power, and this study has shown how economic and reproductive health empowerment programs may have lasting effects on the lives of young vulnerable women constrained by social norms. We find that economic empowerment can contribute to reduced poverty, but also that empowerment programs may initiate behaviors that increase the social pressure on women to have children. More research is needed to better understand how to ensure that women can overcome societal constraints when making economic and fertility choices.

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Appendix — On the doorstep of adulthood: Entrepreneurship and fertility of young women in Tanzania

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A Supplementary analysis

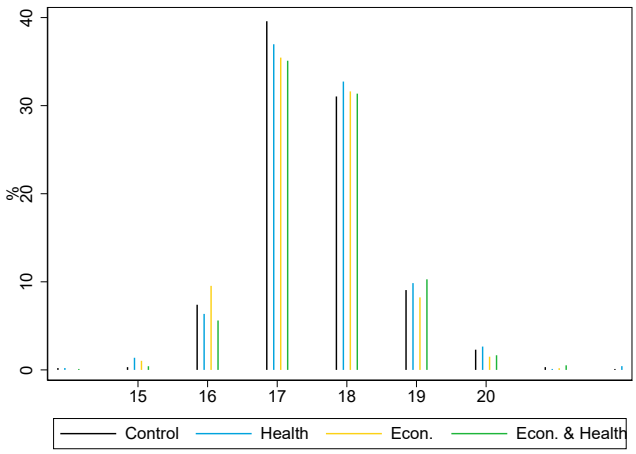
A.1 Distribution of age at baseline.

Age at baseline is an important determinant of early pregnancy. In Figure A1 we show that the distributions of age at baseline are very similar in all treatment arms. We also formally test the equality of distribution of age by treatment arm. Using the Kolmogorov-Smirnov test, we cannot reject the hypothesis that the distribution of age in all arms are the same (control vs health p-value=0.85, control vs economic p-value=0.71, control vs combined p-value=0.51, economic vs health p-value=0.72, combined vs health p-value=1, economic vs combined p-value=0.26).

In this appendix, we also report the main effects on fertility and on economic outcomes controlling for age (a continuous variable) instead of the binary variable above/below

median age that we had pre-specified and that we use in the main text. The estimates, shown in Tables A2 and A1 are very similar to those shown in Tables 5 and 7.

Figure A1: Distribution of age at baseline.



Note: The Figure shows the distribution of the participants' age at baseline in the four treatment arms. The horizontal axis is truncated at age 22, only two participants reported ages above 22.

Table A1: Impacts on fertility with a continuous age covariate.

	(1) Early pregnancy	(2) Started childbearing	(3) Started childbearing
		long-term phone survey	long-term face-to-face survey
Economic	0.082***	0.054**	0.086***
	(0.019)	(0.022)	(0.028)
Health	0.047***	0.053**	0.066**
	(0.017)	(0.022)	(0.027)
Econ. & Health	0.050***	0.036	0.030
	(0.018)	(0.026)	(0.027)
Mean control	0.10	0.24	0.30
Observations	3140	3247	2808

Note: See the explanations in Table 7. The standard errors, clustered by school, are in parentheses. P-value $\leq 0.01^{***}$, $\leq 0.05^{**}$, $\leq 0.1^{*}$.

Table A2: Impact on economic outcomes with a continuous age covariate.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Self-employment			Business income			Total income	
	short term	medium term	long term	short term	medium term	long term	medium term	long term
Economic	0.033**	0.115***	0.094**	29.929**	1492.362***	1561.054***	2009.310***	1749.195***
	(0.013)	(0.032)	(0.036)	(12.417)	(525.263)	(581.379)	(715.280)	(606.323)
Health	-0.003	0.043	0.039	-2.757	888.281**	701.637	1006.506	877.327
	(0.009)	(0.026)	(0.032)	(8.622)	(435.326)	(697.927)	(673.223)	(709.054)
Econ. & Health	0.039**	0.164***	0.117***	37.152**	2606.271***	2012.051***	2957.499***	2604.129***
	(0.017)	(0.037)	(0.032)	(16.187)	(716.847)	(739.614)	(957.595)	(820.589)
Mean control	0.04	0.19	0.29	35.99	1890.58	5454.83	4431.53	6183.54
Observations	2892	2993	3247	2892	2993	3247	2991	3250

Note: See the explanations in Table 5 for variable definitions. The standard errors, clustered by school, are in parentheses. P-value $\leq 0.01^{***}$, $\leq 0.05^{**}$, $\leq 0.1^{*}$.

A.2 Impacts on fertility: robustness to other measures.

In Table A3 we report the treatment impacts on alternative measures of fertility. The first four columns are based on the face-to-face long-term survey. In that survey, we asked the participants if they already had a child and the age of their child in years and months. This allows us to identify how many participants from each treatment arm have given birth, year by year. The first column of Table A3 shows the treatment effects on the proportion of participants who had a child in 2014. The following three columns show the impacts on the proportion of participants with a child in 2015, 2016 and 2017. In the last column we report the proportion of participants who started childbearing as reported in the mid-term survey.

Table A3: Impacts on other measures of fertility.

	(1)	(2)	(3)	(4)	(5)
	Proportion with a child in				Started childbearing in
	2014	2015	2016	2017	the mid-term survey
Economic	.012	$.066^{***}_{**}$	$.082^{***}_{***}$	$.081^{***}_{***}$	.007
	(.014)	(.021)	(.022)	(.023)	(.014)
Health	.003	.03	$.06^{***}_{**}$	$.064^{***}_{**}$	.009
	(.015)	(.02)	(.022)	(.021)	(.017)
Econ. & Health	.01	$.038^{**}_{*}$	.036	$.044^{*}$	.02
	(.015)	(.018)	(.022)	(.023)	(.017)
Tests of equality of coefficients:					
Econ. - Health	.008	.036	.022	.018	-.002
	(.017)	(.022)	(.025)	(.025)	(.015)
Econ. - Econ. & Health	.001	.028	$.046^{*}$	.037	-.013
	(.016)	(.021)	(.025)	(.027)	(.015)
Health - Econ. & Health	-.007	-.008	.024	.02	-.012
	(.017)	(.02)	(.026)	(.025)	(.018)
Health + Econ. - Econ. & Health	.004	$.058^{*}_{*}$	$.106^{***}_{**}$	$.101^{***}_{**}$	-.005
	(.022)	(.029)	(.034)	(.035)	(.022)
Mean Control	.066	.138	.207	.215	.056
Obs.	2893	2893	2893	2893	2992

Note: See the explanations in Table 7 for variable definitions. The multiple hypothesis testing correction considers all the outcomes in this Table to be part of the same family.

A.3 Attrition.

We report in Table A4 the OLS estimates of the treatment effects on the probability of being included in the different surveys. We find that attrition is not significantly correlated with the treatment assignments.

Table A4: Attrition by treatment arm in each survey.

	(1) Short term	(2) Medium term	(3) Long term	(4) Long term
			Phone	Face to face
Health	-0.051	0.002	0.012	-0.000
	(0.033)	(0.027)	(0.016)	(0.028)
Economic	-0.012	-0.025	-0.004	-0.022
	(0.038)	(0.031)	(0.022)	(0.036)
Econ. & Health	-0.027	-0.013	-0.000	-0.012
	(0.037)	(0.025)	(0.017)	(0.029)
Mean control	0.85	0.87	0.93	0.84
Observations	3483	3483	3483	3483

Note: The Table provides OLS estimates of the treatment impacts ("Economic", "Health" and "Econ. & Health") on the probability of being surveyed at different points in time. The standard errors, in parentheses, are clustered at the level of randomization, the schools. None of the coefficients are statistically significantly different from zero at the 0.05 level of significance.

In Tables A5 and A6, we provide the estimates of Lee bounds around the treatment effects on the main outcomes [Lee, 2009]. The impacts on the economic outcomes are robust when we use Lee bounds to take the attrition into account. Regarding the impacts on fertility, the effect of the economic empowerment program on early pregnancy and on childbearing remains significant and the effect of the health empowerment program on childbearing remains significant.

Table A5: Impact on economic outcomes – Lee bounds

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Self-employment			Business income			Total income	
	short term	medium term	long term	short term	medium term	long term	medium term	long term
Economic lower bound	.03	.117***	.09**	28.328	1725.749***	1361.803**	2277.102***	1503.482**
	(.023)	(.037)	(.036)	(21.884)	(614.696)	(692.573)	(864.582)	(689.209)
Economic upper bound	.044**	.146***	.093**	42.145**	2804.485***	1552.119**	3724.947***	1693.798**
	(.021)	(.044)	(.037)	(19.906)	(802.915)	(771.183)	(1189.563)	(764.433)
Health lower bound	-.007	.044	.029	-5.534	996.789	151.731	1230.353	230.79
	(.01)	(.032)	(.032)	(10.352)	(749.865)	(913.716)	(1081.241)	(945.684)
Health upper bound	.033**	.046	.042	32.751**	1062.734	785.745	1276.754	990.136
	(.013)	(.033)	(.034)	(12.862)	(671.626)	(738.798)	(1034.178)	(753.17)
Econ. & Health lower bound	.036	.169***	.12***	35.257	2714.403***	1943.966**	3073.635***	2492.034**
	(.024)	(.041)	(.036)	(23.498)	(851.555)	(905.741)	(1176.762)	(989.27)
Econ. & Health upper bound	.069***	.184***	.12***	67.943***	3267.658***	1965.354**	3811.309***	2536.072***
	(.026)	(.043)	(.036)	(25.408)	(938.24)	(885.275)	(1325.228)	(959.946)
Obs.	1725	1725	1725	1725	1725	1725	1725	1725

Note: The Table provides estimates of the Lee bounds around the treatment impacts ("Economic", "Health" and "Econ. & Health"). "Lower" and "Upper" correspond to the lower and upper bounds. Statistically significant differences between the estimates and zero are indicated by $* \ p < 0.1$, $** \ p < 0.05$, $*** \ p < 0.01$.

Table A6: Impacts on fertility – Lee bounds.

	(1)	(2)	(3)
	Early pregnancy	Started childbearing	
		long-term phone survey	long-term face-to-face survey
Economic lower bound	.075***	.043*	.075**
	(.026)	(.026)	(.034)
Economic upper bound	.08***	.047*	.093**
	(.025)	(.028)	(.042)
Health lower bound	.023	.042*	.064*
	(.025)	(.025)	(.035)
Health upper bound	.048***	.055**	.071**
	(.018)	(.026)	(.034)
Econ. & Health lower bound	.04	.035	.027
	(.027)	(.029)	(.033)
Econ. & Health upper bound	.045*	.036	.041
	(.024)	(.03)	(.038)
Obs.	1725	1725	1725

Note: The Table provides estimates of the Lee bounds around the treatment impacts ("Economic", "Health" and "Econ. & Health"). "Lower" and "Upper" correspond to the lower and upper bounds. Statistically significant differences between the estimates and zero are indicated by $* \ p < 0.1$, $** \ p < 0.05$, $*** \ p < 0.01$.

A.4 Randomization inference.

In this section we present the main results from Tables 5 and 7 with p-values calculated by randomization inference. The p-values are between brackets in Tables A7 and A8. The randomization inference is done using *ritest* in Stata, taking the clustering into account and with two thousand replications per p-value [Heß, 2017]. Our main results are robust to calculating the p-values in this way.

Table A7: Impact on economic outcomes – Randomization Inference

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Self-employment			Business income			Total income	
	short term	medium term	long term	short term	medium term	long term	medium term	long term
	b (se) [p]	b (se) [p]	b (se) [p]	b (se) [p]	b (se) [p]	b (se) [p]	b (se) [p]	b (se) [p]
Economic	.032	.113	.091	29.282	1461.178	1488.605	1940.539	1672.599
	(.013)	(.032)	(.036)	(12.519)	(523.473)	(585.141)	(713.211)	(605.781)
	[.007]	[.001]	[.015]	[.012]	[.007]	[.021]	[.014]	[.014]
Health	-.003	.042	.037	-2.925	876.648	657.946	980.623	835.404
	(.009)	(.026)	(.032)	(8.717)	(434.021)	(695.064)	(666.998)	(704.534)
	[.71]	[.133]	[.271]	[.748]	[.061]	[.369]	[.179]	[.259]
Econ. & Health	.039	.163	.116	37.292	2590.529	1984.99	2922.2	2581.11
	(.017)	(.037)	(.032)	(16.305)	(718.143)	(739.478)	(955.652)	(821.506)
	[.019]	[0]	[.002]	[.019]	[0]	[.019]	[.004]	[.005]
Obs.	2893	2993	3247	2893	2993	3247	2991	3250

Note: The Table provides OLS estimates of the treatment impacts ("Economic", "Health" and "Econ. & Health"). The standard errors, in parentheses, are clustered at the school level (unit of randomization). The p-values, calculated by randomization inference, are in brackets. All the estimations include the covariates listed in Table 1.

Table A8: Impacts on fertility – Randomization Inference

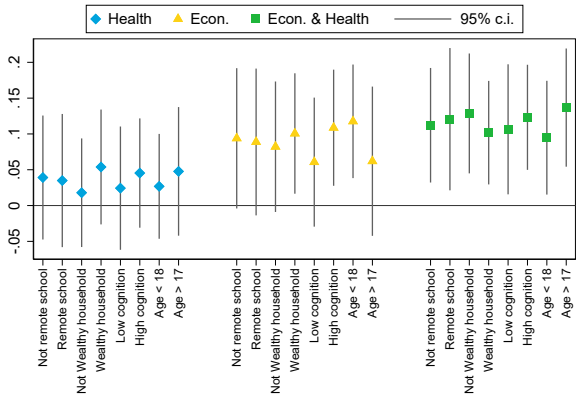
	(1)	(2)	(3)
	Early pregnancy	Started childbearing	
		long-term phone survey	long-term face-to-face survey
	b (se) [p]	b (se) [p]	b (se) [p]
Economic	.084	.051	.082
	(.019)	(.022)	(.028)
	[0]	[.041]	[.01]
Health	.048	.051	.065
	(.018)	(.022)	(.027)
	[.018]	[.04]	[.029]
Econ. & Health	.05	.035	.029
	(.019)	(.026)	(.027)
	[.016]	[.197]	[.298]
Obs.	3140	3247	2808

Note: The Table provides OLS estimates of the treatment impacts ("Economic", "Health" and "Econ. & Health"). The standard errors, in parentheses, are clustered at the school level (unit of randomization). The p-values, calculated by randomization inference, are in brackets. All the estimations include the covariates listed in Table 1.

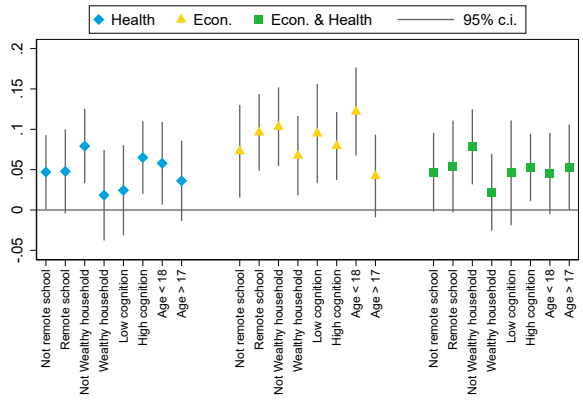
A.5 Heterogeneity analysis.

In this section, we provide a more detailed discussion of the heterogeneity analysis. We test whether the treatments had differential impacts along four prespecified dimensions — at the individual level (age and cognitive ability; these variables could in principle directly influence the students' understanding of the program and their fertility and economic choices), at the household level (wealth; richer households may have different opportunities to set up a business, e.g. better access to capital, or to delay marriage and pregnancy), and at the school level (geographical remoteness; more remote schools are likely to be in environments that are less conducive to income generating activities and women empowerment).

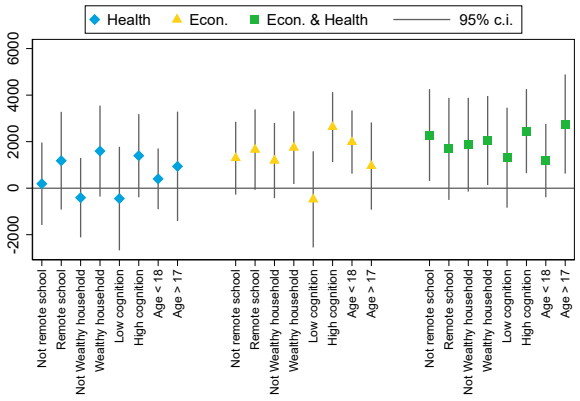
We estimate Equation (2) and report the estimates and standard errors of θ_4, θ_5 and θ_6 for the main outcomes (Self-employment, Business income, Total income, Early pregnancy, and Started childbearing) in Tables A9 and A10. While the tables report the interaction effects, the treatment effects by subgroups can be seen in Figure A2. We do not find any significant heterogeneous impacts that are robust to adjusting the p-values for multiple hypothesis testing.



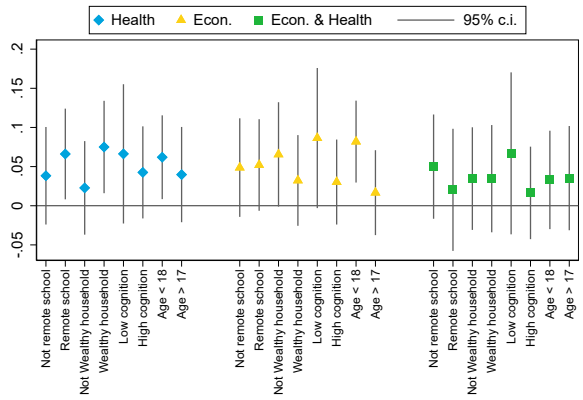
(a) Self-employment.



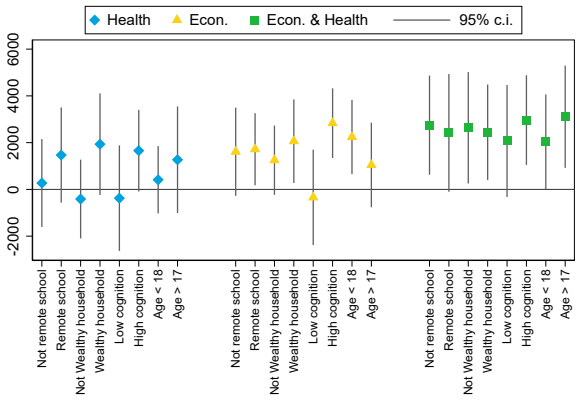
(b) Early pregnancy.



(c) Business income.



(d) Started childbearing.



(e) Total income.

Note: The Figure shows the estimated treatment impacts on (a) Self-employment, (b) Early pregnancy, (c) Business income, (d) Started childbearing (long-term phone survey) and (e) Total income for the pre-specified subgroups.

Figure A2: Impact on the main outcomes in the long term by subgroups.

Table A9: Heterogeneous impacts on economic outcomes.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Self-employment			Business income			Total income	
	short term	medium term	long term	short term	medium term	long term	medium term	long term
Health								
Remote school	.039**	.066	-.004	41.895***	1022.304	989.882	1513.655	1196.41
	(.016)	(.052)	(.063)	(15.824)	(815.282)	(1381.13)	(1263.882)	(1394.647)
Wealthy hh.	.011	-.043	.036	13.686	-1000.339*	2001.894	-1040.763	2345.561*
	(.018)	(.04)	(.045)	(16.568)	(552.887)	(1224.463)	(983.521)	(1372.028)
High cognition	-.003	-.002	.021	-3.391	213.842	1843.338	-149.162	2033.133
	(.017)	(.036)	(.05)	(17.31)	(800.897)	(1450.874)	(1139.845)	(1425.678)
Age > 17	.009	-.003	.021	4.397	591.948	537.013	-334.921	854.19
	(.023)	(.045)	(.052)	(22.322)	(884.059)	(1300.898)	(1233.631)	(1297.52)
Economic								
Remote school	-.001	.066	-.005	3.301	1084.315	365.504	460.037	107.182
	(.025)	(.062)	(.071)	(23.186)	(980.717)	(1173.12)	(1422.603)	(1240.762)
Wealthy hh.	.003	-.089*	.018	8.8	-2709.727***	558.207	-2330.219	812.855
	(.022)	(.049)	(.052)	(21.999)	(860.583)	(1084.527)	(1477.979)	(1112.183)
High cognition	.019	.012	.048	20.398	376.219	3108.047**	1020.901	3174.805**
	(.021)	(.043)	(.047)	(20.508)	(724.286)	(1345.432)	(1104.773)	(1290.73)
Age > 17	-.016	-.006	-.056	-21.408	939.154	-1032.332	-197.774	-1197.605
	(.025)	(.04)	(.058)	(23.006)	(962.131)	(1135.307)	(1275.251)	(1204.358)
Econ. & Health								
Remote school	0	.027	.008	-1.046	1121.689	-595.298	192.395	-332.222
	(.035)	(.075)	(.064)	(33.385)	(1509.177)	(1500.878)	(1967.007)	(1675.017)
Wealthy hh.	.011	-.062	-.027	17.309	-956.85	178.916	390.328	-190.736
	(.023)	(.062)	(.047)	(22.383)	(1370.431)	(1311.599)	(1934.11)	(1529.177)
High cognition	-.012	.075*	.017	-4.852	1060.795	1141.029	-58.427	892.04
	(.027)	(.044)	(.051)	(25.487)	(926.963)	(1334.621)	(1333.171)	(1408.165)
Age > 17	.013	-.022	.042	10.455	529.614	1570.566	-67.861	1070.092
	(.027)	(.042)	(.05)	(25.405)	(932.511)	(1152.654)	(1177.542)	(1327.543)
Mean Control	.038	.187	.294	35.985	1890.577	5454.835	4431.532	6183.538
Obs.	2893	2993	3247	2893	2993	3247	2991	3250

Note: The Table provides OLS estimates of the interaction between the treatment assignment and the baseline variable of interest. The standard errors, in parentheses, are clustered at the school level (the unit of randomization). Statistically significant differences between the estimates and zero are indicated by $* \; p < 0.1$, $** \; p < 0.05$, $*** \; p < 0.01$ *when the p-values are not corrected and by* $\star \; p < 0.1$, $\star\star \; p < 0.05$, $\star\star\star \; p < 0.01$ *when the p-values are corrected for multiple hypothesis testing. The correction considers the outcomes in this Table to be part of the same family. All the estimations include the covariates listed in Table 1.*

Table A10: Heterogeneous impacts on fertility.

	(1) Early pregnancy	(2) Started childbearing	(3) Started childbearing
		long-term phone survey	long-term face-to-face survey
Health			
Remote school	.001	.028	.068
	(.034)	(.042)	(.051)
Wealthy hh.	-.061	.052	-.003
	(.038)	(.039)	(.047)
High cognition	.041	-.024	.02
	(.036)	(.059)	(.062)
Age > 17	-.022	-.022	-.04
	(.037)	(.037)	(.045)
Economic			
Remote school	.023	.003	.023
	(.037)	(.043)	(.055)
Wealthy hh.	-.036	-.033	-.002
	(.032)	(.045)	(.046)
High cognition	-.016	-.056	-.047
	(.034)	(.057)	(.063)
Age > 17	-.08**	-.065**	-.097**
	(.038)	(.032)	(.044)
Econ. & Health			
Remote school	.007	-.03	-.027
	(.038)	(.052)	(.052)
Wealthy hh.	-.056*	0	-.038
	(.03)	(.043)	(.044)
High cognition	.007	-.051	-.042
	(.037)	(.062)	(.064)
Age > 17	.008	.002	.057
	(.037)	(.039)	(.045)
Mean Control	.095	.238	.296
Obs.	3140	3247	2808

Note: The Table provides OLS estimates of the interaction between the treatment assignment and the baseline variable of interest. The standard errors, in parentheses, are clustered at the school level (the unit of randomization). Statistically significant differences between the estimates and zero are indicated by $*\ p < 0.1$, $**\ p < 0.05$, $***\ p < 0.01$ *when the p-values are not corrected and by* $\star\ p < 0.1$, $\star\star\ p < 0.05$, $\star\star\star\ p < 0.01$ *when the p-values are corrected for multiple hypothesis testing. The correction considers the outcomes in this Table to be part of the same family. All the estimations include the covariates listed in Table 1.*

A.6 Mediation

In Table A11, we provide the estimated treatment effects on the main economic outcomes with and without controls for self-employment, being in a relationship and decision-making power. In Table A12, we provide the corresponding effects on the main fertility outcomes.

Table A11: Treatment effects on economic outcomes, controlling for self-employment and decision-making power.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Self-employment						Business income						Total income			
	short term		medium term		long term		short term		medium term		long term		medium term		long term	
Health	-0.003	-0.005	0.042	0.000*	0.037	0.036	-2.925	-4.204	876.648**	69.231	657.946	692.830	980.623	-193.405	835.404	765.572
	(0.009)	(0.010)	(0.026)	(0.000)	(0.032)	(0.032)	(8.717)	(9.574)	(434.021)	(330.446)	(695.064)	(900.196)	(666.998)	(624.609)	(704.534)	(938.215)
Economic	0.032**	0.034**	0.113***	0.000***	0.091**	0.074*	29.282**	30.585**	1461.178***	-68.013	1488.605**	1305.918*	1940.539***	231.189	1672.599***	1309.342*
	(0.013)	(0.014)	(0.032)	(0.000)	(0.036)	(0.038)	(12.519)	(12.939)	(523.473)	(400.996)	(585.141)	(702.033)	(713.211)	(695.392)	(605.781)	(682.836)
Econ. & Health	0.039**	0.027	0.163***	0.000	0.116***	0.091***	37.292**	26.410	2590.529***	324.552	1984.990***	1603.115**	2922.200***	219.331	2581.110***	2174.508**
	(0.017)	(0.018)	(0.037)	(0.000)	(0.032)	(0.032)	(16.305)	(17.490)	(718.143)	(491.946)	(739.478)	(787.121)	(955.652)	(788.372)	(821.506)	(866.552)
Self-employed (MT)		0.045***		1.000***		0.248***		42.580***		11440.842***		4627.158***		12509.337***		5511.617***
		(0.014)		(0.000)		(0.024)		(13.585)		(668.250)		(746.599)		(809.173)		(810.140)
Stable relationship		-0.003		-0.000		0.083***		-3.562		540.158		1843.608***		1201.480**		2519.475***
		(0.010)		(0.000)		(0.018)		(9.733)		(335.232)		(501.839)		(522.004)		(530.384)
Decision-making power		-0.004		-0.000		-0.007		-5.183		-7.682		-269.538		-200.510		-258.574
		(0.009)		(0.000)		(0.019)		(9.610)		(362.357)		(530.610)		(508.206)		(572.362)
Observations	2893	2530	2993	2530	3247	2428	2893	2530	2993	2530	3247	2428	2991	2529	3250	2431

Note: Standard errors clustered at the school level in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A12: Treatment effects on fertility outcomes, controlling for self-employment and decision-making power.

	(1)	(2)	(3)	(4)	(5)	(6)
	Early pregnancy		Started childbearing			
			long-term phone survey	long-term phone survey	long-term face-to-face survey	long-term face-to-face survey
Health	0.048***	0.038**	0.051**	0.006	0.065**	0.026
	(0.018)	(0.019)	(0.022)	(0.023)	(0.027)	(0.030)
Economic	0.084***	0.062***	0.051**	0.029	0.082***	0.059*
	(0.019)	(0.019)	(0.022)	(0.023)	(0.028)	(0.031)
Econ. & Health	0.050***	0.035	0.035	0.002	0.029	-0.014
	(0.019)	(0.022)	(0.026)	(0.026)	(0.027)	(0.031)
Self-employed (MT)		0.076***		0.049***		0.083***
		(0.015)		(0.017)		(0.021)
Stable relationship		0.109***		0.193***		0.218***
		(0.016)		(0.019)		(0.019)
Decision-making power		-0.012		-0.041**		-0.029
		(0.014)		(0.017)		(0.020)
Observations	3140	2357	3247	2428	2808	2129

Note: Standard errors clustered at the school level in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

A.7 Partner characteristics

Partner's characteristics are likely to be of great importance for explaining fertility, and could potentially help to explain the income effect and the relationship effect if the empowerment programs caused women to have different partners than the control group. In the present study, we have data on the age of the partner in the long term, which is strongly correlated with having a child. On average, having a partner who is one year older is associated with a 3.65 percentage points increase in the likelihood of having a child (p-value$<$ 0.001). We also find that there is large heterogeneity in the age of the partner, ranging from 18 years to 50 years.

However, we do not find any evidence of the empowerment programs having an impact on the age of the partner. In column (1) in Table A13, we show that the treatment effects on the age of the partner are small and not statistically significant, and Figure A3 shows that the distribution of the age of the partner is very similar and not statistically significantly different across the treatments and the control group.

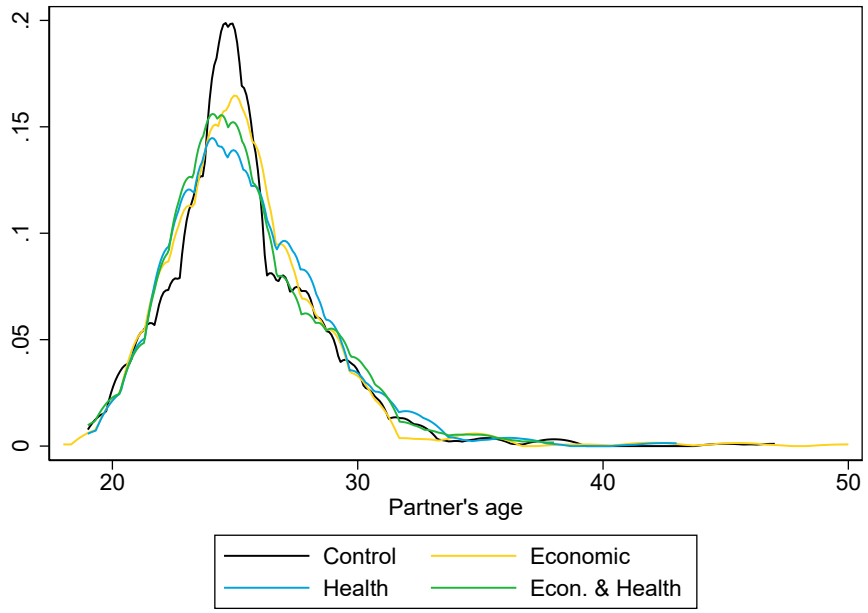
Table A13: Treatment effects on partner characteristics and sexual behavior.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Partner's	Woman decides:			Sexual behavior				
	age	sex	contraception	children	Age at first intercourse	Oldest sexual partner	# sexual partners	Transactional sex	Unwanted sex
Economic	.098	-.013	-.012	.011	-.064	-.051	-.123	.045	-.03**
	(.225)	(.013)	(.014)	(.012)	(.145)	(.214)	(.111)	(.032)	(.014)
Health	.137	-.009	.016	.016*	-.172	.218	.145	.083**	-.004
	(.178)	(.011)	(.019)	(.009)	(.136)	(.182)	(.13)	(.033)	(.013)
Econ. & Health	-.044	.005	-.01	.013	-.159	-.272	.017	-.004	-.015
	(.174)	(.013)	(.015)	(.01)	(.163)	(.181)	(.117)	(.031)	(.014)
Mean Control	25.384	.517	.541	.495	18.484	25.675	1.8	.156	.085
Obs.	2206	2893	2893	2893	2505	2505	2893	2893	2893

Note: The Table provides OLS estimates of the treatment impacts ("Economic", "Health" and "Econ. & Health"). The standard errors, in parentheses, are clustered at the school level (unit of randomization). Statistically significant differences between the estimates and zero are indicated by $*$ $p < 0.1$, $**$ $p < 0.05$, $***$ $p < 0.01$ when the p-values are not corrected and by $\star$ $p < 0.1$, $\star\star$ $p < 0.05$, $\star\star\star$ $p < 0.01$ when the p-values are corrected for multiple hypothesis testing. The correction considers all the outcomes in this Table to be part of the same family. All the estimations include the covariates listed in Table 1. The dependent variables are all measured in the long term (2,895 observations). "Partner's age" is only defined for the sub-sample of participants who have a partner (2,206 observations). The dependent variables "Age at first intercourse" and "Oldest sexual partner" are measured for the sub-sample of participants who have had sexual relationships (2,506 observations). Definitions of dependent variables: Partner's age, Age at first intercourse, and Oldest sexual partner are all measured in years; Woman decides (husband or wife): who decides when to have sex (sex), whether to use condoms (contraception), whether to have children (children), are coded as 0 if they respond "the husband", 0.5 if they respond "both the husband and the wife", and 1 if they respond "the wife"; #sexual partners is the reported number of sexual partners; Transactional sex and Unwanted sex are indicator variables taking the value one if they report that they have had transactional or unwanted sex.

In columns (2)–(9) in Table A13, we study whether the treatments affect variables that likely are related to partner characteristics: how women perceive the decision-making

Figure A3: Distribution of the partner's age, by treatment arm.



Note: The Figure shows the distributions of the partner's age, measured in the long-term, by treatment arm. We cannot reject the hypothesis that the distribution in the control group is equal to the distributions in the treatment arms using the Kolmogorov-Smirnov test (Health, p-value = 0.361); Economic, (p-value = 0.885); Econ. & Health, (p-value = 0.546).

process in a couple (columns 2–4) and self-reported sexual behavior (columns 5-9). We would expect partner characteristics to shape partner dynamics and the women's own experiences in decision-making in a couple, which likely would influence the women's view on who should decide (husband or wife) when to have sex, whether to use condom, and whether to have children. We would also expect the women's sexual history to influence and reflect the characteristics of the partner they end up with.

We do not find evidence of the treatments affecting these variables that likely are related to partner characteristics. As shown in columns (2)–(4) in Table A13, the treatments do not have a statistically significant effect on how the women view the decision-making process in a couple. In terms of reported sexual behavior, columns (5)–(9), we find an effect of the Health treatment causing the women to report more transactional sex (which includes receiving gifts for sex from their partner) and the Economic treatment causing women to report having less unwanted sex, but these effects are not robust to correcting for multiple hypothesis testing.

Taken together, the data —both the direct evidence and the indirect evidence— do not suggest that the treatments affected the partner selection.

A.8 Evidence of the complementary effects of the treatments.

Understanding the complementary effects of the programs. In addition to the direct effects of each program, we noted a negative complementarity in fertility between the two empowerment programs (Table 7): the fertility of women who received both programs increases about as much as the fertility of women who received only one of the programs, but not more. We offer two explanations for this lack of complementarity. First, because women do not really have the time to have more than one child in our study, there can be a ceiling effect if the two programs affect the same women. In other words, if a woman is pushed to have one child by a single program, she will also be pushed to have one child by the combined programs (and not two children). Second, the negative association between decision-making power and fertility may also contribute to explain the observed negative complementarity. The fact that the women obtained greater decision-making power in the Combined arm than in the Economic arm, likely because they received empowerment training in both domains, may have placed the women in the Combined arm in a better position than the women in the Economic arm to overturn an increase in the social pressure to have a child generated by the positive income effect.

We suggest a creative way to test whether the two programs affect the same women. We have shown in Table 5 that the Economic program has a positive effect on incomes. We have shown in Table 2 that the Health program increases *Decision-making power* (DMP), and in Table 4 that it increases the likelihood of being in a *relationship*. Does the combined Econ. & Health arm lead participants to have it all, DMP, relationships, and income? Or does it lead to increases in DMP and relationships among some participants and increases in income for other participants? Answering this question can help us understand the potential complementarities between our two main treatments given that DMP, income, and relationship are thought to influence the outcomes.

In Table A14, we report the treatment effects on the likelihood of having: an income and

a relationship; an income or a relationship; an income and high DMP; an income and low DMP; a relationship and high DMP; a relationship and low DMP. The differential effect of the combined arm is particularly clear in columns (1), (2), and (3). The combined treatment has a much larger effect on the probability to have both an income and a relationship (1). It also increases the probability to have both an income and high DMP (3). These findings indicate that the two treatments, when combined, *"move the same people"*. This can explain why the combined treatment does not lead to a much larger fertility rate than the single treatments. In addition, Table 8 suggests that DMP reduces fertility. The fact that the combined arm leads more women to have both DMP and income can therefore also explain why fertility does not increase even more in this group.

Table A14: Complementarity between treatments.

	(1) Has income and relationship	(2) Has income or relationship	(3) Has income and DMP	(4) Has income and no DMP	(5) Has relationship and DMP	(6) Has relationship and no DMP
Economic	.025	$.07^{**}_{\star}$	$.105^{***}_{\star\star\star}$	.004	$.031^{*}$	-.036
	(.019)	(.032)	(.028)	(.022)	(.017)	(.028)
Health	.032	$.08^{**}_{\star\star}$	$.047^{**}_{\star\star}$	-.027	$.073^{***}_{\star\star}$	.01
	(.028)	(.033)	(.02)	(.029)	(.026)	(.038)
Econ. & Health	$.091^{***}_{\star\star\star}$	$.137^{***}_{\star\star\star}$	$.154^{***}_{\star\star\star}$	-.012	$.112^{***}_{\star\star\star}$	-.03
	(.026)	(.034)	(.023)	(.031)	(.024)	(.03)
Tests of equality of coefficients:						
Econ. - Health	-.006	-.009	$.057^{*}$	.031	$-.041^{*}$	-.046
	(.029)	(.031)	(.029)	(.025)	(.025)	(.032)
Econ. - Econ. & Health	$-.066^{**}$	$-.067^{**}$	-.05	.016	$-.081^{***}_{\star\star}$	-.006
	(.027)	(.032)	(.031)	(.029)	(.024)	(.024)
Health - Econ. & Health	$-.059^{*}$	$-.057^{*}$	$-.107^{***}_{\star\star\star}$	-.015	-.04	.041
	(.034)	(.032)	(.025)	(.034)	(.031)	(.034)
Health + Econ. - Econ. & Health	-.034	.013	-.003	-.011	-.009	.005
	(.04)	(.046)	(.037)	(.042)	(.036)	(.046)
Mean Control	.126	.526	.108	.201	.108	.222
Obs.	2990	2990	2530	2530	2530	2530

Note: The Table provides OLS estimates of the treatment effects on the probability to have an income and/or a relationship and/or decision-making power (DMP). The standard errors, in parentheses, are clustered at the level of randomization, the schools. Statistically significant differences between the estimates and zero are indicated by $* \; p < 0.1$, $** \; p < 0.05$, $*** \; p < 0.01$ *when the p-values are not corrected and by* $\star \; p < 0.1$, $\star\star \; p < 0.05$, $\star\star\star \; p < 0.01$ *when the p-values are corrected for multiple hypothesis testing. The correction considers that the outcomes in this Table are part of the same family. All the estimations include the covariates listed in Table 1.*

A.9 Evidence on the social norms related to fertility.

To provide evidence on the role played by social norms, we asked the women in the long term survey whether (i) their parents would be happy and (ii) society would treat them with more respect if they became pregnant next year. They responded using a five points scale ranging from "strongly disagree" to "strongly agree". In Table A15, we report linear regressions where the dependent variable is an indicator variable for whether they agree that parents would be happy or society would treat them with more respect, on indicator variables for whether they have an income or are in a relationship.

Table A15: Income, relationship and perceived social pressure.

	(1)	(2)	(3)	(4)
	If you were to have a child in the coming year:			
	Parents would be happy		Society would respect	
Has income	0.091***	0.133***	0.051***	0.078***
	(0.019)	(0.024)	(0.018)	(0.023)
In a relationship	0.155***	0.173***	0.165***	0.179***
	(0.019)	(0.023)	(0.021)	(0.024)
Has a child	-0.168***		-0.181***	
	(0.020)		(0.026)	
Constant	0.192***	0.154***	0.312***	0.338***
	(0.041)	(0.055)	(0.041)	(0.053)
Observations	2893	1859	2893	1859

Note: The Table provides OLS estimates of the correlation between the responses to the social pressure questions and having income and being in a relationship in the long term. The dependent variables are indicators equal to one if the participant strongly agrees that parents would be happy (columns (1) and (2)) or society would treat her with more respect (columns (3) and (4)), if she were to have a child in the following year. "Has income" is an indicator equal to one if the participant has her own income. "In a relationship" is an indicator equal to one if she is in a relationship. "Has a child" is an indicator equal to one if she has a child or is pregnant. We control for whether the woman has a child in columns (1) and (3), and consider only the sample of childless participants in columns (2) and (4). The estimations include the baseline covariates listed in Table 1 and indicator variables for the treatment assignment. The standard errors, in parentheses, are clustered at the school level (unit of randomization). Statistically significant differences between the estimates and zero are indicated by $*\ p < 0.1$, $**\ p < 0.05$, $***\ p < 0.01$.

In column (1), we show that there is a strong positive association between having income or being in a relationship and the women believing that their parents would be happy if they became pregnant next year. This association is robust to controlling for whether they have a child (which, as expected, has a negative effect), the set of background variables used in the main analysis, and treatment indicators. In column (2), we show that this association is also robust to only studying the subsample that does not already have a child in the long term. In columns (3) and (4), we show the corresponding analysis for how the women perceive expectations from society, where we observe positive associations between having income or being in a relationship and the women believing that society would treat them with more respect if they became pregnant next year. Taken together,

the evidence suggests that when women have an income or are in a relationship, they perceive a stronger social pressure to have a child.[1]

[1]The extent to which social pressure affects the fertility decision depends on the weight that the women put on social pressure in their decision-making. We would therefore expect women that experience greater decision-making power to be less influenced by an increase in the social pressure to have a child when they have income or are in a relationship. In line with this, we find that the estimated income effect and the relationship effects on fertility are systematically smaller for women with high decision-making power than for women with low decision-making power, which suggests that decision-making power mediates the effects that higher incomes and relationships have on fertility. The estimated interaction effect between having income and decision-making power on fertility is -0.080 (p-value=0.011) for early pregnancy and -0.074 (p-value=0.027) for having started childbearing. The estimated interaction effect between being in a relationship and decision-making power on fertility is -0.035 (p-value=0.219) for early pregnancy and -0.131 (p-value=0.001) for having started childbearing.

A.10 Duration model of birth.

In this Section, we estimate the treatment effects on the occurrence of births. We do so using a Cox proportional hazards model. We include the same covariates as in our main analysis and cluster the standard errors by school. The result is shown in Table A16. We find that the economic program increases the rate of births by 46%, the health program by 31% and the combined one by 25%.

Table A16: Treatment effects on birth (Cox proportional hazards model).

	(1) Birth hazard ratio
Health	1.310**
	(0.146)
Economic	1.455***
	(0.157)
Econ. & Health	1.247*
	(0.144)
N	2839

Note: The Table provides the estimates of a Cox proportional hazards model on birth. The standard errors, in parentheses, are clustered at the school level. Statistically significant differences between the estimates and zero are indicated by $*$ $p < 0.1$, $**$ $p < 0.05$, $***$ $p < 0.01$. *All the estimations include the covariates listed in Table 1.*

B Definition of variables

In this section, we report the list of variables used in all the Figures and Tables, their definition, when they were measured, in which Tables and Figures they appear, and whether they were included in the pre-analysis plans. The variables are listed in Table B1 by their order of appearance in the paper.

Table B1: The variables used in the analysis.

	Variable	Definition	Measured at	Used in	Included in the pre-analysis plans?
1	Age.	Age in years.	Baseline.	Table 1.	No.
2	Age $>$ 17.	A binary variable equal to one if the respondent is 18 years old or older.	Baseline.	Tables 1, A9, A10, and Figure A2.	Yes, as covariate and for heterogeneous impact analysis.
3	Cognitive ability.	A binary variable equal to one for values of the cognitive ability index above the median. The cognitive ability index is made of three questions.	Baseline	Tables 1, A9, A10, and Figure A2.	Yes, as covariate and for heterogeneous impact analysis.
4	Risk aversion.	A binary indicator equal to one if the answer to question 2.2.3. in the baseline questionnaire is "I would keep 100 000" or "I would keep 75 000".	Baseline	Table 1.	Yes, as covariate.
5	Health knowledge.	The share of correct answers given to four health knowledge questions.	Baseline	Table 1.	Yes, as covariate.
		The share of correct answers given to seven health knowledge questions. The questions were incentivized with TSZ 100 per correct answer.	Short term	Table 2.	Yes, as outcome.
6	Business knowledge.	The share of correct answers given to three questions about business practice.	Baseline	Table 1.	Yes, as covariate.
		The share of correct answers given to five questions about business practice. The questions were incentivized with TSZ 100 per correct answer.	Short term	Tables 2 and 6.	Yes, as outcome.

Table B1: (continued)

7	Wealthy household.	An index of family wealth based on (i) whether the household owns a TV, (ii) how many days per week do they eat meat at home, (iii) whether the household is connected to electricity. The index is constructed by taking the average of the standardized variables on these three dimensions, where we then use a dummy for whether this index takes a value above or below the median.	Baseline	Tables 1, A9, A10, and Figure A2.	Yes, as covariate and for heterogeneous impact analysis.
8	Household owns a business.	A binary variable equal to one if the household head owns a business.	Baseline	Table 1.	Yes, as covariate.
9	Woman-headed household.	A binary variable equal to one if the household head is a woman.	Baseline	Table 1.	Yes, as covariate.
10	Remote school.	A binary variable equal to one if it takes at least 30 minutes by car to reach the school from the local district headquarters.	Baseline	Tables 1, A9, A10, and Figure A2.	Yes, as covariate and for heterogeneous impact analysis.
11	N women.	The number of female students in Form IV.	Baseline	Table 1.	Yes, as covariate.
12	Self-employment.	An indicator equal to one if she owns a business, including farming, poultry and livestock rearing.	Baseline, short term, medium term and long term	Tables 5, 6, A2, A5, A9, A11, and Figures 2 and A2.	Yes, as outcome.
13	Early pregnancy.	An indicator equal to one if she was pregnant or had her first child before she was 20 years old.	Baseline, medium term and long term	Tables 7, 8, A1, A6, A10, A12, and Figures 3, 4, and A2.	No.
14	Business income.	Revenues from the business in a normal week (winsorized at 95^{th} percentile).	Short term, medium term and long term	Tables 5, 6, A2, A5, A9, A11, and Figure A2.	Yes, as outcome.
15	Total income.	Sum of the business income and all other incomes (winsorized at 95^{th} percentile).	medium term and long term	Tables 5, 6, A2, A5, A9, A11, and Figure A2.	Yes, as outcome in the medium term.
16	Started childbearing.	Indicator equal to one if she is pregnant or has a child.	medium term and long term.	Tables 7, 8, A1, A6, A10, A12, A15, and A16.	Yes, as outcome.

Table B1: (continued)

17	Mother's age at first birth.	Mother's age when she gave birth to her first child.	Long term.	Figure 3 and Table A16.	No.
18	Risk.	The answer to "I am willing to take risks, in general. Tick one from 0 to 10, where 0 is "completely unwilling" and 10 is "completely willing"", standardized by subtracting the mean of the control group and dividing by the standard deviation of the control group.	Short term.	Table 2.	No.
19	Patience.	Indicator variable equal to one if the respondent hypothetically chooses to wait for 1 month to receive TZS 20,000 instead of receiving TZS 10,000 today.	Short term.	Table 2.	No.
20	Competitiveness.	A binary indicator equal to one if she chose the competitive payment scheme over the fixed rate scheme in an incentivized lab-in-the-field experiment set up to measure the willingness to compete.	Short term	Table 2.	Yes, as outcome.
21	Self-control.	This index is constructed as the mean answer value to the seven following statements: (i) I have little control about things that happen to me, (ii) I often feel helpless dealing with the problems of life, (iii) There is not much I can do to change important things in my life, (iv) On the whole, I am satisfied with myself, (v) I am quite sure of myself, (vi) I certainly feel useless at times, (vii) I have a positive attitude towards myself. The answers were given on a five-point scale: 1 Strongly disagree, 2 Disagree, 3 Neither agree nor disagree, 4 Agree and 5 Strongly agree. Responses were rescaled were appropriate so that a higher value of the index indicates more self-control.	Short term	Table 2.	Yes, as outcome.
22	Gender equality – economic.	The answer to: "it is acceptable to me that a wife earns more money than her husband". The response is on a scale of 1 to 5, where 1 is Strongly disagrees and 5 is Strongly agrees.	Short term	Tables 2 and 6.	Yes, as outcome.

Table B1: (continued)

23	Gender equality – health.	We ask the following question that comes from the DHS - Tanzania: "do you agree that a husband is justified in hitting or beating his wife if (answer YES or NO): 1. she burns the food 2. she argues with him 3. she goes out without telling him 4. she neglects the children 5. she refuses to have sexual intercourse with him The variable is equal to the number of No answers given by the respondent.	Short term	Table 2.	Yes, as outcome.
24	Decision-making power index.	The variable is constructed as follows: we make an index with the three decision-making variables (self-control, gender equality in the health and in the economic domains) using principal component analysis. Then, we make a binary variable equal to one if that index is above its median value.	Short term	Tables 2, 8, A11, and A12.	No.
25	Keep studying.	A binary variable equal to one if she answers yes to "Have you made plans to continue to study recently (in the last few months)".	Short term.	Table 3.	No.
26	Set up a business.	A binary variable equal to one if she answers yes to "Have you made plans to start a business recently (in the last few months) ?".	Short term.	Tables 3 and 6.	Yes.
27	Age at marriage.	The answer in years to "At what age do you want to get married?".	Short term.	Table 3.	No.
28	Age at first birth.	The answer in years to "At what age would you like to have your first child?".	Short term.	Table 3.	No.
29	# occupations.	The number of occupations reported.	Medium term.	Table 4.	No.
30	Student.	An indicator equal to one if she answered yes to "Are you attending school or training now?".	Medium term.	Table 4.	No.
31	Self-employed: non agri.	An indicator equal to one if she owns a non agricultural business.	Medium term.	Table 4.	No.
32	Self-employed: land.	An indicator equal to one if she owns and cultivates a plot of land.	Medium term.	Table 4.	No.
33	Self-employed: livestock.	An indicator equal to one if she raises livestock.	Medium term.	Table 4.	No.

Table B1: (continued)

34	Salaried employment.	An indicator equal to one if she answered yes to "Do you work in someone else's home or business?", or "Do you work on somebody else's farm?", or "Do you have formal employment?".	Medium term	Table 4.	No.
35	Family business.	An indicator equal to one if she answered yes to "Do you help out in family business?" or "Do you help out on a family farm?".	Medium term	Table 4.	No.
36	Domestic chores.	An indicator equal to one if she answered yes to "Do you do domestic work at home?"	Medium term	Table 4.	No.
37	Relationship.	An indicator equal to one if she reported being married, engaged, living with a partner or having a boyfriend.	Medium term and long term	Tables 4, 8, A11, A12, A15, and Figure 4.	No.
38	Money from boyfriend.	An indicator equal to one if she reported receiving money from a boyfriend.	Medium term	Table 4 and Figure 4.	No.
39	Migrated.	An indicator equal to one if she reported living in a different place than at baseline.	Medium term	Table 4.	No.
40	Has income.	An indicator equal to one if she has any source of income.	Medium term and long term	Tables 8 and A15.	No.
41	Happiness (binary).	An indicator equal to one if she says she *agrees* or *strongly agrees* with the statement "I am very happy with my life".	Baseline, short term, medium term and long term	Table 9.	No.
42	Happiness (continuous).	Response value to the following question, where we ask whether they agree that "I am very happy with my life", using the scale "1. Strongly disagree, 2. Disagree, 3. Neither agree nor disagree, 4. Agree, 5. Strongly agree".	Baseline, short term, medium term and long term.	Table 9.	Yes, as outcome in the medium and long term.
43	Health index.	An indicator variable equal to one if the respondent reports in the face-to-face interview: (i) STDs, (ii) Abnormal genital discharges, or (iii) Genital sore or ulcer, or if the respondent is tested positive for syphilis.	Long term.	Table 9.	Yes, as outcome.
44	Syphilis.	An indicator variable equal to one if the respondent is tested positive for syphilis.	Long term.	Table 9.	Yes, as outcome.
45	Malaria.	An indicator variable equal to one if the respondent is tested positive for malaria.	Long term.	Table 9.	Yes, as outcome.
46	Short term.	An indicator variable equal to one if the respondent was interviewed in the short-term survey.	Short term.	Table A4.	No.
47	Medium term.	An indicator variable equal to one if the respondent was interviewed in the medium-term survey.	Medium term.	Table A4.	No.

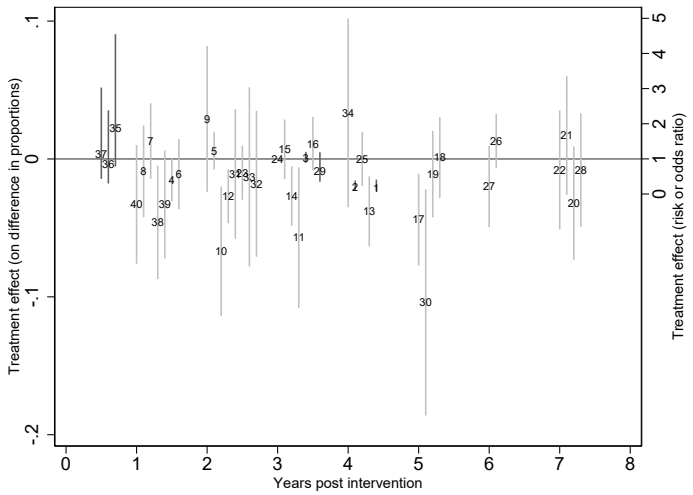
Table B1: (continued)

48	Long term (phone).	An indicator variable equal to one if the respondent was interviewed in the long-term phone survey.	Long term.	Table A4.	No.
49	Long term (face-to-face).	An indicator variable equal to one if the respondent was interviewed in the long-term face-to-face survey.	Long term.	Table A4.	No.
50	Partner's age.	The age of the respondent's partner.	Long term.	Table A13.	No.
51	Woman decides: sex.	Recoded indicator of who decides about sexual activity in the couple (0 = husband, 0.5 = both, 1 = wife).	Long term.	Table A13.	No.
52	Woman decides: contraception.	Recoded indicator of who decides about contraception use (0 = husband, 0.5 = both, 1 = wife).	Long term.	Table A13.	No.
53	Woman decides: children.	Recoded indicator of who decides about having children (0 = husband, 0.5 = both, 1 = wife).	Long term.	Table A13.	No.
54	Age at first intercourse.	The respondent's age at first sexual intercourse.	Long term.	Table A13.	No.
55	Oldest sexual partner.	The age of the respondent's oldest sexual partner.	Long term.	Table A13.	No.
56	No. sexual partners.	The number of sexual partners the respondent has had.	Long term.	Table A13.	No.
57	Transactional sex.	An indicator equal to one if the respondent has received money or gifts in exchange for sex.	Long term.	Table A13.	No.
58	Unwanted sex.	An indicator equal to one if the respondent has experienced unwanted sexual intercourse.	Long term.	Table A13.	No.
59	Parents would be happy about pregnancy.	An indicator equal to one if the respondent agrees or strongly agrees that her parents would be happy if she became pregnant.	Long term.	Table A15.	No.
60	Society would respect if pregnant.	An indicator equal to one if the respondent agrees or strongly agrees that people in her community would respect her more if she had a child.	Long term.	Table A15.	No.

The Table displays the list of variables used in all the Figures and Tables, their definition, when they were measured, in which Tables and Figures they appear, and whether they were included in the pre-analysis plans.

C Literature review

This section provides an overview of existing interventions studying how different types of women empowerment programs affect fertility. Table C1 provides a list of the studies covered in the overview. The list is established from a general free search of the literature. We have included all randomized controlled trials that study women empowerment, target young women, and report fertility outcomes, even if the intervention did not have fertility as the main focus. Fertility is in most studies self-reported based on a question about whether the respondent has ever been pregnant (in some cases, formulated as "ever given birth", or "have children"). In Figure C1, we summarize the literature review by showing the estimated effects and confidence intervals ordered by how many years after the baseline fertility was measured.



Note: The Figure shows the estimated effects of various women empowerment programs on fertility (ever having been pregnant). The plotted numbers correspond to the point estimates, with the number referring to the ID number of the study in Table C1. The horizontal axis indicates when the effect is measured (in years after the intervention). The estimates from studies 1, 2, 3, 29, 35, 36 and 37 (dark gray intervals) are expressed in risk ratios or odds ratios (ratio of proportions in treated and control arms) and must be read on the right axis. The other estimates (light gray intervals) are expressed as the difference between the proportions in the treated and control arm and must be read on the left axis. The bars correspond to 95 percent confidence intervals.

Figure C1: Estimates of women empowerment effects on fertility.

In Table C1, we provide a crude classification of whether the interventions are on sexual and reproductive health (Health) or economic (Econ) women empowerment, report key features of the studies, and the estimated effect on fertility for each follow up round

and each treatment arm (compared to the control group). We also highlight whether the study measured the effect of the intervention on income, since a main finding in the present paper is the positive income effect from an economic women empowerment program on fertility. We enter one line per study, per arm and per round of follow-up. **ID** is the line number used as a reference in Figure C1. For example, lines (7)–(10) report the estimated effects from Baird et al. (2011): two cash transfer programs (conditional and unconditional) at two points in time (one year and two years after the intervention) (a–d). For each estimate, we report **Reference** (the full reference can be found in the reference list), **Type of intervention** (sexual and reproductive health (Health) or economic (ECON) women empowerment), **Country (years)** (indicate where and when the study was conducted), **Time** (the number of years between the baseline and the follow-up), **Age** (the age of the participants at baseline), **N** (the number of observations), **Share ever pregnant** (the share of pregnant participants in the control and the treated group), **Treatment effect** (the estimated treatment effect on the difference in shares as reported in the paper), **Risk/odds ratio** (the relative risk coefficient or the odds ratio), **95 % CI** (the corresponding confidence interval, calculated based on reported standard errors if not reported in the paper), and **Income effect** (indicates whether the effects on income-related measures are reported and the nature of the effects).

Table C1: The effect of women empowerment on fertility in other studies.

ID	Reference	Type of intervention	Country (years)	Time	Age	N	Share ever pregnant		Treatment effect	Risk/odds ratio	95% C.I.	Income effect
							Control	Treated				
1	1) Cabezón et al. [2005]	Health (1997cohort) Abstinence educ.	Chile (1996-2001)	4	15-16	1259	0.189	0.033	-0.156	0.17619	[0.076 ; 0.409]	Not reported
2	2) Cabezón et al. [2005]	Health (1998cohort) Abstinence educ.	Chile (1996-2001)	4	15-16	1259	0.226	0.044	-0.182	0.19574	[0.100 ; 0.385]	Not reported
3	Ross et al. [2007]	Health Multiple info. intervent.	Tanzania (1998-2001)	3	15.7	4775	0.455	0.469	0.014	1.03	[0.890 ; 1.200]	Not reported
4	Dupas [2011]	Health Info HIV-risk	Kenya (2003-2005)	1	15.1	5988	0.054	0.03888	-0.01512		[-0.031 ; 0.001]	Not reported
5	Dupas [2011]	Health Abstinence educ.	Kenya (2003-2005)	2	15.1	5988	0.054	0.06	0.006		[-0.008 ; 0.020]	Not reported
6	Baird et al. [2010]	ECON CCT	Malawi (2007-2008)	1	15.61	2691	0.166	0.155	-0.011		[-0.036 ; 0.014]	Not reported
7	1)Baird et al. [2011]	ECON CCT	Malawi (2008-2010)	1	15.2	2086	0.089	0.102	0.013		[-0.014 ; 0.040]	Not reported
8	2)Baird et al. [2011]	ECON UCT	Malawi (2008-2010)	1	15.2	2086	0.089	0.08	-0.009		[-0.042 ; 0.024]	Not reported
9	3)Baird et al. [2011]	ECON CCT	Malawi (2008-2010)	2	15.2	2087	0.247	0.276	0.029		[-0.024 ; 0.082]	Not reported
10	4)Baird et al. [2011]	ECON UCT	Malawi (2008-2010)	2	15.2	2087	0.247	0.18	-0.067		[-0.114 ; -0.020]	Not reported
11	Jensen [2012]	ECON Recr. serv-¿jobs	India (2003-2006)	3	15–21	1442	0.43	0.373	-0.057		[-0.108 ; -0.006]	Impact on employment, not on expenditures
12	1)Bandiera et al. [2020]	ECON + Health Voc.tr&info	Uganda (2008-2012)	2	16.3	4806	0.123	0.091	-0.027		[-0.047 ; -0.007]	Large impacts on self-empl and expenditures
13	2)Bandiera et al. [2020]	ECON + Health Voc.tr&info	Uganda (2008-2012)	4	16.3	3415	0.114	0.144	-0.038		[-0.063 ; -0.013]	Impact on self-employment
14	1)Duflo et al. [2015]	ECON Educ sub	Kenya (2003-2010)	3	13.7	9433	0.16	0.133	-0.027		[-0.049 ; -0.005]	Not reported
15	2)Duflo et al. [2015]	Health HIV educ	Kenya (2003-2010)	3	13.7	9433	0.16	0.167	0.007		[-0.015 ; 0.029]	Not reported
16	3)Duflo et al. [2015]	ECON + Health Subs + HIV educ	Kenya (2003-2010)	3	13.7	9433	0.16	0.171	0.011		[-0.009 ; 0.031]	Not reported
17	4)Duflo et al. [2015]	ECON Educ sub	Kenya (2003-2010)	5	13.7	8302	0.329	0.285	-0.044		[-0.077 ; -0.011]	Not reported

Table C1: (continued)

18	5)Duflo et al. [2015]	Health	Kenya	5	13.7	8302	0.329	0.33	0.001		[-0.028 ; 0.030]	Not reported
		HIV educ	(2003-2010)									
19	6)Duflo et al. [2015]	ECON + Health	Kenya	5	13.7	8302	0.329	0.318	-0.011		[-0.042 ; 0.020]	Not reported
		Subs + HIV educ	(2003-2010)									
20	7)Duflo et al. [2015]	ECON	Kenya	7	13.7	5719	0.493	0.461	-0.032		[-0.073 ; 0.009]	Not reported
		Educ sub	(2003-2010)									
21	8)Duflo et al. [2015]	Health	Kenya	7	13.7	5719	0.493	0.51	0.017		[-0.026 ; 0.060]	Not reported
		HIV educ	(2003-2010)									
22	9)Duflo et al. [2015]	ECON + Health	Kenya	7	13.7	5719	0.493	0.485	-0.008		[-0.051 ; 0.035]	Not reported
		Subs + HIV educ	(2003-2010)									
23	1)Palermo et al. [2016]	ECON	Zambia	2	28.2	2096	0.99	0.98	-0.01		[-0.030 ; 0.010]	Not reported
		UCT	(2010-2014)									
24	2)Palermo et al. [2016]	ECON	Zambia	3	28.2	2171	1	1	0		[0.000 ; 0.000]	Not reported
		UCT	(2010-2014)									
25	3)Palermo et al. [2016]	ECON	Zambia	4	28.2	2178	0.98	0.98	0		[-0.020 ; 0.020]	Not reported
		UCT	(2010-2014)									
26	1)Buchmann et al. [2018]	Health	Bangladesh	6	15-17	15405	0.61423	0.62723	0.013		[-0.007 ; 0.033]	Not reported
		Safe space&educ	(2007-2017)									
27	2)Buchmann et al. [2018]	ECON	Bangladesh	6	15-17	15405	0.61423	0.59423	-0.02		[-0.049 ; 0.009]	Not reported
		Delay mar.inc.	(2007-2017)									
28	3)Buchmann et al. [2018]	ECON +Health	Bangladesh	7	15-18	15406	0.61423	0.60623	-0.008		[-0.049 ; 0.033]	Not reported
		Inc + Safe space&ed	(2007-2017)									
29	Cho et al. [2018]	ECON	Kenya	3	14.8	343	0.168605	0.116959	-0.05165	0.65	[0.350 ; 1.190]	Not reported
		Free sch.unif.+fees	(2011-2014)									
30	Hallfors et al. [2015]	ECON	Zimbabwe	5	12	287	0.222	0.118	-0.104		[-0.186 ; -0.022]	Not reported
		Free unif.+fees+suplies	(2007-2012)									
31	1)Özler et al. [2020]	Health	Liberia	2	13-14	1174	0.167	0.156	-0.011		[-0.058 ; 0.036]	Not reported
		Life skills +cash	(2016-2018)									
32	2)Özler et al. [2020]	ECON + Health	Liberia	2	13-14	1174	0.167	0.149	-0.018		[-0.071 ; 0.035]	Not reported
		Life s.curr + more cash	(2016-2018)									
33	1)Austrian et al. [2020]	Health	Zambia	2	14.4	3080	0.34	0.327	-0.013		[-0.078 ; 0.052]	Not reported
		Group meetings ++	(2013-2017)									
34	2)Austrian et al. [2020]	Health	Zambia	4	14.4	3080	0.44	0.473	0.033		[-0.035 ; 0.102]	Not reported
		Group meetings ++	(2013-2017)									
35	1)Burke et al. [2020]	ECON	South Africa	0.5	15.4	1656	0.04	0.071	0.63	1.88	[0.780 ; 4.550]	Not reported
		Econ.training	(2015-2016)									
36	2)Burke et al. [2020]	Health	South Africa	0.5	15.4	1656	0.04	0.03	-0.17	0.85	[0.300 ; 2.380]	Not reported

Table C1: (continued)

		HIV/Health train	(2015-2016)									
37	3)Burke et al. [2020]	ECON + Health	South Africa	0.5	15.4	1656	0.04	0.041	0.13	1.14	[0.430 ; 3.030]	Not reported
		Econ+HIV train	(2015-2016)									
38	1) Dupas et al. [2018]	Health Teacher	Cameroon	1	15.5	2892	0.095	.049	-.046		[-0.087 ; -0.005]	Not reported
		train HIV	(2010-2011)									
39	2) Dupas et al. [2018]	Health 60 min	Cameroon	1	15.5	2892	0.095	.062	-.033		[-0.072 ; 0.006]	Not reported
		HIV-train	(2010-2011)									
40	3) Dupas et al. [2018]	Health 60 min HIV-train	Cameroon	1	15.5	2892	0.095	.062	-.033		[-0.076 ; 0.010]	Not reported
		+risk info	(2010-2011)									

D Statistical power

Table D1 provides, for each outcome, the intra-cluster correlation observed in the control group (ICC) and the minimum detectable effect for control vs. treatment comparison (MDE). The MDE is expressed in standard deviations, it is obtained under the following parameters: a level of significance of 5%, a level of power of 80%, 20 clusters per arm and 722 observations per arm (corresponding to the baseline numbers minus 15% of attrition). The outcomes are listed in the order in which they appear in the paper.

Given the low intra-cluster correlations observed in our sample, the MDEs for the main outcome (self-employment, income, fertility) are relatively small, ranging from 0.03 to 0.19 standard deviations. Most MDEs for the secondary outcomes are in the 0.10sd to 0.20sd range.

Table D1: Intra-cluster correlations and minimum detectable effects

	(1) ICC	(2) MDE
Business knowledge	.005	.07
Health knowledge	.05	.2
Self-control	.081	.254
Gender equality (economic)	.03	.158
Gender equality (health)	.024	.14
Decision-making power index	.059	.217
Willingness to take risks	.017	.121
Patience	.014	.11
Competitiveness	.058	.215
Keep studying	.117	.304
Set up a business	.046	.193
Age at marriage	.029	.154
Age at first birth	.016	.118
# occupations	.045	.19
Student	.051	.202
Self-employed (non-agri)	.043	.187
Self-employed (land)	.023	.138
Self-employed (livestock)	.084	.259
Salaried worker	.053	.207
Family business	.032	.162
Domestic chores	0	.033
Relationship	.013	.105
Money from boyfriend	.011	.097
Migrated	.073	.242
Self-employment (short term)	0	.033
Self-employment (medium term)	.043	.186
Self-employment (long term)	.044	.188
Business income (short term)	0	.033
Business income (medium term)	0	.033
Business income (long term)	.008	.084
Total income (medium term)	.005	.069
Total income (long term)	.004	.067
Early pregnancy	.006	.077
Started childbearing (phone survey)	.01	.094
Started childbearing (face-to-face)	.015	.112

Note: The Table provides, for each outcome, the intra-cluster correlation observed in the control group (ICC) and the minimum detectable effect for control vs. treatment comparison (MDE). The MDE is expressed in standard deviations, it is obtained under the following parameters: a level of significance of 5%, a level of power of 80%, 20 clusters per arm and 722 observations per arm (corresponding to the baseline numbers minus 15% of attrition).

E Scalability

In this appendix, we discuss the scalability and replicability challenges of the interventions implemented in this study, following the framework introduced by List [2023].

Evidence against false positives – Many interventions that appear successful in pilot studies may never truly have worked to begin with, as pilot results can be driven by, for example, small samples, chance, or context-specific enthusiasm. The present study has a fairly large sample, but we acknowledge that teachers at each school may have been particularly excited to teach something very different from their usual subjects. Similarly, participating girls likely realized that this was content their older peers had not been taught at school. Thus, we cannot rule out that there would be less "energy" if a similar course were made compulsory for all girls at the secondary-school level.

Identification of underlying mechanisms – Our interventions worked in the sense that the economic program clearly expanded the girls' economic possibilities. Teaching entrepreneurship is not emphasized in the regular school curriculum, and the intervention evidently led girls to make plans, start businesses, and realize higher incomes. These mechanisms would plausibly also be at play in a scaled-up version of the program. Similarly, if a scaled-up health program were to increase relationship quality, we would expect it to affect fertility as it did in this study.

Population comparability – Often, the individuals who opt into pilots are not the same as those reached at scale. In our case, the relevant population includes not only the participants themselves (the girls) but also the teachers implementing the courses. The entire cohort of girls at each school was included, so scaling the intervention to other schools in the same regions would likely reach similar students. At each school, one teacher was selected by the principal, and we have no evidence that it was difficult to recruit teachers. We therefore believe that our study exhibits high population comparability.

Contextual robustness – Effects may depend on institutional settings, incentives, culture, and timing. In our case, participating girls had been interviewed in a baseline survey prior to the intervention. We cannot rule out that the baseline survey itself affected the girls' motivation or made them feel special. Similarly, teachers may have invested more energy and effort than they would have if the program had been one of several ordinary subjects taught at the school. On the other hand, teachers often become more familiar and confident with a topic when teaching it repeatedly, which could improve quality at scale.

We also acknowledge that the study was conducted in rural and semi-rural areas; thus, similar findings may not necessarily be expected in more densely populated urban areas, where challenges related to female empowerment, fertility, and adolescent livelihoods may differ. However, the booklets and topics could be adapted to better fit such contexts.

Implementation and cost considerations – One reason we developed these programs and implemented them directly through schools and teachers was to limit implementation costs and enhance scalability. Nonetheless, costs may rise nonlinearly with scale, quality control may become more difficult, and administrative burdens may increase. Our implementing partner, Femina Hip, not only developed the booklets and facilitator guides but also organized teacher training. If the program were scaled up, Femina would likely need to hire additional staff at some point, and specialized expertise in this domain may be scarce. On the other hand, printing additional booklets would be relatively inexpensive, and booklets could potentially be reused.

Our programs cost about $23 (2013 USD) per participant per program. This cost includes the development of the training material, printing and distributing the booklets, as well as the cost of training the teachers. Expanding the programs to new cohorts of students with the same teachers should be almost free (they may need to replace some of the booklets), while expanding to new schools would require training new teachers and printing

new booklets. In terms of costs, our intervention is similar to BRAC's ELA (Bandiera et al. [2020] report a cost of about $17.90 per girl). While we could not find comprehensive documentation of costs in published studies, our program (as well as BRAC's ELA) seem to be on the lower side of costs, compared to other expensive programs such as The Adolescent Girls Empowerment Program (AGEP) in Zambia [Austrian et al., 2020] which is substantially more intensive (including several components) and costs approximately $771 per participant over the two-year program (`https://assets.publishing.service.gov.uk/media/5a82dbc4ed915d74e6237fd1/Evaluation-of_Adolescent-Girls-Empowerment-Programm pdf`).

Expected voltage drop at scale – List [2023] argues that social interventions, like electricity, may lose "voltage" over distance and scale. Above, we have outlined several risks associated with scaling up, and the impacts estimated in this study could therefore be interpreted as an upper bound. We emphasize, however, that the interventions were delivered by regular local teachers within existing infrastructure (regular secondary schools), rather than by external experts in specialized facilities. The fact that our programs are grounded in local expertise and implementation, and delivered at relatively low cost, makes them strong candidates for potential scale-up.

F Pre-analysis plans

We registered one plan for each of the main survey rounds (Nos. 150, 511 and 2215). These are available on the registry's website: `https://www.socialscienceregistry.org/`. We follow the pre-analysis plans in most of the analysis, but deviate in some places based on feedback that we received when presenting the study. We here list the deviations:

- "Early pregnancy" was not a pre-specified outcome, but was repeatedly asked for because it is an important variable in the literature.
- "Total income" was not a pre-specified long-term outcome, but was considered important to study whether an increase in business income crowded out other sources of income.
- In the plan, we pre-specified that we would use the inverse hyperbolic sine transformation of the income variables. Given the recent papers arguing against the use of the inverse hyperbolic sine transformation [Chen and Roth, 2023, Mullahy and Norton, 2024], we use the variables in level instead, and winsorize them at the 95^{th} percentile instead to limit the influence of a few very large values.
- We have supplemented the analysis of short-term effects with some variables that were not pre-specified ("Keep studying", "Age at marriage", "Age at first birth", index of decision-making power).
- We replaced the pre-specified measures of risk-taking and patience with what we now consider to be better measures of risk preferences and time preference.
- The analysis of behavioral changes in the mid-term (Table 4) and the exploratory analysis of social norms (Table A15) were not pre-specified.
- We did not pre-specify any correction for multiple hypothesis testing.

In this section, we report the full pre-specified analysis:

- We report the treatment effects, with and without controls, in Tables D2–D7.
- Heterogeneous analysis in Tables D8–D10. In this analysis, in order to limit the length of this appendix, we only report the interaction term. The other estimated coefficients are easily obtained from the code and data shared through this paper.
- To simplify the reading of Tables D2–D10 relative to the pre-analysis plans, we follow the naming of the variables and the organization as presented in the pre-analysis plans. We did not pre-specify any correction for multiple hypothesis testing. The p-values (and star symbols) shown in the following tables are therefore not corrected.

Table D2: Impacts in the short term (with covariates)

	(1) K1 Health knowledge	(2) K2 Business knowledge	(3) B1 Safe sex	(4) B2 Business plans	(5) G1 Violence	(6) G2 Earnings	(7) E1 Compete	(8) E2 Empowerment
Economic	.002	.031***	-.059	.378***	.092	.291***	.064	.061
	(.017)	(.011)	(.048)	(.038)	(.07)	(.077)	(.048)	(.042)
Health	.001	0	-.049	.018	-.264***	.124	-.026	.12**
	(.018)	(.012)	(.036)	(.027)	(.097)	(.076)	(.057)	(.047)
Econ. & Health	.018	.062***	-.009	.435***	-.323***	.304***	.01	.187***
	(.017)	(.014)	(.038)	(.046)	(.087)	(.076)	(.045)	(.05)
Tests of equality of coefficients:								
Econ. - Health	.001	.032**	-.01	.36***	.355***	.167**	.091	-.06
	(.014)	(.013)	(.052)	(.039)	(.091)	(.07)	(.062)	(.051)
Econ. - Econ. & Health	-.016	-.03**	-.05	-.058	.415***	-.013	.055	-.126**
	(.013)	(.014)	(.055)	(.053)	(.086)	(.072)	(.049)	(.055)
Health - Econ. & Health	-.017	-.062***	-.04	-.417***	.059	-.18**	-.036	-.067
	(.015)	(.015)	(.038)	(.047)	(.106)	(.071)	(.06)	(.056)
Health + Econ. - Econ. & Health	-.014	-.031*	-.099	-.039	.151	.111	.029	-.006
	(.024)	(.018)	(.063)	(.06)	(.131)	(.107)	(.075)	(.072)
Mean Control	.684	.38	.38	.151	1.422	3.817	.332	-2.477
Obs.	2896	2896	2896	2892	2888	2893	2911	2890

Note: The Table provides OLS estimates of the treatment impacts ("Economic", "Health" and "Econ. & Health"), tests of equality of impacts between treatment arms ("Econ. - Health", "Econ. - Econ. & Health" and "Health - Econ. & Health"), and a test of complementarity between the economic empowerment program and the reproductive health empowerment program ("Health + Econ. - Econ. & Health"). The standard errors, in parentheses, are clustered at the level of randomization, the schools. Statistically significant differences between the estimates and zero are indicated by $* \ p < 0.1$, $** \ p < 0.05$, $*** \ p < 0.01$. *All the estimations include the covariates listed in Table 1.*

Table D3: Impacts in the medium term (with covariates)

	(1) B1 Fertility	(2) B2 Self-employed	(3) B3 Business income	(4) B4 Patience	(5) G1 Violence	(6) G2 Earnings	(7) E1 In-control	(8) E2 Useless	(9) W1 Happiness	(10) W2 Happiness health	(11) W3 Happiness econ.	(12) W4 Sickness	(13) W5 Income
Economic	.007	.113***	.706***	-.033	.019	.224**	-.068	-.092	-.008	-.011	.223***	.015	.637***
	(.014)	(.032)	(.262)	(.037)	(.032)	(.096)	(.068)	(.103)	(.06)	(.064)	(.083)	(.035)	(.24)
Health	.009	.042	.291	-.039	-.006	.099	-.123	-.024	.141	-.002	.144	.04	.234
	(.017)	(.026)	(.206)	(.032)	(.028)	(.086)	(.083)	(.1)	(.101)	(.063)	(.087)	(.032)	(.194)
Econ. & Health	.02	.163***	1.143***	-.033	-.013	.103	-.158*	-.105	.281***	.094	.264***	.002	.992***
	(.017)	(.037)	(.323)	(.035)	(.028)	(.089)	(.086)	(.106)	(.061)	(.059)	(.094)	(.034)	(.299)
Tests of equality of coefficients:													
Econ. - Health	-.002	.071**	.415	.005	.025	.125	.054	-.068	-.148	-.008	.079	-.025	.402
	(.015)	(.03)	(.266)	(.03)	(.028)	(.08)	(.082)	(.094)	(.106)	(.067)	(.114)	(.037)	(.245)
Econ. - Econ. & Health	-.013	-.05	-.436	0	.032	.121	.09	.012	-.289***	-.105*	-.041	.013	-.355
	(.015)	(.04)	(.379)	(.033)	(.028)	(.084)	(.088)	(.101)	(.066)	(.059)	(.114)	(.037)	(.35)
Health - Econ. & Health	-.012	-.121***	-.851**	-.005	.007	-.004	.035	.081	-.14	-.096	-.12	.038	-.758**
	(.018)	(.036)	(.336)	(.029)	(.024)	(.072)	(.101)	(.1)	(.106)	(.061)	(.116)	(.036)	(.314)
Health + Econ. - Econ. & Health	-.005	-.008	-.145	-.038	.026	.22*	-.033	-.012	-.148	-.107	.103	.052	-.121
	(.022)	(.048)	(.439)	(.046)	(.04)	(.121)	(.124)	(.143)	(.119)	(.085)	(.138)	(.048)	(.407)
Mean Control	.056	.187	1.162	1.162	.243	3.463	3.463	3.433	3.799	4.512	2.536	2.536	1.083
Obs.	2992	2993	2993	2993	2993	2993	2993	2993	2951	2993	2993	2993	2993

Note: The Table provides OLS estimates of the treatment impacts ("Economic", "Health" and "Econ. & Health"), tests of equality of impacts between treatment arms ("Econ. - Health", "Econ. - Econ. & Health" and "Health - Econ. & Health"), and a test of complementarity between the economic empowerment program and the reproductive health empowerment program ("Health + Econ. - Econ. & Health"). The standard errors, in parentheses, are clustered at the level of randomization, the schools. Statistically significant differences between the estimates and zero are indicated by $* \ p < 0.1$, $** \ p < 0.05$, $*** \ p < 0.01$. *All the estimations include the covariates listed in Table 1.*

Table D4: Impacts in the long term (with covariates)

	(1) B1 Fertility	(2) B2 Self-employed	(3) B3 Business income	(4) B4 Safe sex	(5) B5 Patience	(6) B6 Risk	(7) G1 Violence	(8) G2 Decision-making	(9) E1 In-control	(10) W1 Happiness	(11) W2 Infections
Economic	.053*	.091**	.807***	-.089	-.011	48.845	-.104	.016	.002	-.022	-.022
	(.027)	(.036)	(.3)	(.163)	(.032)	(89.549)	(.105)	(.021)	(.021)	(.069)	(.025)
Health	.052*	.037	.253	.315*	-.003	10.873	.096	-.019	.016	.114*	.008
	(.026)	(.032)	(.298)	(.175)	(.029)	(112.138)	(.089)	(.018)	(.023)	(.068)	(.025)
Econ. & Health	.021	.116***	.824**	-.225	-.016	30.062	.119	-.014	-.006	.239***	-.018
	(.029)	(.032)	(.321)	(.155)	(.031)	(75.472)	(.092)	(.017)	(.025)	(.072)	(.022)
Tests of equality of coefficients:											
Econ. - Health	0	.054*	.554**	-.405**	-.007	37.971	-.199**	.035*	-.014	-.136*	-.03
	(.022)	(.031)	(.254)	(.183)	(.027)	(131.266)	(.092)	(.019)	(.022)	(.075)	(.029)
Econ. - Econ. & Health	.032	-.025	-.017	.136	.005	18.782	-.223**	.03	.008	-.261***	-.004
	(.026)	(.033)	(.299)	(.165)	(.029)	(94.54)	(.097)	(.019)	(.025)	(.076)	(.026)
Health - Econ. & Health	.031	-.079***	-.571*	.541***	.012	-19.189	-.024	-.005	.022	-.125*	.026
	(.026)	(.027)	(.291)	(.173)	(.026)	(118.323)	(.079)	(.014)	(.026)	(.075)	(.027)
Health + Econ. - Econ. & Health	.084**	.012	.236	.451*	.002	29.655	-.128	.011	.024	-.147	.004
	(.038)	(.046)	(.431)	(.238)	(.042)	(143.545)	(.133)	(.026)	(.034)	(.101)	(.036)
Mean Control	.323	.294	2.359	0	.643	.643	2815.321	.099	.149	3.532	.154
Obs.	3247	3247	3247	2893	3245	3245	2893	3247	2893	3247	2734

Note: The Table provides OLS estimates of the treatment impacts ("Economic", "Health" and "Econ. & Health"), tests of equality of impacts between treatment arms ("Econ. - Health", "Econ. - Econ. & Health" and "Health - Econ. & Health"), and a test of complementarity between the economic empowerment program and the reproductive health empowerment program ("Health + Econ. - Econ. & Health"). The standard errors, in parentheses, are clustered at the level of randomization, the schools. Statistically significant differences between the estimates and zero are indicated by $* \ p < 0.1$, $** \ p < 0.05$, $*** \ p < 0.01$. *All the estimations include the covariates listed in Table 1.*

Table D5: Impacts in the short term (no covariates)

	(1) K1 Health knowledge	(2) K2 Business knowledge	(3) B1 Safe sex	(4) B2 Business plans	(5) G1 Violence	(6) G2 Earnings	(7) E1 Compete	(8) E2 Empowerment
Economic	.001	.033***	-.06	.378***	.092	.291***	.065	.061
	(.018)	(.012)	(.048)	(.038)	(.07)	(.077)	(.048)	(.042)
Health	.004	0	-.05	.018	-.264***	.124	-.025	.12**
	(.018)	(.012)	(.036)	(.027)	(.097)	(.076)	(.057)	(.047)
Econ. & Health	.02	.065***	-.008	.436***	-.323***	.304***	.008	.187***
	(.019)	(.014)	(.038)	(.045)	(.087)	(.076)	(.045)	(.05)
Tests of equality of coefficients:								
Econ. - Health	-.003	.033**	-.01	.36***	.355***	.167**	.09	-.06
	(.014)	(.013)	(.051)	(.039)	(.091)	(.07)	(.062)	(.051)
Econ. - Econ. & Health	-.019	-.032**	-.052	-.058	.415***	-.013	.058	-.126**
	(.015)	(.014)	(.054)	(.053)	(.086)	(.072)	(.049)	(.055)
Health - Econ. & Health	-.016	-.065***	-.043	-.418***	.059	-.18**	-.033	-.067
	(.016)	(.015)	(.038)	(.046)	(.106)	(.071)	(.06)	(.056)
Health + Econ. - Econ. & Health	-.015	-.032*	-.103	-.041	.151	.111	.033	-.006
	(.025)	(.019)	(.063)	(.06)	(.131)	(.107)	(.075)	(.072)
Mean Control	1.083	.38	.38	.151	1.422	3.817	.332	.332
Obs.	2993	2896	2896	2892	2888	2893	2911	2911

Note: The Table provides OLS estimates of the treatment impacts ("Economic", "Health" and "Econ. & Health"), tests of equality of impacts between treatment arms ("Econ. - Health", "Econ. - Econ. & Health" and "Health - Econ. & Health"), and a test of complementarity between the economic empowerment program and the reproductive health empowerment program ("Health + Econ. - Econ. & Health"). The standard errors, in parentheses, are clustered at the level of randomization, the schools. Statistically significant differences between the estimates and zero are indicated by $* \ p < 0.1$, $** \ p < 0.05$, $*** \ p < 0.01$.

Table D6: Impacts in the medium term (no covariates)

	(1) B1 Fertility	(2) B2 Self-employed	(3) B3 Business income	(4) B4 Patience	(5) G1 Violence	(6) G2 Earnings	(7) E1 In-control	(8) E2 Useless	(9) W1 Happiness	(10) W2 Happiness health	(11) W3 Happiness econ.	(12) W4 Sickness	(13) W5 Income
Economic	.007	.113***	.706***	-.033	.019	.224**	-.068	-.092	-.008	-.011	.223***	.015	.637***
	(.014)	(.032)	(.262)	(.037)	(.032)	(.096)	(.068)	(.103)	(.06)	(.064)	(.083)	(.035)	(.24)
Health	.009	.042	.291	-.039	-.006	.099	-.123	-.024	.141	-.002	.144	.04	.234
	(.017)	(.026)	(.206)	(.032)	(.028)	(.086)	(.083)	(.1)	(.101)	(.063)	(.087)	(.032)	(.194)
Econ. & Health	.02	.163***	1.143***	-.033	-.013	.103	-.158*	-.105	.281***	.094	.264***	.002	.992***
	(.017)	(.037)	(.323)	(.035)	(.028)	(.089)	(.086)	(.106)	(.061)	(.059)	(.094)	(.034)	(.299)
Tests of equality of coefficients:													
Econ. - Health	-.002	.071**	.415	.005	.025	.125	.054	-.068	-.148	-.008	.079	-.025	.402
	(.015)	(.03)	(.266)	(.03)	(.028)	(.08)	(.082)	(.094)	(.106)	(.067)	(.114)	(.037)	(.245)
Econ. - Econ. & Health	-.013	-.05	-.436	0	.032	.121	.09	.012	-.289***	-.105*	-.041	.013	-.355
	(.015)	(.04)	(.379)	(.033)	(.028)	(.084)	(.088)	(.101)	(.066)	(.059)	(.114)	(.037)	(.35)
Health - Econ. & Health	-.012	-.121***	-.851**	-.005	.007	-.004	.035	.081	-.14	-.096	-.12	.038	-.758**
	(.018)	(.036)	(.336)	(.029)	(.024)	(.072)	(.101)	(.1)	(.106)	(.061)	(.116)	(.036)	(.314)
Health + Econ. - Econ. & Health	-.005	-.008	-.145	-.038	.026	.22*	-.033	-.012	-.148	-.107	.103	.052	-.121
	(.022)	(.048)	(.439)	(.046)	(.04)	(.121)	(.124)	(.143)	(.119)	(.085)	(.138)	(.048)	(.407)
Mean Control	.056	.056	1.162	.454	.243	.243	3.463	2.581	3.799	3.799	2.536	2.536	1.083
Obs.	2992	2992	2993	2992	2993	2993	2993	2993	2951	2951	2993	2993	2993

Note: The Table provides OLS estimates of the treatment impacts ("Economic", "Health" and "Econ. & Health"), tests of equality of impacts between treatment arms ("Econ. - Health", "Econ. - Econ. & Health" and "Health - Econ. & Health"), and a test of complementarity between the economic empowerment program and the reproductive health empowerment program ("Health + Econ. - Econ. & Health"). The standard errors, in parentheses, are clustered at the level of randomization, the schools. Statistically significant differences between the estimates and zero are indicated by $* p < 0.1$, $** p < 0.05$, $*** p < 0.01$.

Table D7: Impacts in the long term (no covariates)

	(1) B1 Fertility	(2) B2 Self-employed	(3) B3 Business income	(4) B4 Safe sex	(5) B5 Patience	(6) B6 Risk	(7) G1 Violence	(8) G2 Decision-making	(9) E1 In-control	(10) W1 Happiness	(11) W2 Infections
Economic	.053*	.091**	.807***	-.089	-.011	48.845	-.104	.016	.002	-.022	-.022
	(.027)	(.036)	(.3)	(.163)	(.032)	(89.549)	(.105)	(.021)	(.021)	(.069)	(.025)
Health	.052*	.037	.253	.315*	-.003	10.873	.096	-.019	.016	.114*	.008
	(.026)	(.032)	(.298)	(.175)	(.029)	(112.138)	(.089)	(.018)	(.023)	(.068)	(.025)
Econ. & Health	.021	.116***	.824**	-.225	-.016	30.062	.119	-.014	-.006	.239***	-.018
	(.029)	(.032)	(.321)	(.155)	(.031)	(75.472)	(.092)	(.017)	(.025)	(.072)	(.022)
Tests of equality of coefficients:											
Econ. - Health	0	.054*	.554**	-.405**	-.007	37.971	-.199**	.035*	-.014	-.136*	-.03
	(.022)	(.031)	(.254)	(.183)	(.027)	(131.266)	(.092)	(.019)	(.022)	(.075)	(.029)
Econ. - Econ. & Health	.032	-.025	-.017	.136	.005	18.782	-.223**	.03	.008	-.261***	-.004
	(.026)	(.033)	(.299)	(.165)	(.029)	(94.54)	(.097)	(.019)	(.025)	(.076)	(.026)
Health - Econ. & Health	.031	-.079***	-.571*	.541***	.012	-19.189	-.024	-.005	.022	-.125*	.026
	(.026)	(.027)	(.291)	(.173)	(.026)	(118.323)	(.079)	(.014)	(.026)	(.075)	(.027)
Health + Econ. - Econ. & Health	.084**	.012	.236	.451*	.002	29.655	-.128	.011	.024	-.147	.004
	(.038)	(.046)	(.431)	(.238)	(.042)	(143.545)	(.133)	(.026)	(.034)	(.101)	(.036)
Mean Control	.323	.294	2.359	0	0	2815.321	3.557	.099	.149	3.532	.154
Obs.	3247	3247	3247	2893	2893	2893	3247	3247	2893	3247	2734

Note: The Table provides OLS estimates of the treatment impacts ("Economic", "Health" and "Econ. & Health"), tests of equality of impacts between treatment arms ("Econ. - Health", "Econ. - Econ. & Health" and "Health - Econ. & Health"), and a test of complementarity between the economic empowerment program and the reproductive health empowerment program ("Health + Econ. - Econ. & Health"). The standard errors, in parentheses, are clustered at the level of randomization, the schools. Statistically significant differences between the estimates and zero are indicated by $* \ p < 0.1$, $** \ p < 0.05$, $*** \ p < 0.01$.

Table D8: Heterogeneous impacts in the short term (with covariates)

	(1) K1 Health knowledge	(2) K2 Business knowledge	(3) B1 Safe sex	(4) B2 Business plans	(5) G1 Violence	(6) G2 Earnings	(7) E1 Compete	(8) E2 Empowerment
Health								
Remote school	-.069**	.006	-.038	.089*	-.098	-.255*	.083	.092
	(.033)	(.024)	(.069)	(.05)	(.189)	(.143)	(.112)	(.093)
Wealthy hh.	.005	-.041*	.117**	-.004	.149	.054	-.042	.022
	(.022)	(.024)	(.045)	(.047)	(.139)	(.132)	(.068)	(.061)
High cognition	0	-.013	-.033	.02	.061	.049	.07*	.046
	(.017)	(.019)	(.052)	(.038)	(.133)	(.125)	(.042)	(.053)
Age > 17	0	.034	.022	.006	-.337***	.035	-.027	.01
	(.018)	(.021)	(.05)	(.042)	(.111)	(.11)	(.052)	(.055)
Economic								
Remote school	-.031	.004	-.101	-.003	-.177	.002	.068	.113
	(.028)	(.021)	(.102)	(.072)	(.139)	(.15)	(.089)	(.087)
Wealthy hh.	.029	-.028	.02	.052	.09	-.031	-.041	-.006
	(.023)	(.024)	(.053)	(.046)	(.144)	(.147)	(.061)	(.065)
High cognition	-.017	-.02	.008	.013	-.09	-.212**	.066	-.02
	(.018)	(.021)	(.045)	(.043)	(.147)	(.103)	(.049)	(.056)
Age > 17	.015	.02	.023	.017	-.382***	.169	-.029	.032
	(.024)	(.018)	(.051)	(.05)	(.121)	(.123)	(.06)	(.055)
Econ. & Health								
Remote school	-.069**	-.008	.011	.155*	-.261	-.032	.15*	.067
	(.03)	(.028)	(.076)	(.087)	(.17)	(.149)	(.087)	(.102)
Wealthy hh.	.028	-.009	.068	-.081	.238*	-.01	-.033	.006
	(.023)	(.024)	(.05)	(.06)	(.139)	(.126)	(.064)	(.062)
High cognition	-.014	.013	.023	.048	-.036	-.088	.039	.129**
	(.018)	(.022)	(.05)	(.054)	(.149)	(.097)	(.051)	(.061)
Age > 17	-.009	.002	-.018	-.023	-.267**	.085	-.038	.028
	(.025)	(.02)	(.05)	(.051)	(.131)	(.108)	(.056)	(.066)
Mean Control	.684	.38	.689	.151	1.422	3.817	.332	-2.477
Obs.	2896	2896	2893	2892	2888	2893	2911	2890

Note: The Table provides OLS estimates of the interaction between the treatment assignment and the baseline variable of interest. The standard errors, in parentheses, are clustered at the level of randomization, the schools. Statistically significant differences between the estimates and zero are indicated by $*\ p < 0.1$, $**\ p < 0.05$, $***\ p < 0.01$. *All the estimations include the covariates listed in Table 1.*

Table D9: Heterogeneous impacts in the medium term (with covariates)

	(1) B1 Fertility	(2) B2 Self-employed	(3) B3 Business income	(4) B4 Patience	(5) G1 Violence	(6) G2 Earnings	(7) E1 In-control	(8) E2 Useless	(9) W1 Happiness	(10) W2 Happiness health	(11) W3 Happiness econ.	(12) W4 Sickness	(13) W5 Income
Health													
Remote school	-.009	.066	.765*	-.019	-.038	-.079	.001	-.065	-.11	.035	.252	.07	.633*
	(.033)	(.052)	(.385)	(.062)	(.057)	(.174)	(.164)	(.196)	(.201)	(.126)	(.176)	(.062)	(.367)
Wealthy hh.	-.048	-.043	-.583*	.058	.039	.232	-.003	.098	.081	-.026	.16	-.037	-.495
	(.031)	(.04)	(.32)	(.053)	(.042)	(.142)	(.134)	(.143)	(.169)	(.089)	(.12)	(.056)	(.305)
High cognition	.008	-.002	.28	-.007	-.024	.056	-.338***	-.028	-.14	.093	.151	.013	.286
	(.026)	(.036)	(.304)	(.05)	(.046)	(.111)	(.12)	(.116)	(.118)	(.086)	(.124)	(.043)	(.273)
Age > 17	-.032	-.003	.151	.052	-.068	.111	-.069	-.12	.093	.009	.149	.066*	.082
	(.021)	(.045)	(.345)	(.059)	(.048)	(.142)	(.141)	(.132)	(.133)	(.084)	(.143)	(.039)	(.321)
Economic													
Remote school	.01	.066	.667	-.001	-.045	.201	-.036	-.027	.103	-.024	.218	-.024	.568
	(.028)	(.062)	(.482)	(.071)	(.064)	(.18)	(.124)	(.195)	(.118)	(.125)	(.186)	(.068)	(.446)
Wealthy hh.	-.048*	-.089*	-1.199***	.102*	.017	.032	.015	.128	.141	-.033	.042	.013	-1.07***
	(.024)	(.049)	(.392)	(.055)	(.052)	(.123)	(.142)	(.145)	(.13)	(.109)	(.099)	(.053)	(.364)
High cognition	.016	.012	.179	.08	-.031	-.2*	-.207	.094	.018	.021	.325**	-.025	.185
	(.024)	(.043)	(.345)	(.056)	(.044)	(.103)	(.125)	(.134)	(.114)	(.079)	(.141)	(.048)	(.308)
Age > 17	-.031	-.006	.269	.046	-.016	.152	-.186	-.124	.068	.105	.089	.002	.265
	(.023)	(.04)	(.379)	(.062)	(.041)	(.13)	(.144)	(.116)	(.149)	(.074)	(.137)	(.043)	(.343)
Econ. & Health													
Remote school	.028	.027	.385	.013	-.075	-.172	-.081	-.191	.15	.123	.185	-.075	.312
	(.034)	(.075)	(.67)	(.071)	(.057)	(.175)	(.169)	(.203)	(.116)	(.116)	(.19)	(.066)	(.624)
Wealthy hh.	-.032	-.062	-.535	-.005	.029	.032	-.029	.186	-.007	-.096	.154	-.028	-.558
	(.033)	(.062)	(.59)	(.05)	(.039)	(.136)	(.126)	(.182)	(.121)	(.094)	(.117)	(.053)	(.545)
High cognition	.012	.075*	.735*	.045	-.034	.057	-.253**	-.056	-.014	.188**	.397***	-.062	.728*
	(.027)	(.044)	(.418)	(.059)	(.038)	(.119)	(.118)	(.153)	(.129)	(.092)	(.139)	(.045)	(.373)
Age > 17	.004	-.022	.16	.05	-.009	.022	.009	.02	.049	.061	.211	.008	.141
	(.027)	(.042)	(.357)	(.06)	(.046)	(.121)	(.141)	(.166)	(.144)	(.084)	(.15)	(.045)	(.322)
Mean Control	.056	.187	1.162	.454	.243	3.463	3.433	2.581	3.799	4.512	2.536	.251	1.083
Obs.	2992	2993	2993	2992	2993	2993	2993	2993	2951	2993	2993	2992	2993

Note: The Table provides OLS estimates of the interaction between the treatment assignment and the baseline variable of interest. The standard errors, in parentheses, are clustered at the level of randomization, the schools. Statistically significant differences between the estimates and zero are indicated by $*\ p < 0.1$, $**\ p < 0.05$, $***\ p < 0.01$. *All the estimations include the covariates listed in Table 1.*

Table D10: Heterogeneous impacts in the long term (with covariates)

	(1) B1 Fertility	(2) B2 Self-employed	(3) B3 Business income	(4) B4 Safe sex	(5) B5 Patience	(6) B6 Risk	(7) G1 Violence	(8) G2 Decision-making	(9) E1 In-control	(10) W1 Happiness	(11) W2 Infections
Health											
Remote school	.045	-.004	.359	.302	.016	-209.42	.037	-.031	.002	.14	-.017
	(.051)	(.063)	(.588)	(.348)	(.059)	(231.669)	(.18)	(.034)	(.046)	(.135)	(.05)
Wealthy hh.	.03	.036	.759*	-.246	.038	2.057	-.032	.03	.002	.001	.05
	(.044)	(.045)	(.437)	(.281)	(.044)	(189.542)	(.124)	(.031)	(.037)	(.141)	(.042)
High cognition	.025	.021	.374	.395	-.087	-6.292	0	-.003	-.005	.168	.006
	(.058)	(.05)	(.462)	(.259)	(.06)	(170.416)	(.104)	(.031)	(.043)	(.118)	(.042)
Age > 17	-.037	.021	.277	-.048	.022	-3.769	-.071	-.053**	-.1**	-.149	.003
	(.042)	(.052)	(.499)	(.276)	(.051)	(175.873)	(.144)	(.025)	(.042)	(.132)	(.036)
Economic											
Remote school	0	-.005	.338	.047	-.015	-56.261	-.046	.043	-.012	-.04	.002
	(.052)	(.071)	(.587)	(.338)	(.063)	(186.621)	(.206)	(.042)	(.046)	(.142)	(.05)
Wealthy hh.	-.01	.018	.488	-.362	.138***	76.966	-.149	-.024	-.013	.122	-.038
	(.05)	(.052)	(.471)	(.243)	(.048)	(157.731)	(.14)	(.035)	(.035)	(.12)	(.041)
High cognition	-.046	.048	.77*	-.06	-.014	80.794	-.074	.024	.046	.199**	.015
	(.058)	(.047)	(.458)	(.237)	(.049)	(198.171)	(.113)	(.03)	(.037)	(.096)	(.043)
Age > 17	-.097***	-.056	-.173	-.411	-.018	-300.852*	-.081	-.052*	-.101***	-.342***	-.018
	(.035)	(.058)	(.552)	(.302)	(.043)	(163.652)	(.155)	(.029)	(.038)	(.129)	(.036)
Econ. & Health											
Remote school	-.045	.008	.01	-.222	.018	-143.323	.134	.025	-.037	.067	-.045
	(.058)	(.064)	(.636)	(.308)	(.062)	(150.845)	(.183)	(.034)	(.051)	(.143)	(.044)
Wealthy hh.	-.008	-.027	.173	.105	.035	-95.397	-.11	.013	-.037	-.068	.012
	(.047)	(.047)	(.477)	(.244)	(.049)	(150.97)	(.133)	(.033)	(.034)	(.128)	(.041)
High cognition	-.027	.017	.188	.102	-.097*	-58.218	-.107	.011	.001	.147	.006
	(.06)	(.051)	(.45)	(.228)	(.051)	(174.231)	(.125)	(.027)	(.042)	(.099)	(.043)
Age > 17	.026	.042	.688	-.29	-.046	102.11	.036	-.015	-.094**	-.159	.062*
	(.042)	(.05)	(.519)	(.267)	(.046)	(179.917)	(.15)	(.026)	(.04)	(.122)	(.035)
Mean Control	.323	.294	2.359	0	.643	2815.321	3.557	.099	.149	3.532	.154
Obs.	3247	3247	3247	2893	3245	2893	3247	3247	2893	3247	2734

Note: The Table provides OLS estimates of the interaction between the treatment assignment and the baseline variable of interest. The standard errors, in parentheses, are clustered at the level of randomization, the schools. Statistically significant differences between the estimates and zero are indicated by $* p < 0.1$, $** p < 0.05$, $*** p < 0.01$. *All the estimations include the covariates listed in Table 1.*

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