

Women’s Empowerment in Action: Evidence from a Randomized Control Trial in Africa*

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Abstract

Women in developing countries are disempowered: high youth unemployment, early marriage and childbearing interact to limit their investments into human capital and enforce dependence on men. We evaluate a multi-faceted policy intervention attempting to jump-start adolescent women’s empowerment in Uganda, a context in which 60% of the population are aged below twenty. The intervention aims to relax human capital constraints that adolescent girls face by simultaneously providing them vocational training and information on sex, reproduction and marriage. We find that four years post-intervention, adolescent girls in treated communities are 48% more likely to engage in income generating activities, an impact almost entirely driven by their greater engagement in self-employment. Teen pregnancy falls by 34%, and early entry into marriage/cohabitation falls by 62%. Strikingly, the share of girls reporting sex against their will drops by close to a third and aspired ages at which to marry and start childbearing move forward. The results highlight the potential of a multi-faceted program that provides skills transfers as a viable and cost-effective policy intervention to improve the economic and social empowerment of adolescent girls over a four year horizon. *JEL Classifications: I25, J13, J24.*

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1 Introduction

Women’s empowerment has three key dimensions: political, economic, and control over one’s body. In today’s developed countries, the historic process of economic empowerment, and to a lesser extent, control over the body, mostly preceded universal suffrage [Fernandez 2014]. This is almost entirely reversed in many developing countries today: universal suffrage for women was often achieved at independence, yet empowerment along economic and reproductive dimensions has progressed more slowly and might be reversing in some countries [Doepke *et al.* 2012].

In these countries, female labor force earnings are strikingly low and the majority of women marry and have children at far younger ages relative to their contemporaries in developed nations [World Bank 2007, Doepke *et al.* 2012]. The type of technological advances that drove demand for female labor in the developed nations have spread less far in the developing world [Goldin 2006], access to contraceptive methods, which enable control over reproduction and facilitate human capital investment, is more limited [Goldin and Katz 2002] and violence towards women is more prevalent and acceptable [Anderson and Ray 2010, 2012, Doepke *et al.* 2012]. Many women in these countries appear trapped in an equilibrium where the phenomena of low human capital investment, restricted access to labor markets and limited control over their bodies reinforce each other, leading to dependence on men.

The key question is then whether jump-starting women’s human capital accumulation can set them on a trajectory towards a better equilibrium, or whether such circumstances are maintained by binding social norms or low aspirations, that cannot easily be shifted or relaxed by public policy [Field *et al.* 2010]. This is the research question at the heart of our analysis. We evaluate a multi-faceted program that provides adolescent girls with an opportunity to simultaneously accumulate two types of human capital: vocational skills to enable them to start small-scale income generating activities, and life skills to help to make informed choices about sex, reproduction and marriage.

Targeting adolescents is important: as dependence on parents comes to a close during adolescence, there is a central tension between whether women are able to delay childbearing and undertake human capital investments critical to pursuing some form of career, or become dependent on men (either as a wife or via temporary relationships). A lack of future labor market opportunities can reduce the incentives for young girls to invest in their human capital [Jensen 2012], leading to early marriage and childbearing, and potentially increasing their dependency on older men [Dupas 2011]. In turn, teen pregnancy and early marriage are likely to have a decisive impact on the ability of young girls to accumulate human capital, and limit their future labor force participation [Field and Ambrus 2008, Bruce and Hallman 2008].¹ Economic empowerment and social empowerment, in its most basic form as having control over the body, thus interact in

¹Baird *et al.* [2011] document that marriage and schooling are mutually exclusive activities in Malawi, and Ozier [2011] provide similar evidence from Kenya. In Bangladesh, Field and Ambrus [2008] show that each additional year that marriage is delayed is associated with .3 additional years of schooling and 6.5% higher literacy rates.

a powerful way during adolescence. Hence interventions targeted towards adolescent girls might have higher returns than later timed interventions [Heckman and Mosso 2014].

Helping young women out of this low-empowerment equilibrium has become a priority for policy makers in developing countries because of burgeoning youth populations and concerns over youth unemployment.² This is true throughout Sub-Saharan Africa and especially in Uganda, the focus of this study. Uganda has the second lowest median age of all countries and the highest child dependency ratio as shown in Figure 1A [UNAIDS 2010]. For those in the labor force, Figure 1B shows women tend to have higher unemployment rates than men, and this is especially pronounced in the youngest age cohorts. Finally, as Figure 1C highlights, relative to their contemporaries in richer economies, the fertility rate of Ugandan women is three to four times higher and the gap is most pronounced among adolescents aged 15 to 19.³

Against this background, the multifaceted program we evaluate aims to break the vicious circle between low labor force participation and high fertility by kick-starting human capital accumulation along two dimensions through the simultaneous provision of: (i) ‘hard’ vocational skills to enable adolescent girls to start small-scale income generating activities; (ii) ‘soft’ life skills to build knowledge enabling girls to make informed choices about sex, reproduction and marriage. The intervention is delivered from designated ‘adolescent development clubs’ rather than in schools, and can thus reach school drop-outs as well as girls currently enrolled in school.

The program was developed in another country, Bangladesh, where female disempowerment is also a major issue. Since 1993 in Bangladesh, BRAC, one of the world’s largest NGOs, has established 9,000 clubs that have reached over one million adolescent girls. We worked with BRAC to evaluate the program in an African setting where women face similar challenges to those in Bangladesh. The program has proved to be transportable across countries, and also scalable and cost effective: to date BRAC has started 1200 clubs in Uganda, reaching 50,000 girls.⁴

We collaborated with BRAC to randomly assign clubs across communities. We surveyed and

²The number of young people in the developing world is increasing: one billion people on the planet are aged between 15 and 24 and reside in a developing country, an increase of 17% since 1995. Nowhere is this phenomenon more pronounced than in Sub-Saharan Africa, where 60% of the population is now aged below twenty [World Bank 2009]. Youths face severe economic challenges, as they account for most of the region’s poor and unemployed: in sub-Saharan Africa, 60% of the total unemployed are aged 15-24, and on average 72% of the youth population live on less than \$2 per day. The continued rise in the numbers of young people in the global population has led policy makers to consider responses to what has now become termed the ‘youth bulge’ [World Bank 2007]. The central policy challenge is to provide increasing numbers of young people the skills and job opportunities to enable them to lead fulfilled and economically self-reliant lives in adulthood. A parallel set of concerns are that ever rising numbers and proportions of youth will be a key factor driving alienation, social unrest and demands for political reforms, as has been observed throughout North Africa and the Middle East recently [Fuller 1995, Goldstone 2002].

³Demographic and Health Survey data indicates 38% of the 52 million women aged 20-24 in developing countries were married before age 18 [Mensch *et al.* 2005] and these girls are often subject to unprotected sex. Girls aged 15-24 are almost 8 times more likely than men to be HIV positive in Sub-Saharan Africa [Bruce and Hallman 2008, UNAIDS 2010, Dupas 2011]. Unprotected heterosexual intercourse together with the onward transmission of HIV to newborn and breast-fed babies is responsible for the vast majority of new HIV infections in the region.

⁴The program has also started in Tanzania, where 200 clubs have over 7,000 adolescents enrolled in them, 120 clubs have been set up in South Sudan. Ongoing pilots are taking place in Afghanistan and Liberia.

tracked a representative sample of almost 5,000 adolescent girls at baseline, midline (two-years post intervention) and endline (four years post-intervention). Club participation is voluntary and unrelated to other BRAC activities. The take-up rate is 21%, suggesting that a sizeable share of eligible girls have latent demand for the combined vocational and life skills on offer, and are not held back from participating by social norms or their own weak aspirations over women’s labor force participation, teen childbearing and marriage.

Our results show that four years post-intervention, the bundled provision of hard vocational and soft life skills through the program leads to substantial advances in economic empowerment and control over the body for adolescent girls in treated communities relative to girls in control communities. ITT estimates imply girls in treated communities are 4.8 percentage point (pp) more likely to engage in income generating activities relative to girls in control communities, corresponding to a 48% increase over baseline levels, that is driven predominantly by additional engagement in self-employment activities (by 51%).

Despite school-enrolled girls being eligible for the program, we find no reduction in school enrollment among eligibles (at either midline or endline). Hence, economic gains from the program do not come at the cost of girl’s lowering their investment in formal education.

The program significantly improves control over the body: there is a 34% reduction in rates of early (teen) pregnancy, and a 62% reduction in rates of marriage/cohabitation. Most dramatically, the share of adolescent girls reporting having had sex unwillingly in the past year is 5.3pp lower in treatment vs. control communities, starting from a baseline level of 17%. This is perhaps the clearest marker that the bundled provision of life skills and vocational training successfully improves the adolescent girls’ relationship quality.

Finally, we evaluate changes in girls’ expectations for ages at marriage, childbearing and fertility, as well as aspirations for their own daughters (and sons). The overall picture from these aspirations related outcomes are that although the program impacts most dimensions in the short term, these tend to die out by endline. There are however two notable dimensions of aspirations that do not die out, and relate closely to the earlier documented impacts: these relate to adolescent girl’s views on ideal ages at marriage for women, and the most suitable age to start childbearing. On both dimensions, these shifts in girls aspirations endure and we record impacts that are statistically significant at endline.

Our paper contributes to the literature evaluating the impact of human capital interventions targeted to youth. The evaluation helps fill two gaps in the literature: (i) to study the impact of a bundled provision of hard and soft skills, in the form of vocational and life skills training, in contrast to many earlier interventions that focus on one dimension in isolation; (ii) to study the impact of such a bundled skills intervention that targets adolescents in a critical stage of the life cycle as they transit from school to work [Heckman and Kautz 2014]. A number of meta-analyses and systematic reviews of the literature have pointed to the low or short-lived returns in low-income settings to standalone vocational skills training programs [Card *et al.* 2010, Blattman and

Ralston 2015, McKenzie 2017]. Similarly, standalone school-based sex education programs have met with, at best, rather mixed success [Gallant and Maticka-Tyndale 2004, Paul-Ebhohimhen *et al.* 2008, Cornish and Campbell 2009, McCoy *et al.* 2010, Groh *et al.* 2012, De Walque 2014]. As in our setting, some of the more promising life skills interventions have been those delivered outside of school environments [Dupas 2011].

Our findings complement a small body of research using large-scale randomized control trials to provide evidence on the *interlinkages* between economic and reproductive challenges that adolescent girls face in developing countries. The main body of evidence built up along these lines relates to the impacts of (un)conditional cash transfers on risky behaviors, where conditionality often relates to school attendance. For example, Baird *et al.* [2011] find a conditional cash transfer of \$10 per month conditional on school attendance for adolescent girls in Malawi led to significant declines in early marriage, teenage pregnancy and self-reported sexual activity after a year, while an unconditional cash transfer had generally weaker impacts. Baird *et al.* [2014] report beneficial impacts on the economic and social empowerment of adolescent girls in Malawi that have dropped out of formal schooling from a cash transfer conditioned on school attendance.⁵

This branch of work sheds light on the direct effect of resources, rather than skills, on economic and social empowerment. Perhaps closest to our evaluation in terms of another multi-faceted intervention targeting adolescents is the program evaluated by Duflo *et al.* [2015]: they investigate a school-based HIV prevention program in Kenya coupled with subsidies to attend school, and present evidence highlighting the joint determination of schooling and pregnancy outcomes for adolescent girls. They show the efficacy of providing adolescent girls information on how to reduce their exposure to pregnancy risks, is larger when reinforced by program components that *simultaneously* empower girls to lead economically independent lives.

Relative to the earlier literature, our results highlight the potential of a multi-faceted program that provides bundled hard and soft *skills* as a viable and cost-effective alternative to direct (un)conditional cash transfers, in promoting the economic and social empowerment of adolescent girls over a four year horizon.

The paper is organized as follows. Section 2 details the intervention and its implementation. Section 3 describes the research design, data and estimation strategy. Section 4 presents estimates of the program’s two- and four-year impacts on adolescent girls’ economic empowerment, control over the body, expectations and aspirations. Section 5 discusses the cost effectiveness of the intervention, and we conclude by highlighting the broader implications of our findings for policies and future research designed to address the economic and reproductive challenges facing the burgeoning number of young women in the developing world today.

⁵Baird *et al.* [2014] provide a systematic review of the effects of cash transfer programmes on schooling outcomes, using data covering 35 studies. They find that both conditional cash transfers (CCTs) and unconditional cash transfers (UCTs) improve the odds of being enrolled in and attending school compared to no cash transfer programme. The effect sizes for enrolment and attendance are always larger for CCTs compared to UCTs, but the difference is not statistically significant.

2 Background

The Empowerment and Livelihood for Adolescents (ELA) program is designed to improve the lives of adolescent girls through the simultaneous provision of two types of skills: vocational and life skills. The program is implemented by the NGO, BRAC Uganda. In contrast to school-based information campaigns on adolescent health, the ELA program operates outside of schools, through development clubs that are in a fixed meeting place in the community. Clubs are open five afternoons per week and timed so that girls enrolled in school can attend. Club activities are led by a female mentor. Mentors are selected from within the community, are slightly older than the target population of girls, and receive small lump-sum payments for their work. They are trained during a week-long initiation program, as well as monthly refresher courses.

Using locally hired mentors ensures the program is scalable (as evidenced by its spread across countries, and also its expansion within Uganda). Moreover, the fact that mentors are close in age to mentees and have often successfully confronted challenges related to economic and social empowerment, is thought to help facilitate the transfer of knowledge. Indeed, existing work emphasizes that school-based interventions designed to socially empower adolescent girls may have limited impact because youth are uncomfortable discussing such matters with teachers [Gallant and Maticka-Tyndale 2004, Ross *et al.* 2006].

Club participation is voluntary and unrelated to participation in other BRAC activities. Eligibility is based on gender and age: girls aged between 14 and 20 are permitted to participate. Given the difficulties of verifying ages in the field and the demand for vocational and life skills from other girls, in practice some girls outside of this age range also attend the clubs and receive skills training. In addition, the clubs also host popular recreational activities such as reading, staging dramas, singing, dancing and playing games. As such, outside of school hours, the clubs serve as a protected local space in which adolescent girls can meet, socialize, privately discuss issues of concern and to continue to develop their skills.

The vocational skills and life skills training are provided in the first two years of the intervention. After this adolescent girls are free to use the clubs as a safe, social space but do not receive further training. Vocational skills training comprises a series of courses on income generating activities. Although many of the skills are applicable for either wage or self-employment, more focus is placed on the adolescent girls establishing small-scale enterprises of their own. Courses relating to a broad range of income generating activities are provided including hair-dressing, tailoring, computing, agriculture, poultry rearing and small trades operation.

The vocational training modules are taught by entrepreneurs engaged in the respective activities or by hired professionals as well as BRAC's own agriculture and livestock program staff. These courses are supplemented by financial literacy courses covering budgeting, financial services and accounting skills. The process of matching girls to income generating activities is partly demand-driven, but account is also taken of the girl's educational level, the local business environment

and demand for such services (so that all girls in a community are *not* provided the same vocational skill). The overarching aim of the vocational skills component of the program is to aid the economic empowerment of adolescent girls.⁶

The key topics covered in the life skills training sessions include sexual and reproductive health, menstruation and menstrual disorders, pregnancy, sexually transmitted infections, HIV/AIDS awareness, family planning, rape; other sessions cover enabling topics such as management skills, negotiation, conflict resolution and leadership; a final class of life skills training focuses on providing girls with legal knowledge on women’s issues such as bride price, child marriage and violence against women. These life skills training sessions are conducted either by the trained mentors and/or BRAC’s own professional staff. The overarching aim of the life skills component of the program is to socially empower girls by enhancing the control that adolescent girls have over their own bodies, and to enable them to act on improved knowledge of reproductive health.

Two further points are of note. First, given the age range of targeted girls, some are enrolled in school, others have graduated, while others have dropped out. Although the clubs operate outside of school times, emphasis is placed on ensuring that girls enrolled in school do not reduce their educational investments in order to engage in club activities. We later provide evidence the program had no adverse impact on girls’ contemporaneous investments into formal educational.

3 Design, Data and Estimation

3.1 Research Design

We evaluate the ELA program using a randomized control trial. BRAC has established branch offices throughout Uganda, ten of which were chosen for the evaluation. Five branches are located in the urban or semi-urban regions of Kampala and Mukono; the others are located in the mostly rural region around Iganga and Jinja. In each branch, fifteen communities with the potential to host an ELA club were identified. From this list, ten communities in each branch office were randomly assigned to receive the treatment, i.e. to set up a club and deliver the ELA program, with the remaining five communities assigned as controls. In each treated community, a single club was opened. The research design thus delivers 100 treatment and 50 control communities, stratified by branch office.⁷

⁶The vocational skills provided overlap those studied in the literature on stand-alone business skills training [Field *et al.* 2010, Karlan and Valdivia 2011, Drexler *et al.* 2014]. However, it is useful to stress the key differences between this intervention and the kind of business training/entrepreneurship skills program reviewed by McKenzie and Woodruff [2013], that have been found to have relatively weak impacts even among those self-selected into micro-entrepreneurship: (i) it targets adolescent girls, the majority of whom do not engage in self-employment activities at baseline; (ii) it has an intense training period lasting far longer than a few weeks; (iii) the training covers general business skills as well as technical knowledge and sector specific content; (iv) it bundles vocational skills with life skills.

⁷For expositional ease we refer to *communities* as the unit of randomization. For the rural branches these correspond to villages. For the branches located in urban or semi-urban regions of Kampala and Mukono, the

We present two- and four-year impacts of the program. The vocational and life skills training are provided in the first two years of the intervention. The two-year effects capture the immediate post-training impact of the program and the four-year effects the longer term impact. When the evaluation was originally designed, the intention was that after two-years half of the 100 treated communities would be randomly assigned to additionally offer microfinance to participating older adolescents in order to capitalize on their newly acquired skills. During the first two years post-intervention, BRAC staff, mentors and adolescent club participants were unaware of the potential future offer of microfinance. In practice what occurred was that two-years post-intervention, a very limited offer of microfinance was actually made to age-eligible girls in treated communities: the terms of microfinance on offer did not differ from other pre-existing sources available to girls in the communities, and unsurprisingly, we find an almost zero take-up of microfinance. Hence when examining four-year impacts we continue to compare outcomes between the original set of treated communities (with and without microfinance) to control communities. We later provide evidence confirming the future offer of microfinance does not drive any of the two-year findings.

3.2 Data, Attrition and Descriptives

3.2.1 Surveys

An initial census of all adolescent girls in the 150 evaluation communities was conducted in early 2008. This revealed that around 130 eligible adolescent girls resided in the average community, and was used to draw a random sample of around 40 girls to survey in each. The baseline survey was administered to adolescent girls from March to June 2008. ELA clubs were established between June and September 2008, midline surveys were fielded from March to June 2010, and endline surveys were fielded May to July 2012. Each survey covers topics related to: (i) the vocational skills component, such as financial literacy, analytical ability, labor market and income generating activities; (ii) the life skills component, such as engagement in sex, childbearing and marriage/cohabitation, HIV related knowledge; (iii) other margins such as educational investments, time use, expenditures, and further measures of economic and social empowerment.

At baseline 5,966 adolescents were surveyed: 3,964 (2,002) from treatment (control) communities. Despite the high degree of geographic mobility of adolescent girls in Uganda, 4,888 (3,522) adolescents were tracked to midline (endline) follow-up, corresponding to a two-year (four-year) tracking-rate of 82% (59%), that is comparable to rates from studies in similar contexts [Duflo *et al.* 2015, Friedman *et al.* 2016].

randomized units often correspond to smaller urban areas or slums.

3.2.2 Attrition

Table A1 shows correlates of attrition. We first consider attrition at midline: Column 1 shows that residing in a treated community does not predict attrition over this time frame. Column 2 shows this to be robust within branch, and Column 3 shows that the result holds conditioning on individual characteristics, measured at baseline. Moreover, none of these characteristics: age, current enrollment in school, being married/cohabiting or having children, themselves predict attrition. Column 4 examines how individual characteristics differentially relate to attrition between treated and control communities. We find no evidence that adolescent girls in treated communities are differentially likely to attrit along these dimensions.

We next examine whether and how attrition varies between: (i) midline and endline (Columns 5-8); (ii) baseline and endline, the vast majority of who are also observed at midline (Columns 9-12). Reiterating the earlier results, we see that treatment does not predict attrition, nor do individual characteristics of girls at baseline, and nor is there much evidence of differential attrition by these characteristics in treated communities relative to control communities.

Undoubtedly the relatively high attrition rate at endline reduces the precision of the treatment effect estimates. The evidence in Table A1 does not shed light on whether attrition is likely to upwards or downwards bias our estimates. To address issues of selective attrition, we therefore present Lee bounds estimates of all the midline and endline impacts [Lee 2009], where the bounds assume the tracked sample is either entirely negatively or entirely positively selected.

3.2.3 Baseline Characteristics

Table 1 shows characteristics of adolescent girls at baseline, by treatment status. It does so for those girls tracked to endline and used to estimate endline ITT effects. The first panel shows adolescent girls in our sample are on average aged 16, and just under 70% are enrolled in school full-time. We next present an overall index of ‘gender empowerment’, scaled from 0 to 100. This is based on multiple questions asked to girls relating to gender roles in labor markets, education and household chores. A higher index value corresponds to girls believing that tasks should be gender neutral.⁸ In control communities, the index average is just 32 (out of 100), suggesting norms biased against women, as held by adolescent girls themselves, are highly prevalent. Our analysis examines whether the multi-faceted ELA intervention changes norms and behaviors from this baseline, through its relaxation of human capital constraints.

⁸The empowerment index is a variable that cumulates the number of times a respondent answers “Both/Same” to the following questions: “Who should earn money for the family?”, “Who should have a higher level of education in the family?”, “Who should be responsible for washing, cleaning and cooking?”, “If there is no water pump or tap, who should fetch water?”, “Who should be responsible for feeding and bathing children?”, “Who should help the children in their studies at home?” and “Who should be responsible for looking after the ill persons?” The other possible answers given to the respondent were “Male” and “Female”. The index is then re-scaled such that 100 indicates that the respondent answered that both sexes should be responsible for the mentioned activities.

The second panel focuses on economic empowerment, first presenting evidence on girls’ own assessment of their entrepreneurial ability: this is based on an index scaled to run from 0 to 100, constructed from 10 underlying questions.⁹ The average score is around 70, suggesting most girls are confident about having the necessary business-related skills pre-intervention. Despite this confidence, only 6% of girls report being self-employed in control communities (the type of income generating activity the program fosters by relaxing vocational skills constraints), and rates of wage employment are even lower (3.6%) at baseline. On anxieties related to the transition into the labor market, around 60% of girls worry they will not find a job in adulthood. These statistics illustrate that economic empowerment is extremely low among our sampled girls.¹⁰

The third panel shows that despite their young age, 11% of girls already have at least one child and around 12% of them are already married or in a cohabiting relationship. The data also illustrates how high the incidence of girls having sex against their will is in the communities we study. In control communities at baseline 17% report having had sex unwillingly in the past year. This signals a striking lack of control that adolescent girls have over their bodies, a fact associated with low economic empowerment, early childbearing and marriage in our sample.

On life skills at baseline, we see that one in four of them *incorrectly* answer a very basic question related to pregnancy knowledge, that asks whether “A woman cannot become pregnant at first intercourse or with occasional sexual relations”. Girls score around 3.8 on a 0-6 scale of HIV knowledge on average, yet there is considerable variation in this metric: at the tails of the knowledge distribution, 5.2% of girls correctly answer all the questions and 2.0% provide no correct answers. Only 45% of adolescent girls report always using a condom if they are sexually active and only 20% report using some other form of contraceptive. These self-reports help explain why teenage pregnancies are common in these communities.¹¹ The final row reveals that adolescent girls believe that women should get married at around 24 years of age: clearly observed behavior departs significantly from these expressed ideals, suggesting the presence of binding constraints.

Table A2 presents a complete set of balance checks for both this endline sample, and the baseline

⁹The entrepreneurial index consists of cumulative ranks (scaled from one to ten with ten being the highest) of the following activities: “Run your own business”, “Identify business opportunities to start up new business”, “Obtain credit to start up new business or expand existing business”, “Save in order to invest in future business opportunities”, “Make sure that your employees get the work done properly”, “Manage financial accounts”, “Bargain to obtain cheap prices when you are buying anything for business (inputs)”, “Bargain to obtain high prices when you are selling anything for business (outputs)”, “Protect your business assets from harm by others”, “Collecting the money someone owes you”.

¹⁰The rates of self-employment reported in our baseline match closely with those from the nationally representative Uganda National Household Survey 2005/2006. There we find that among those in the labor force, self-employment rates for 12-20 years olds are 7%.

¹¹The HIV knowledge index is based on the number of statements correctly identified as true or false. The statements are: (i) “A person who has HIV is different from a person who is ill with AIDS”; (ii) “During vaginal sex, it is easier for a woman to receive the HIV virus than for a man”; (iii) “Pulling out the penis before a man climaxes keeps a women from getting HIV during sex”; (iv) “A woman cannot get HIV if she has sex during her period”; (v) “Taking a test for HIV one week after having sex will tell a person if she or he has HIV”; (vi) “A Pregnant woman with HIV can give the virus to her unborn baby”.

sample of 5,966 interviewed girls irrespective of whether they attrit or not. Table A2 shows that on most dimensions in the estimation sample, treatment and control groups are balanced. In this sample, the null of equal means is rejected for only one out of the twenty-one outcomes considered. In all cases the normalized differences are small relative to the sample variation, and well below the rule of thumb value of .25 [Imbens and Wooldridge 2009]. Moreover, there are no large differences between the characteristics of girls in the estimation and baseline samples. This confirms what was earlier suggested by the attrition analysis, that there is not strong evidence of attrition being predicted by observables.

3.2.4 Club Participation

Table 2 documents participation in the ELA clubs at midline and endline. The first row shows that until midline, in treated communities the ELA club participation rate is 21%: recall this is the period over which the vocational skills and life skills training are all provided. There is no drop off in continued participation to endline, suggesting there is some value to girls being able to enjoy the safe space the clubs provide.

Appendix Table A3 shows characteristics of participants and non-participants in treatment communities (as measured at midline, once all training had been delivered and using the sample of girls tracked to endline). On nearly all dimensions, ELA participants do not significantly differ from non-participants. Hence, participants do not appear to be strongly negatively or positively selected on the various measures of economic empowerment and control over the body.¹²

The practicalities of program implementation lead to possible non-compliance with the research design: an adolescent girl resident in a control community wishing to attend a club in a treated community is always able to do so.¹³ As Table 2 shows, 4.7% of girls in control communities (77 girls) have *ever* participated in ELA club activities by midline. More than 75% of the girls that initially did attend from control communities had dropped out by six months prior to midline, and by endline, only 8% of girls in control communities report ever having attended an ELA club.

The remaining rows in Table 2 report statistics *conditional* on club participation in treated communities. We focus on treatment communities as the number of *regular* participants from control communities is negligible. We see that the majority of adolescents who have ever participated in ELA club activities continue to be engaged through to midline. Nearly half of all participants have attended club meetings one or twice a week over the first two years of the club’s operation. Hence, the intervention amounts to a considerable time investment for participants, and it is plausible that such an intense intervention permanently shifts the level of human capital accumulated, which, in turn, drives the economic and social empowerment of treated girls.

¹²There is a nominal fee due for club attendance but in practice this is often waived (and this is common knowledge). Hence binding credit constraints are unlikely to drive non-participation.

¹³In some urban areas, the distance to the nearest club can be similar in treatment and control communities. In rural locations, most clubs are located in the center of treatment locations.

By midline, 53% (85%) of club participants have taken part in the vocational skills (life skills) training. The majority (51%) report having received both forms of training; we therefore infer that 33% take-up *only* life skills training, and 1% take-up *only* vocational skills training. Revealed preference therefore suggests the two training components are complementary for the majority.¹⁴

3.3 Estimation

As club participation is voluntary, we focus on intent-to-treat (ITT) impacts throughout, estimated using the following OLS ANCOVA specification for the impact on outcome y_{ijt} for adolescent i in community j , separately for midline ($t = 1$) and endline ($t = 2$),

$$y_{ijt} = \alpha + \gamma_t \text{treat}_{ij} + \beta X_{ij0} + \delta y_{ij0} + \varepsilon_{ijt}. \quad (1)$$

treat_{ij} equals one if individual i is in a community assigned to be treated and zero otherwise. γ_1 and γ_2 are the coefficients of interest from the midline and endline specifications, measuring the ITT impact of the ELA program at midline and endline respectively. X_{ij0} controls for the adolescent’s age at baseline ($t = 0$), and we also include a series of dummies for our randomization strata (i.e. branch) [Bruhn and McKenzie 2009]. y_{ij0} is the outcome at baseline, and ε_{ijt} is a disturbance term clustered by community j .

To account for attrition, we bound the treatment estimates using the trimming procedure proposed by Lee [2009]. This can be performed for the midline and endline samples separately, hence the motivation for using the specification above for the midline and endline samples, rather than pooling the data waves into a single specification. In the Appendix we present a robustness check on our main results from running such a pooled specification. The Lee bounds at midline (endline) are calculated based on girls tracked to midline (midline and endline).¹⁵ As Lee [2009] discusses, using covariates to trim the samples yields tighter bounds. In our setting, sample sizes dictate that we cannot use any covariates to perform the trimming. Hence when showing the Lee bounds estimates, we also present comparable ITT estimates that do not condition on covariates: these ITT estimates are always guaranteed to lie within the estimated Lee bounds (unlike the ITT estimates from (1) that condition on other baseline covariates).¹⁶

¹⁴This variation in skills training is not driven by supply side constraints. In nearly all treated communities we observe: (i) some eligible girls taking-up a component and other girls not doing so; (ii) the vast majority of eligible girls report life and livelihood skills training as being available even if they don’t themselves take-up the course(s). In addition, we do not find school enrolment at baseline to be a significant determinant of enrolment in the vocational training component: this is as expected given clubs operate out of school hours.

¹⁵The procedure trims observations from above (below) in the group with lower attrition, to equalize the number of observations in treatment and control groups. It then re-estimates the program impact in the trimmed sample to deliver the lower (upper) bounds for the true treatment effect (as well as standard errors for each bound). The bounding procedure relies on the assumptions that treatment is assigned randomly and that treatment affects attrition in only one direction so there are no heterogeneous effects of the treatment on attrition/selection: this is in line with the evidence provided in Tables A1 and A2.

¹⁶To check whether the midline impacts pick up anticipation effects of the future offer of microfinance, we focus

4 Results

4.1 Economic Empowerment

Table 3 summarizes the ITT treatment impacts of the program on outcomes related to economic empowerment. We show midline and endline impacts. To benchmark the magnitude of each, Column 1 shows the level (and standard deviation) of the outcome at baseline in control communities. Column 2 then shows the number of adolescents in the sample used to estimate the midline and endline ITTs respectively. Columns 3 and 4 report the ITT estimates from (1) at midline and endline (so conditional on a full set of baseline covariates); Columns 5 and 6 report unconditional ITT estimates to maintain consistency with the Lee bounds treatment effect estimates (and their associated standard error) shown in Columns 5 and 6.

Row 1 shows the impact on girl’s self-reported entrepreneurial skills. The midline ITT estimate shows an increase of 8% over its baseline value, and at endline this is sustained at a 3% increase. Figures 2A and 2B presents spider graphs showing the midline and endline ITT impacts (and their associated 95% confidence interval) for each component of the entrepreneurial skills score. Strikingly, the program increases entrepreneurial skills on all ten dimensions at midline: girls in treatment communities perceive themselves as having better entrepreneurial skill than girls in control communities in terms of being able to run a business, identifying business opportunities, obtaining and managing capital, managing employees, bargaining over input and output prices, protecting assets and collecting debts. Hence relative to girls in control communities at midline, this is a major shift upward in the treated girls’ self-perceived ability to run small businesses.

We next analyze whether this translates into actual labor market activities of adolescent girls. We find that eligible girls are 6.8pp (4.9pp) more likely to be engaged in any income generating activity at midline (endline), a 66% (49%) increase over the baseline mean. Improvements in human capital related to entrepreneurial ability do therefore get reflected in economically significant improvements in labor force participation. Labor force participation is a major driver of women’s empowerment across the world.

Rows 3 and 4 show this increase is entirely driven by adolescent girls engaging in *self-employment* activities. At midline, rates of self-employment are double those in control communities, and at endline these rates remain 50% higher. Even taking into account selective attrition, the Lee bounds estimates remain well away from zero: the lower bound endline estimate still corresponds to a 48% increase in self-employment over baseline levels.

Given the multiple outcomes considered, we summarize the impacts of the program on economic empowerment by constructing an overall index of outcomes, where the subcomponents are those in Rows 1 to 4: we convert each subcomponent into a z-score, average across subcomponents and

on the sample of 100 treated communities and then estimate whether the future random assignment to microfinance predicts outcomes in the first two years of the program. Reassuringly, for nearly all outcomes, we find no significant ITT anticipation impacts of future assignment to microfinance.

then re-construct a z-score of the average. The final row in Table 3 shows the ITT effect estimates on this economic empowerment index: at midline the ITT impact shows an effect size of .238 (from a baseline level of 0 by construction), that is significant at the 1% level; by endline this falls to .139, but the impact remains significant at the 1% level. Columns 5 and 6 show both impacts to be robust to selective attrition: all four of the Lee bounds estimates remain significantly different from zero. The Lee bounds estimates at endline suggest: (i) if attrited girls are negatively selected, then the upper bound ITT estimate on the index of economic empowerment is .185; (ii) if attrited girls are positively selected, then the lower bound ITT estimate on the index of economic empowerment is .096; (iii) both bounds are significantly different from zero at conventional levels.¹⁷

Overall, these results suggests that an intense, bundled-skills intervention such as ELA has quantitatively significant impacts on adolescent girls' economic empowerment. The documented impacts are encouraging relative to the impact evaluations of other programs delivering standalone entrepreneurship training – see for example Field *et al.* [2010], Karlan and Valdivia [2010], Bruhn *et al.* [2012], Drexler *et al.* [2014], and Fairlie *et al.* [2015], or the review of such evidence in McKenzie and Woodruff [2013].¹⁸ This is despite the fact that other programs are often specifically *targeted* towards those who have self-selected to be small-scale entrepreneurs. Our evidence suggests that bundling the provision of hard and soft skills that simultaneously tackle economic and social constraints adolescent girls face, can lead to significant improvements in business skills and engagement in self-employment even among girls who *ex ante*, might not consider themselves

¹⁷In Table A4 we examine related impacts for total earnings, albeit with the caveat that earnings are difficult to measure precisely in low-income settings especially when generated through self-employment. The results in the top panel of Table A4 suggest that by endline, annual earnings of girls increase threefold. the point estimate is UGX85K, corresponding to US\$50 in 2008 prices, which is economically significant. We have also explored treatment effects on earnings from self and wage-employment separately (results not shown). As expected, earnings from self-employment significantly increase, while there is no impact on earnings from wage-employment. Estimating midline (endline) ITT impacts on annual earnings from self-employment from a Tobit specification we find that: (i) on the extensive margin, adolescent girls are 4.5pp (3.6pp) more likely to have some earnings from self-employment, corresponding to a 102% (79%) increase over baseline levels; (ii) on the intensive margin, self-employment earnings increase by nearly five times their baseline level at midline (and by more than six times their baseline value at endline). On the intensive margin we find the proportionate impact on earnings from self-employment to be larger than on hours worked in self-employment, indicating the marginal product of labor for adolescent girls in self-employment rises as a consequence of the combined hard and soft skills provided by the program.

¹⁸Field *et al.* [2010] evaluate the provision of basic financial literacy training to female entrepreneurs in India. Only a socially unrestricted sub-group benefited in terms of business income and borrowings. Drexler *et al.* [2014] find that teaching accounting principles to micro-borrowers in the Dominican Republic has no impact on the way they run their business or business outcomes. However, simple rule-of-thumb style training does affect financial record keeping. Karlan and Valdivia [2010] investigate the impact of an intense training intervention of up to two years, that delivered training on business practices to clients of a Peruvian Microfinance institution. Despite improving business knowledge, the intervention failed to impact business outcomes. Fairlie *et al.* [2015] find that providing entrepreneurs training has no long-run measurable impact on business operations. Two studies have however found more substantial evidence of the effectiveness of such interventions: Bruhn *et al.* [2012] suggests granting small and medium enterprises in Mexico access to consulting services, that are much more costly than the forms of business intervention described above, does have large positive impacts on firm profits, but not on employment. Calderon *et al.* [2013] report large impacts on profits from self-employment among female entrepreneurs in rural Mexico from a business skills intervention. A key channel for the impact is changes in product mix offered by entrepreneurs.

as being on the margin of being an entrepreneur.

The second natural point of comparison is with the literature evaluating standalone vocational training interventions. Such hard skills interventions are often found to have limited impacts in developed [Blundell *et al.* 2004, Card *et al.* 2010] and developing countries [Card *et al.* 2011, Groh *et al.* 2012]. Among studies finding impacts, Attanasio *et al.* [2012] show that for women, the likelihood of being employed increases by 6.1pp. This impact is slightly larger than those we find for the ELA intervention, although as we discuss later, the ELA program is significantly cheaper, and designed to be scalable in the context of Sub-Saharan Africa.

Finally, we address concerns of adverse effects on contemporaneous schooling investments because the program targets girls of school going age. Table A4 examines education related impacts. Row 2 confirms the program does not significantly increase drop out rates, either at midline or endline. Hence the increased rates of self-employment documented above do not come at the expense of school enrolment. Indeed, as the final two rows show (taking as given the program has no direct impact on school enrolment): (i) among those in school, the ITT estimate implies the ELA program marginally *increases* their hours of study at midline; (ii) among those that have dropped out of school at baseline, the program motivates a significantly higher proportion of dropped out girls to consider going back to school. In short, the evidence suggests the program *increases* the value attached to formal education in treated communities.

4.2 Control Over the Body

Table 4 shows the program impacts on control over the body for adolescent girls, as measured through outcomes such as childbearing, marriage and sex. Rows 1 and 2 cover the critical issues of whether the program affects early childbearing and marriage, two of the most significant roadblocks to adolescent girls acquiring human capital and fully participating in labor markets. The program has a strong negative impact on early childbearing: the ITT impact at midline in Column 3 shows the probability of having a child is 2.7pp lower in treated communities than control communities: given that at baseline 11.3% of girls have at least one child, this is a 24% drop in fertility rates over a two year period. If we consider that fertility rates rise between baseline and endline from 10.5% to 12.3% in control communities as girls get older, the ITT estimate implies this natural rate of increase is eliminated in treatment communities where adolescent girls largely forego reproduction once the program is offered. These trends continue to endline, at which point girls in treated communities are 3.8pp less likely to have a child than girls in control communities.

Delaying the onset of marriage is an important mechanism through which adolescent girls can improve their long term earnings potential [Field and Ambrus 2008, Baird *et al.* 2011]. Along this margin the program also has noteworthy impacts: the midline ITT estimate shows girls in treated communities to be 6.9pp less likely to be married/cohabiting at follow up, corresponding to 53% of the baseline mean. Again in control communities marriage rates for adolescent girls rise naturally

from 12% to 18% from baseline to follow-up, and the evidence suggests this is almost entirely prevented from happening by the program in treatment communities. Again this divergence in trends continues to endline, at which point they are 8pp less likely to be married or cohabiting.

In Row 3 we see the rate of adolescents who report having had sex unwillingly during the past year is 6.1pp lower in treated communities at midline and 5.3pp lower at endline. Starting from a baseline of 17% in control communities, this corresponds to a near 30% reduction in the incidence of such events by endline. This impact is likely a direct result of three program features: (i) girls being able to act on specific soft skills accumulated through the life skills sessions on negotiation, rape and legal rights, as well as improved knowledge of reproductive health; (ii) the additional vocational skills provided raise girls' engagement in and earnings from self-employment, and such economic empowerment likely reinforces girls' control over their bodies [Baird *et al.* 2011, 2014]; (iii) the fact that the clubs provide a safe location for girls, especially in the after-school period in the afternoon when their parents might not be back from work.

The program also significantly improves girl's health related knowledge, both in terms of a basic question related to pregnancy (Row 4) and as measured by a HIV-related knowledge index (Row 5).

In terms of sexual behaviors, in Row 6 we see that condom use increases by midline among sexually active girls: the percentage of girls who *always* use a condom when having intercourse is 13pp higher, although again this impact dies out by endline. On the other hand, both Lee bounds estimates at endline (that do not control for any covariates) remain significantly different from zero.¹⁹ Row 7 shows that among the sexually active there is little evidence that other forms of contraceptive use increase. This is reassuring because although girls are encouraged to use various forms of contraception, there is limited availability of such alternatives in these communities. Hence the results do not seem to reflect girls merely repeating what they have been taught in life skills courses, or experimenter demand effects.²⁰

Aggregating all these margins of control over the body into a single index, we see the ITT effect size is to increase the index by .535 at midline, and by .269 at endline, which are both larger point estimates relative to the earlier documented impact on economic empowerment index in Table 3. Moreover, all the Lee bounds estimates on the index are significantly different from zero at midline and endline.

¹⁹As argued in Dupas [2011], childbearing is not a perfect proxy for the incidence of risky sex because: (i) adolescent girls in long-term relationships are more likely to get pregnant than girls in several short-term relationships; (ii) teenage girls might be more likely to abort if the father is a teenage boy who cannot provide economic support; (iii) adolescent girls might be more likely to engage in anal sex with partners to avoid pregnancy, and this is especially risky for HIV transmission. The concern that such changes in behavior might be driving fertility drops is partly ameliorated by the increased self-reported condom usage.

²⁰A recent trend in the literature examining interventions to reduce risky behaviors has been towards the collection of bio-markers rather than relying on self-reports that are often argued to be more unreliable. Corno and de Paula [2014] test this claim by developing and calibrating a model of STIs: they identify conditions under which self-reports can be more reliable than bio-markers, where these conditions depend on the prevalence of STIs and properties of the epidemiological model of infection.

Comparing our findings to the literature, we note first that meta-analyses generally report weak impacts of standalone HIV-education programs, irrespective of whether they are delivered via classroom-based courses [Gallant and Maticka-Tyndale 2004, McCoy *et al.* 2010, Duflo *et al.* 2015] or peer-provided courses [Cornish and Campbell 2009]. There are two recent studies that find impacts of *standalone* education programs that are worth comparing to. First, Arcand and Wouabe [2010] use a regression discontinuity design to estimate the impacts of a school-based HIV prevention course in Cameroon. Their estimated impacts on childbearing and condom usage are slightly above the ITT estimates we find. Second, Dupas [2011] uses an RCT design to evaluate the effectiveness of the Kenyan national HIV curriculum relative to an intervention providing information on the *relative risk* of HIV infection by the partner’s age. She finds that exposure to this curriculum causes a 28% reduction in teenage pregnancies over a one-year period, and the key mechanism relates to how risks are presented to adolescents.

4.3 Aspirations

We complete our analysis by considering ITT effects on girl’s perception of gender roles, and their aspirations related to marriage and childbearing: these serve as markers for the program potentially impacting deep rooted social norms about girls’ role in society and lifetime opportunities, which might be far harder to shift than the accumulation of human capital as focused on so far. The results are in Table 5: the first outcome is an aggregate gender empowerment index which reflects how girls perceive their role in various tasks related to the labor market and in the household. The other outcomes are girls’ aspirations over ages at marriage for themselves and their children, desired fertility and aspirations over age at first childbirth.

The overall picture from these aspirations related outcomes are that although the program has impacts on most dimensions in the short term, these tend to nearly always die out by endline. This is best illustrated in the final row where all outcomes are incorporated into an aspirations index z-score: at midline this index significantly increases by .259, but by endline, there is no statistical difference between adolescent girls in treatment and control communities. While these results help reassure against the concern that the earlier results are driven merely by reporting bias or experimenter demand effects, they also serve to highlight the great challenge in being able to permanently shift aspirations, even when girls’ economic and social empowerment have improved in treated communities.

There are however two notable dimensions of aspirational changes that do persist, and these both relate closely to the earlier documented impacts in terms of control over the body. The first is shown in Row 2: girl’s views on ideal ages at marriage for women in *society* as a whole. Adolescent girls in treated communities report significantly higher ages of .77 and .23 years at midline and endline. As not all ages of marriage are logically feasible, an appropriate way to benchmark these impacts is relative to the standard deviation of baseline responses (rather than their mean value).

The ITT impacts then correspond to a shift in expectations on age at marriage for women of around 25% (8%) of a standard deviation at midline (endline). If unmarried at follow-up, we also asked girls about their expected age at the time of their *own marriage*: the difference between girls in treatment and control communities is almost one year (not shown).²¹

The second longer lasting dimension along which aspirations are shifted relate to childbearing: Row 5 shows there are significant increases in what girls report being the most suitable age for women to have their first child at both midline and endline: the ITT estimates are .619 and .272 respectively, corresponding to 20% and 9% of the baseline standard deviation, respectively.

Both longer lasting changes in aspirations related to age at marriage and at first child were earlier picked up in actual behaviors, where we documented significant reductions in fertility and marriage among treated girls relative to controls. In order to more permanently shift some of the other dimensions, one avenue for future interventions to consider is to also target fathers and other men in the communities.

4.4 Robustness and Heterogeneous Impacts

In Table A5 we present midline and endline ITT estimates based on the following specification that pools both post-intervention survey waves:

$$y_{ijt} = \alpha + \sum_t \gamma_t (treat_{ij} \times W_t) + \beta X_{ij0} + \delta y_{ij0} + W_1 + \varepsilon_{ijt}, \quad (2)$$

where W_t ($t = 1, 2$) is a survey wave dummy, and the coefficients of interest are (γ_1, γ_2) . Focusing on the overall indices of economic empowerment, social empowerment and aspirations, Table A5 shows the quantitative and qualitative pattern of results remains the same as discussed earlier.

We have also probed whether subsamples of adolescent girls drive the core impacts documented earlier. Table A6 presents results on impact heterogeneity along the following dimensions: (i) rural versus urban households; (ii) rich versus poor households, as defined by whether the household’s asset values at baseline are above or below the median for all households; (iii) girls aged above 16 at baseline versus older girls at baseline. We see that for indices related to economic and social empowerment, the impacts are largely *homogeneous* across rural and urban areas, rich and poor households, and young and old girls.²² This implies, for example, that relaxing human capital skills constraints can lead to behavioral change with regards to sex, childbearing and marriage among adolescent girls of all ages from 12 to 20. This might not have been the case for older girls if such

²¹Adolescent girls were also asked who they thought would be involved in deciding their marriage partners (not shown). We find that among treated girls there is a significant reduction in the likelihood they report the choice will be made by them alone, and a corresponding increase of similar magnitude in the likelihood they report decisions over marriage partners will be made in conjunction with their parents. This might be taken as tentative evidence that higher quality marriage partners being sought, as well as changes in the timing of marriage.

²²The results for younger girls are especially encouraging given the conventional wisdom that girls aged 10-14, particularly those out of school, face the greatest economic challenges and health challenges arising from unsafe sexual behavior in this context [UNICEF 2003].

behavior were habitual for example, or if younger girls particularly lacked bargaining power or negotiation skills in their relationships with men. Similarly being rural or urban, richer or poorer, younger or older does not seem to constrain adolescent girls from benefitting economically from the program. For the aspirations index, along most dimensions except the urban-rural divide, the program shifts impacts at midline but these die out by endline.

The lower part of Table A6 examines heterogeneous impacts on education related outcomes. We see these ITT impacts are also similar across the three dimensions considered at midline and endline. In particular, the finding that the program does not encourage girls to drop out from schooling applies equally to rural and urban areas, rich and poor households, and young and old girls. This is again encouraging: if, for example, girls were especially myopic, the incentives to drop out of school in the presence of the program might be higher in rural areas where the returns to education are limited due to a lack of labor market opportunities.

5 Cost Effectiveness

The ELA program has proved to be transportable across countries (with modification), having started in Bangladesh, been tailored to other contexts in South Asia and East Africa, and is now being piloted in Liberia and Sierra Leone. In Uganda, the scalability and potential cost effectiveness of the program has also been demonstrated through its expansion to over 1200 clubs.²³

Given the gains to adolescent girls accrue through channels of economic and social empowerment, many of the gains are unpriced and other will be realized over the life cycle, as vocational and life skills are accumulated, entry into self-employment is accelerated, and marriage and child bearing are delayed. It is precisely events such as getting married or having children during adolescence which interrupt human capital accumulation and thus permanently and significantly adversely affect the lifetime earnings potential of women across the developing world. There is also a literature which suggests that having sex against one's will seriously lowers lifetime incomes [MacMillan 2011]. Monetizing all these gains in a sensible way is beyond the scope of this paper, but they are likely to be substantial. Given this, we do not attempt to calculate the internal rate of return of the program. Rather, we conduct the more modest task of describing the program cost structure and using the endline results to gauge how large the benefits would have to be for

²³Adoho *et al.* [2014] evaluated the ELA program in Liberia: their independent replication of the short run (6-month) impacts find that adolescent girls in treated communities increased employment by 47% and earnings by 80% relative to girls in control communities. Their impact evaluation documents positive effects on a variety of empowerment measures, including access to money, self-confidence, and anxiety about circumstances and the future. The evaluation found no net impact on fertility or sexual behavior, suggesting those channels might take longer to work through. Another replication pilot study was also attempted in Tanzania [Buehren *et al.* 2017] but this failed due to implementation issues. For example, in Tanzania it turned out to be far harder to secure a safe space in communities. In many cases, an arrangement with local schools or church had to be found to share space, and this limited BRAC's ability to decide on the timing of club activities. In addition, the donated club houses were often insecure. The provision of materials for the life skills training and quality of vocational training were other implementation challenges. The impact evaluation in Sierra Leone is ongoing.

the program to be cost effective at endline.

Table 6 categorizes the program's fixed and variable costs, where variable costs depend on the number of participating girls. Depending on whether the costs are incurred once only or recur each month, we list the amounts in Column 1 or 2 respectively. Columns 3 and 4 then split each cost into its first year, and subsequent year components respectively. All costs are in 2008 US\$.

Rows 1 to 3 show the costs associated with the initial program investment of setting up a program office, training of program staff and program manual development. The second set of fixed costs in Rows 4 to 14 comprise all cost items that are necessary to provide the infrastructure for the ELA clubs to function (irrespective of the number of actual club participants). Finally, Rows 15 to 19 detail the variable costs of the program. Summing across all costs in the 100 treated communities, Row 20 shows that in year one, the program costs \$365,690. This falls to \$232,240 in year two onwards as some set-up costs are not recurring. This somewhat overestimates the total program costs because some of these resources would have been put to another overlapping use in the absence of the program. However, as it is impossible to accurately measure what fraction of these costs would still have been reallocated to other uses, we include them all as program costs and so bias the results against yielding a positive net gain.

Our pre-baseline census listing of all households revealed that around 130 eligible adolescent girls resided in the average community. Given the benefits we document relate to ITT estimates of residing in a community that is offered the ELA program (and we have no reliable way to estimate spillover effects), we use this number of eligible girls to calculate the per girl cost of the program. Hence in the fourth panel of Table 6, Rows 21 and 22 show the average fixed and variable costs per eligible girl. The overall cost per eligible is shown in Row 23. Given our ITT estimates are measured four-years after the baseline, we focus on the fourth year per-girl cost of \$17.9.

To put the cost estimate in context, we note that \$17.9 corresponds to less than 1% of household annual incomes at baseline. If the per girl benefits to an adolescent girl residing in a community that is offered the ELA program are larger than this, it would suggest the program is sustainable from the social planner's perspective.²⁴

As mentioned above, monetizing the benefits of the program is not straightforward because the main gains will be over the life cycle or unpriced and so hard to value. The impacts of the program can be crudely monetized using the ITT estimate on annual earnings at endline. The final row of Table 6 shows this endline increase of \$50 (taken from Table A4, and is significantly different from zero). This more than offsets the per girl program cost.

Even if the benefits of the program outweigh its costs, the question of whether the same resources could be spent more effectively remains open. As discussed earlier, the bundled ELA intervention appears to improve outcomes at least as well as single-pronged interventions that have focused on classroom-based education courses designed to reduce risky behaviors, or exclusively

²⁴We do not factor in the opportunity cost of time of attending the ELA clubs. We do however know that attendance does not come at the cost of reduced participation in formal schooling, as shown in Tables A4 and A5.

on vocational training designed to improve labor market outcomes among youth. However, one class of vocational training programs that has met with some success are the *Jovenes* programs implemented throughout Latin America. For example, Attanasio *et al.* [2012] find that for the *Jovenes* program in Colombia, among women, the likelihood to be employed increases by 6.1pp, which is a larger impact than we find for the bundled ELA intervention. However the costs per trainee of the *Jovenes* programs vary from \$600 to \$2000 per participant served [World Bank 2009]. These costs are still an order of magnitude larger than the \$17.9 per eligible girl of the ELA program, or given a 21% take-up rate, a cost of \$85 per participating adolescent girl.

Another approach to understand whether the ELA program is socially beneficial is to consider the impacts of providing unconditional cash transfers in a similar setting. This is precisely what is considered in Blattman *et al.* [2014], who present evidence from the Youth Opportunities program (YOP) using a randomized control trial in which youth were given unconditional and unsupervised cash transfers.²⁵ They find that almost 80% of youth chose to spend these transfers on acquiring vocational skills and tools, and that the resultant increase in earnings imply an annual return on capital of 35% on average. There are of course many differences between the treated individuals in the ELA and YOP programs: the YOP targets both genders and those aged 16 to 35; individuals form groups to apply for the unconditional transfers; the per person transfer \$374. Although the ELA program can be thought of as a constrained version of such unconditional cash transfers, even if the rates of return through labor market outcomes alone are half as much, this still compares favorably with regards to other formal sector financial investment opportunities available in Uganda in mid-2008 when the ELA program was initiated.²⁶

In summary, our results highlight the potential of a multi-faceted program that provides bundled hard and soft *skills*, as a viable and cost-effective alternative to direct (un)conditional cash transfers, in promoting the economic and social empowerment of adolescent girls over a four year horizon.

6 Conclusions

Developing countries face enormous challenges stemming from rapid population growth and a rising proportion of young people entering the labor market. For women in developing countries,

²⁵Similarly, Baird *et al.* [2012] report that the provision of unconditional cash transfers via lotteries, to girls aged 13-22 and enrolled in school at baseline in Malawi, significantly reduced the prevalence of HIV and herpes simplex virus 2 [HSV-2] after 18 months. These effects were also supported by self-reported sexual behaviors. To gauge the cost per treated girl, we note that monthly cash transfers valued at between \$4 and \$10 were provided to girls along with monthly transfers of between \$1 and \$5 to their guardians.

²⁶For example, the International Financial Statistics of the IMF state that the deposit rate in the formal sector in Uganda (i.e. the rate paid by commercial banks for savings deposits) was 10.7% in 2008, 9.75% in 2009 and 7.69% in 2010. An alternative investment would have been to buy a two-year Uganda Treasury bond auctioned at the end of May 2008. It sold at a discount and yielded 14.45% according to the Bank of Uganda (http://www.bou.or.ug/bou/collateral/tbond_forms/2008/May/tbond_28May2008.html).

these challenges are coupled with a lack of empowerment: they lag behind their contemporaries in richer nations on many relevant dimensions of female empowerment but most strikingly so as regards economic empowerment and control over the body. Yet effectively facing each challenge requires us to think *jointly* about economic and reproductive issues [Dufflo 2012]. A lack of future labor market opportunities can reduce the incentives for young girls to invest in their human capital leading to early marriage and childbearing, and potentially increasing their dependency on older men. At the same time, teen pregnancy and early marriage are likely to have a decisive impact on the ability of young girls to accumulate human capital and limit their future labor force participation.

In this paper we evaluate an attempt to jump-start female economic and social empowerment in the world's second youngest country: Uganda. We examine the impacts of a multifaceted program that provides adolescent girls an opportunity to simultaneously relax constraints related to two types of human capital: hard vocational skills to enable them to start small-scale income generating activities, and soft life skills to enable them to make informed choices about sex, reproduction and marriage. The ideas which underpin the program were developed in Bangladesh where the program has achieved significant scale. Our evidence suggests these ideas can be effectively transported (with modification) from South Asia to a setting in Sub-Saharan Africa. Engaging in economic activities and delaying childbearing and marriage is likely to have a major impact on the life trajectories of adolescent girls. For example, such delays have been shown, in other contexts, to improve marriage quality, increase decision-making within households and reduce exposure to domestic violence [Goldin and Katz 2002, Jensen and Thornton 2003, Field and Ambrus 2008]. Alongside economic empowerment they are fundamental to improving women's lives.

Africa has been a laggard relative to other developing regions in terms of how quickly it is converging to the low fertility, late marriage and high career participation norms that characterize women's lives in developed nations. There is thus a case to be made for cost-effective programs like this to help women in Africa accelerate convergence towards these norms. What our results suggest is that such progress is possible. The impacts found over a four-year period suggest that the poor life circumstances that adolescent girls find themselves in at baseline will not necessarily be maintained by binding social norms.

The external validity of our results are currently being researched as ELA-style programs have been piloted in a range of Sub-Saharan countries. The program offers some promise to policy makers, this being a low cost and scalable intervention that enables adolescent girls to improve their life outcomes. As this research agenda expands, an obvious direction for future work is to unbundle the intervention and separate out the relative importance of vocational skills, life skills and the provision of a safe space.

A second important direction for future work to take is to study in more detail the impacts such programs have on interactions between men and adolescent girls. Indeed, in related work combining this intervention with a lab experiment, we find the ELA program led to significant

increases in adolescent girl’s competitiveness [Buehren *et al.* 2016]. Doing so would help crystallize whether the gains occur because adolescent girls are able to match with better quality men when their human capital improves [Dupas 2011], whether it improves their bargaining power within existing relationships, say because of a direct impact of earned income of women and their autonomy in relationships [Anderson and Eswaran 2009], or whether men change attitudes towards women as the program raises returns to women’s human capital rises.²⁷ This last channel is an important mechanism that drove the provision of women’s rights across countries over time [Doepke and Tertilt 2009], and can feed back into a virtuous circle that further widens women’s economic opportunities and drives forward economic development [Goldin and Katz 2002, Bailey 2006, Tertilt 2006, Dufflo 2012].

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Table 1: Characteristics of Adolescent Girls, By Treatment Status**Sample: Adolescent Girls Tracked to Endline (N = 3474)****Means, standard errors in parentheses, standard deviations in brackets**

	(1) Treatment	(2) Control	(3) Difference	(4) Normalized Difference
Age	16.3 [2.68]	16.3 [2.76]	-.014 (.162)	-.004
Currently enrolled in school [yes=1]	.689 [.463]	.685 [.465]	.004 (.031)	.006
Gender empowerment [0-100 score]	28.6 [24.2]	31.7 [24.5]	-3.13 (2.04)	-.091
Entrepreneurial ability [0-100 score]	69.6 [24.3]	71.8 [24.7]	-2.17 (1.97)	-.063
Self-employment [yes=1]	.070 [.255]	.059 [.235]	.011 (.010)	.032
Wage employment [yes=1]	.057 [.231]	.036 [.186]	.021** (.010)	.070
Never worry to get a good job in adulthood [yes=1]	.397 [.489]	.389 [.488]	.007 (.031)	.010
Has child(ren) [yes=1]	.114 [.318]	.113 [.317]	.0006 (.022)	.001
Married or cohabiting [yes=1]	.101 [.302]	.129 [.335]	-.027 (.019)	-.061
Had sex unwillingly in the past year [yes=1]	.198 [.399]	.174 [.380]	.023 (.029)	.042
Pregnancy knowledge [0-1 score]	.729 [.445]	.737 [.441]	-.008 (.030)	-.013
HIV knowledge [0-6 score]	3.83 [1.23]	3.78 [1.23]	.045 (.081)	.026
If sexually active, always uses condom [yes=1]	.423 [.495]	.446 [.498]	-.023 (.051)	-.033
If sexually active, uses other contraceptives [yes=1]	.187 [.390]	.203 [.403]	-.016 (.045)	-.029
Suitable age at marriage for a woman	23.9 [3.07]	23.9 [3.08]	.035 (.217)	.008

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. The sample is based on those adolescent girls who are observed at baseline, midline and endline and where information on their age and the outcome at endline is available (N = 3474). The standard errors on the differences are estimated from running the corresponding least squares regression and allowing for the errors to be clustered by community. The normalized difference is computed following Imbens and Wooldridge [2009]. The gender empowerment index is a variable that cumulates the number of times a respondent answers "Both/Same" to the following questions: "Who should earn money for the family?", "Who should have a higher level of education in the family?", "Who should be responsible for washing, cleaning and cooking?", "If there is no water pump or tap, who should fetch water?", "Who should be responsible for feeding and bathing children?", "Who should help the children in their studies at home?" and "Who should be responsible for looking after the ill persons?" The other possible answers given to the respondent were "Male" and "Female". The index is then rescaled such that 100 indicates that the respondent answered that the female should (at least partly) be responsible for all the activities. The entrepreneurial ability index is the cumulative and rescaled score aggregating the self-assessed ranks to the following activities (where 10 was the highest rank and 1 the lowest): "Run your own business", "Identify business opportunities to start up new business", "Obtain credit to start up new business or expand existing business", "Save in order to invest in future business opportunities", "Make sure that your employees get the work done properly", "Manage financial accounts", "Bargain to obtain cheap prices when you are buying anything for business (inputs)", "Bargain to obtain high prices when you are selling anything for business (outputs)", "Protect your business assets from harm by others", "Collecting the money someone owes you". The pregnancy knowledge index equals 1 if the respondent correctly identifies the statement "A woman cannot become pregnant at first intercourse or with occasional sexual relations" as true or false. The HIV knowledge index is based on the number of statements correctly identified as true or false. The relevant statements are, "A person who has HIV is different from a person who is ill with AIDS", "During vaginal sex, it is easier for a woman to receive the HIV virus than for a man", "Pulling out the penis before a man climaxes keeps a woman from getting HIV during sex", "A woman cannot get HIV if she has sex during her period", "Taking a test for HIV one week after having sex will tell a person if she or he has HIV." and "A Pregnant woman with HIV can give the virus to her unborn baby". Variables indicating suitable ages were trimmed at 15 years or younger.

Table 2: Participation in ELA Clubs

Means, standard errors in parentheses, standard deviations in brackets

	Midline Sample (N = 4831)				Endline Sample (N = 3474)			
	Treatment (1)	Control (2)	Difference (3)	Normalized Difference (4)	Treatment (5)	Control (6)	Difference (7)	Normalized Difference (8)
Have heard about club [yes=1]	.590 [.492]	.400 [.490]	.189*** (.036)	.272	.795 [.404]	.613 [.487]	.182*** (.042)	.287
Have ever participated in club activities, conditional on having heard about club [yes=1]	.207 [.405]	.047 [.212]	.159*** (.016)	.349	.246 [.431]	.083 [.276]	.163*** (.024)	.318
Continued participation, conditional on ever having participated [yes=1]	.629 [.483]				.356 [.479]			
Attend(ed) club meetings at least 3 times a week, conditional on ever having participated [yes=1]	.273 [.446]				.421 [.494]			
Attend(ed) club meetings 1 or 2 times a week, conditional on ever having participated [yes=1]	.494 [.500]				.337 [.473]			
Received vocational skills training, conditional on ever having participated [yes=1]	.526 [.500]				.602 [.490]			
Received life skills training, conditional on ever having participated [yes=1]	.846 [.361]				.758 [.428]			
Received life and vocational skills training, conditional on ever having participated [yes=1]	.507 [.500]				.569 [.496]			

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. Columns 1-4 relate to outcomes measured at midline: the sample covers those adolescent girls tracked from baseline to midline and where information on their age is available (N = 4831). Columns 5-8 relate to outcomes at endline: the sample covers those adolescent girls tracked from baseline to midline and endline and where information on their age is available (N = 3474). The standard errors on the differences are estimated from running the corresponding least squares regression allowing for the errors to be clustered by community. The normalized difference is computed following Imbens and Wooldridge (2009). The indicators for having received vocational skills and/or life skills are elicited from respondents' declarations to having participated in the corresponding training sessions at least very few times. Training area examples mentioned for the vocational training include training in hair-dressing, computer and poultry rearing. Training area examples mentioned for the life skill training include learning about pregnancy or HIV.

Table 3: Economic Empowerment

Coefficients, standard errors in parentheses, standard deviations in brackets

Lower and upper Lee bounds and associated standard errors shown in smaller font in Columns 5 and 6

Outcome	(1) Baseline Levels, Control	(2) Sample Size at Midline/Endline	(3) ITT Midline, With Controls	(4) ITT Endline, With Controls	(5) ITT Midline, No Controls	(6) ITT Endline, No Controls
1. Entrepreneurial ability [0-100 score]	71.8	4,797 / 3,455	5.63***	1.80*	5.76***	1.29
	[24.7]		(.982)	(.951)	(2.17)	(1.80)
2. Any IGA [yes=1]	.102	4,831 / 3,474	.068***	.049**	4.82***	.279
	[.302]		(.016)	(.020)	7.31***	2.13**
3. Self-employment [yes=1]	.063	4,831 / 3,474	.059***	.032*	.070***	.050**
	[.243]		(.012)	(.017)	(.019)	(.024)
4. Wage employment [yes=1]	.040	4,831 / 3,474	.009	.018	.049***	.068***
	[.196]		(.007)	(.012)	.076***	.068***
Economic Empowerment Index	.023	4,831 / 3,474	.238***	.139***	.061***	.033*
	[1.03]		(.042)	(.052)	(.013)	(.019)
					.039***	.054**
					(.015)	(.023)
					.008	.017
					(.009)	(.014)
					-.017	.039*
					(.015)	(.023)
					.179***	.185***
					(.045)	(.061)

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. Standard errors are clustered by community. In Columns 3 and 4, the control variables include the adolescent girl's age and a series of indicator variables for branch areas (the randomization strata). The entrepreneurial ability index is the cumulative and rescaled score aggregating the self-assessed ranks to the following activities (where 10 was the highest rank and 1 the lowest): "Run your own business", "Identify business opportunities to start up new business", "Obtain credit to start up new business or expand existing business", "Save in order to invest in future business opportunities", "Make sure that your employees get the work done properly", "Manage financial accounts", "Bargain to obtain cheap prices when you are buying anything for business (inputs)", "Bargain to obtain high prices when you are selling anything for business (outputs)", "Protect your business assets from harm by others", "Collecting the money someone owes you". The Economic Empowerment Index is based on the entrepreneurship ability and the indicators for any IGA, self-employment and wage employment. The index is constructed by converting each component into a z-score, averaging these and taking the z-score of the average. z-scores for each component are computed using means and standard deviations in control communities at baseline and the z-score averaged by treatment group is imputed for missing values. The Lee bounds in Column 5 are estimated considering girls included in the midline as the selected sample. The lower and upper bounds in Column 6 are estimated considering girls included in the midline and endline as the selected sample.

Table 4: Control Over the Body

Coefficients, standard errors in parentheses, standard deviations in brackets

Lower and upper Lee bounds and associated standard errors shown in smaller font in Columns 5 and 6

Outcome	(1) Baseline Levels, Control	(2) Sample Size at Midline/Endline	(3) ITT Midline, With Controls	(4) ITT Endline, With Controls	(5) ITT Midline, No Controls	(6) ITT Endline, No Controls
1. Has child(ren) [yes=1]	.113 [.317]	4,806 / 3,415	-.027*** (.010)	-.038*** (.013)	-.031* (.017)	-.040* (.022)
					-.054*** (.016)	-.029*** (.010)
					-.043*** (.013)	-.020 (.023)
2. Married or cohabiting [yes=1]	.129 [.335]	4,713 / 3,263	-.069*** (.013)	-.080*** (.015)	-.071*** (.018)	-.082** (.032)
					-.094*** (.017)	-.069*** (.011)
					-.086*** (.016)	-.070*** (.023)
3. Had sex unwillingly in the past year [yes=1]	.174 [.380]	1,847 / 1,655	-.061** (.028)	-.053** (.025)	-.071*** (.024)	-.031 (.027)
					-.102*** (.033)	-.067*** (.019)
					-.033* (.018)	-.023 (.038)
4. Pregnancy knowledge [0-1 score]	.737 [.441]	4,750 / 3,386	.048** (.021)	.025 (.016)	.058** (.026)	.029 (.034)
					.051*** (.015)	.077*** (.018)
					.009 (.023)	.035** (.016)
5. HIV knowledge [0-6 score]	3.79 [1.26]	4,831 / 3,474	.471*** (.047)	.109** (.045)	.507*** (.079)	.115 (.078)
					.452*** (.053)	.611*** (.070)
					.036 (.081)	.160*** (.061)
6. If sexually active, always uses condom [yes=1]	.446 [.498]	1,781 / 1,630	.130*** (.038)	.035 (.039)	.194*** (.030)	.089** (.039)
					.192*** (.027)	.198*** (.031)
					.081** (.032)	.099*** (.034)
7. If sexually active, uses other contraceptives [yes=1]	.203 [.403]	1,781 / 1,630	.028 (.031)	-.019 (.049)	.047* (.028)	-.042 (.037)
					.046** (.020)	.053* (.032)
					-.048* (.029)	-.030 (.036)
Control Over the Body Index	-.018 [1.03]	4,831 / 3,474	.535*** (.038)	.269*** (.034)	.540*** (.052)	.265*** (.060)
					.521*** (.033)	.611*** (.041)
					.193*** (.064)	.305*** (.047)

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. Standard errors are clustered by community. In Columns 3 and 4, the control variables include the adolescent girl's age and a series of indicator variables for branch areas. The pregnancy knowledge index equals 1 if the respondent correctly identifies the statement "A woman cannot become pregnant at first intercourse or with occasional sexual relations" as true or false. The HIV knowledge index is based on the number of statements correctly identified as true or false. The relevant statements are "A person who has HIV is different from a person who is ill with AIDS", "During vaginal sex, it is easier for a woman to receive the HIV virus than for a man", "Pulling out the penis before a man climaxes keeps a woman from getting HIV during sex", "A woman cannot get HIV if she has sex during her period", "Taking a test for HIV one week after having sex will tell a person if she or he has HIV." and "A Pregnant woman with HIV can give the virus to her unborn baby". The Control Over the Body Index is based on all the listed outcomes. The index is constructed by converting each component into a z-score, averaging these and taking the z-score of the average. z-scores for each component are computed using means and standard deviations in control communities at baseline and the z-score averaged by treatment group is imputed for missing values. The Lee bounds in Column 5 are estimated considering girls included in the midline as the selected sample. The lower and upper bounds in Column 6 are estimated considering girls included in the midline and endline as the selected sample.

Table 5: Aspirations

Coefficients, standard errors in parentheses, standard deviations in brackets

Lower and upper Lee bounds and associated standard errors shown in smaller font in Columns 5 and 6

Outcome	(1) Baseline Levels, Control	(2) Sample Size at Midline/Endline	(3) ITT Midline, With Controls	(4) ITT Endline, With Controls	(5) ITT Midline, No Controls	(6) ITT Endline, No Controls
1. Gender empowerment index [0-100 score]	32.9 [24.4]	4,831 / 3,474	2.86*** (.932)	-2.25 (1.59)	2.63** (1.26) 1.10 3.45*** (.996) (.789)	-2.56 (2.08) -3.24*** -.969 (1.08) (1.53)
2. Suitable age at marriage for a woman	23.9 [3.08]	4,790 / 3,457	.770*** (.116)	.231* (.132)	.826*** (.145) .679*** 1.01*** (.116) (.134)	.176 (.252) -.006 .320** (.188) (.153)
3. Suitable age at marriage for a man	28.0 [3.74]	4,789 / 3,453	.693*** (.125)	.199 (.149)	.747*** (.198) .546*** 1.01*** (.135) (.163)	.139 (.366) -.109 .363* (.238) (.189)
4. Preferred number of children	4.11 [1.43]	4,774 / 3,416	-.279*** (.052)	.013 (.052)	-.296*** (.089) -.394*** -.247*** (.051) (.048)	.028 (.086) -.053 .137 (.072) (.084)
5. Suitable age for women to have her first baby	23.5 [3.20]	4,781 / 3,445	.619*** (.110)	.272* (.158)	.681*** (.168) .538*** .880*** (.107) (.118)	.277 (.213) .101 .431*** (.152) (.144)
6. Preferred age at which daughter(s) get married	24.8 [2.64]	4,757 / 3,380	.718*** (.118)	.123 (.116)	.749*** (.126) .605*** .928*** (.109) (.119)	.059 (.209) -.101 .184 (.156) (.136)
7. Preferred age at which son(s) get married	28.4 [3.13]	4,761 / 3,378	.120 (.113)	.025 (.116)	.185 (.167) -.003 .431*** (.126) (.156)	-.014 (.311) -.204 .185 (.184) (.195)
Aspirations Index	-.015 [.967]	4,831 / 3,474	.269*** (.038)	.059 (.045)	.290*** (.055) .233*** .361*** (.038) (.043)	.045 (.095) -.014 .106* (.060) (.060)

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. Standard errors are clustered by community. In Columns 3 and 4, the control variables include the adolescent girl's age and a series of indicator variables for branch areas. The gender empowerment index is the sum of the answers to the following questions: "Who should earn money for the family?", "Who should have a higher level of education in the family?", "Who should be responsible for washing, cleaning and cooking?", "If there is no water pump or tap, who should fetch water?", "Who should be responsible for feeding and bathing children?", "Who should help the children in their studies at home?" and "Who should be responsible for looking after the ill persons?" where answers are coded as 1 if the respondent chooses "both" and zero otherwise. The other possible answers given to the respondent were "Male" and "Female". The index is then rescaled such that 100 indicates that the respondent answered that the female should (at least partly) be responsible for all the activities. All variables indicating ages are trimmed at 15 years or younger. The Aspirations Index is based on all the listed outcomes. The index is constructed by converting each component into a z-score, averaging these and taking the z-score of the average. z-scores are computed using means and standard deviations in control at baseline. The Lee bounds in Column 5 are estimated considering girls included in the midline as the selected sample. The lower and upper bounds in Column 6 are estimated considering girls included in the midline and endline as the selected sample.

Table 6: Cost Effectiveness, in 2008 US\$

			(1) Non-Recurring	(2) Recurring Monthly	(3) Year One	(4) Year Two Onwards	
<u>A. Fixed Costs</u>	(1)	Office Space & Equipment	10 Branch Offices	4,000		4,000	
	(2)	Program Assistant Training	10 Assistants	2,250		2,250	
	(3)	Training & Operational Material Development	2 Manuals	4,000		4,000	
	(4)	Program Management Compensation	2 Coordinators		780	9,360	9,360
	(5)	Program Assistant Compensation	10 Assistants		1,690	20,280	20,280
	(6)	Adolescent Leader Compensation	100 Adolescent Leaders		1,200	14,400	14,400
	(7)	Adolescent Leader Training	100 Adolescent Leaders	22,500		22,500	
	(8)	Adolescent Leader Training (for Replacements)	20 Adolescent Leaders	4,500			4,500
	(9)	Adolescent Leader Refreshers	100 Adolescent Leaders		400	4,800	4,800
	(10)	Club Rent	100 Clubs		1,000	12,000	12,000
	(11)	Club Materials	100 Clubs	42,000		42,000	
	(12)	Club Materials (Replenishment)	100 Clubs	16,800			16,800
	(13)	Branch Office Overhead	10 Branch Offices		800	9,600	9,600
	(14)	Country Office Overhead	1 Country Office		4,000	48,000	48,000
<u>B. Variable Costs</u>	(15)	Financial Literacy Courses	2,500 Members	12,500		12,500	12,500
	(16)	Livelihood Training (Year 1)	2,000 Members	100,000		100,000	
	(17)	Livelihood Training Inputs (Year 1)	2,000 Members	60,000		60,000	
	(18)	Livelihood Training (Year 2)	1,000 Members	50,000			50,000
	(19)	Livelihood Training Inputs (Year 2)	1,000 Members	30,000			30,000
<u>C. Total Costs</u>	(20)	ELA Program Costs for the 100 studied Communities			365,690	232,240	
<u>D. Yearly Per Unit Average Costs</u>	(21)	Assuming 130 potential girl attendees per club	Fixed Costs		14.9	10.7	
	(22)		Variable Costs		13.3	7.12	
	(23)		Total Costs		28.1	17.9	
<u>E. Yearly Benefits</u>	(24)	ITT Impact of ELA on Individual Annual Earnings				50	

Notes: The exchange rate used to convert monetary values is based on January 2008 at which point \$1 was worth approximately UGX1700. The yearly costs shown in Columns 3 and 4 are obtained by multiplying Column 2 times 12 (months) and adding Column 1 for all fixed and variable cost categories applicable to the respective year of operation. The yearly total cost of the ELA Program stated in row 20 is the summation of all individual cost items applicable to the respective year. The yearly benefits shown in row 24 are based on the headline ITT impact estimates on annual earnings.

Table A1: Attrition

OLS estimates

Standard errors clustered by community

Outcome:	Tracked Between Baseline and Midline				Tracked Between Baseline, Midline and Endline				Tracked Between Baseline and Endline						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)			
Treatment	.023 (.030)	.024 (.027)	.026 (.027)	-.019 (.100)	-.011 (.043)	-.011 (.024)	-.010 (.024)	-.080 (.110)	-.013 (.045)	-.013 (.022)	-.014 (.022)	-.110 (.104)			
Age			-.0004 (.002)	-.0009 (.004)			-.0009 (.003)	-.002 (.005)			-.002 (.002)	-.004 (.004)			
Currently enrolled in school [yes=1]			.017 (.015)	-.015 (.030)			.003 (.020)	-.027 (.031)			-.007 (.019)	-.038 (.030)			
Married or cohabiting [yes=1]			.012 (.018)	.024 (.033)			.012 (.022)	.021 (.039)			.005 (.021)	-.002 (.035)			
Has child(ren) [yes=1]			.021 (.020)	.004 (.033)			.014 (.026)	-.027 (.046)			.016 (.025)	-.034 (.044)			
Treatment x age				.0007 (.005)				.002 (.006)				.003 (.005)			
Treatment x currently enrolled in school [yes=1]				.046 (.039)				.043 (.042)				.045 (.040)			
Treatment x married or cohabiting [yes=1]				-.022 (.040)				-.013 (.047)				.013 (.044)			
Treatment x has child(ren) [yes=1]				.024 (.043)				.059 (.056)				.072 (.054)			
Mean of Dependent Variable:		.819					.590					.647			
Branch Dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes			
Observations	5,966	5,966	5,661	5,661	5,966	5,966	5,661	5,661	5,966	5,966	5,661	5,661			

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. The dependent variable in Columns 1-4 is a dummy that is equal to one if the adolescent girl is tracked between the baseline survey and the midline survey, and zero otherwise. The dependent variable in Columns 5-8 is a dummy that is equal to one if the adolescent girl is tracked between the baseline, midline and endline surveys, and the dependent variable in Columns 9-12 is a dummy that is equal to one if the adolescent girl is tracked between the baseline and endline surveys (but is not necessarily observed at midline). The standard errors are clustered by community. There are ten branch dummies controlled for in Columns 2-4, 6-8 and 10-12.

Table A2: Balance at Baseline

Means, standard errors in parentheses, standard deviations in brackets

	Estimation Sample (N = 3474)				Baseline Sample (N = 5966)	
	(1) Treatment	(2) Control	(3) Difference	(4) Normalized Difference	(5) Difference	(6) Normalized Difference
Age	16.3 [2.68]	16.3 [2.76]	-.014 (.162)	-.004	-.063 (.150)	-.015
Currently enrolled in school [yes=1]	.689 [.463]	.685 [.465]	.004 (.031)	.006	-.010 (.027)	-.016
Entrepreneurial ability [0-100 score]	69.6 [24.3]	71.8 [24.7]	-2.17 (1.97)	-.063	-2.48 (1.64)	-.071
Self-employment [yes=1]	.070 [.255]	.059 [.235]	.011 (.010)	.032	.011 (.010)	.032
Wage employment [yes=1]	.057 [.231]	.036 [.186]	.021** (.010)	.070	.020** (.009)	.067
Never worry to get a good job in adulthood [yes=1]	.397 [.489]	.389 [.488]	.007 (.031)	.010	.024 (.026)	.035
Expenditure on goods in the last month [UGX]	12,345 [18,842]	11,916 [18,850]	429 (1,113)	.016	1,269 (1,020)	.048

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. In Columns 1-4 the estimation sample covers those adolescent girls tracked from baseline to midline and endline and where information on their age is available (N = 3474). In Columns 5 and 6 the baseline sample covers all adolescent girls surveyed at baseline (N = 5966). The standard errors on the differences are estimated from running the corresponding least squares regression and allowing for the errors to be clustered by community. The normalized difference is computed following Imbens and Wooldridge [2009]. The Entrepreneurial ability index is the cumulative and rescaled score aggregating the self-assessed ranks to the following activities (where 10 was the highest rank and 1 the lowest): "Run your own business", "Identify business opportunities to start up new business", "Obtain credit to start up new business or expand existing business", "Save in order to invest in future business opportunities", "Make sure that your employees get the work done properly", "Manage financial accounts", "Bargain to obtain cheap prices when you are buying anything for business (inputs)", "Bargain to obtain high prices when you are selling anything for business (outputs)", "Protect your business assets from harm by others", "Collecting the money someone owes you". The top 1% outliers of the expenditure variable have been removed. All monetary variables are deflated and expressed in terms of the price level in January 2008 using the monthly consumer price index published by the Uganda Bureau of Statistics.

Table A2 (continued): Balance at Baseline

Means, standard errors in parentheses, standard deviations in brackets

	Estimation Sample (N = 3474)				Baseline Sample (N = 5966)	
	(1) Treatment	(2) Control	(3) Difference	(4) Normalized Difference	(5) Difference	(6) Normalized Difference
Has child(ren) [yes=1]	.114 [.318]	.113 [.317]	.0006 (.022)	.001	.003 (.017)	.008
Married or cohabiting [yes=1]	.101 [.302]	.129 [.335]	-.027 (.019)	-.061	-.020 (.014)	-.046
Had sex unwillingly in the past year [yes=1]	.198 [.399]	.174 [.380]	.023 (.029)	.042	.054** (.022)	.102
Pregnancy knowledge [0-1 score]	.729 [.445]	.737 [.441]	-.008 (.030)	-.013	-.004 (.025)	-.006
HIV knowledge [0-6 score]	3.83 [1.23]	3.78 [1.23]	.045 (.081)	.026	.055 (.076)	.032
If sexually active, always uses condom [yes=1]	.423 [.495]	.446 [.498]	-.023 (.051)	-.033	-.006 (.039)	-.009
If sexually active, uses other contraceptives [yes=1]	.187 [.390]	.203 [.403]	-.016 (.045)	-.029	-.016 (.026)	-.032
Gender empowerment index [0-100 score]	28.6 [24.2]	31.7 [24.5]	-3.13 (2.04)	-.091	-2.81 (2.02)	-.081
Suitable age for marriage for a woman	23.9 [3.07]	23.9 [3.08]	.035 (.217)	.008	.115 (.201)	.026
Suitable age for marriage for a man	27.8 [3.71]	28.0 [3.74]	-.199 (.192)	-.038	-.112 (.186)	-.021
Preferred number of children	4.19 [1.53]	4.11 [1.43]	.076 (.106)	.036	.120 (.101)	.057
Suitable age for women to have the first baby	23.7 [3.21]	23.5 [3.20]	.204 (.257)	.045	.165 (.251)	.036
Preferred age at which daughter(s) get married	25.0 [2.83]	24.8 [2.64]	.138 (.157)	.035	.192 (.163)	.048
Preferred age at which son(s) get married	28.5 [3.18]	28.4 [3.13]	.090 (.163)	.020	.192 (.165)	.042

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. In Columns 1-4 the estimation sample covers those adolescent girls tracked from baseline to midline and endline and where information on their age is available (N = 3474). In Columns 5 and 6 the sample covers all adolescent girls surveyed at baseline (N = 5966). The standard errors on the differences are estimated from running the corresponding least squares regression using the baseline data only and allowing for the errors to be clustered by community. The normalized difference is computed following Imbens and Wooldridge [2009]. The pregnancy knowledge index equals 1 if the respondent correctly identifies the statement "A woman cannot become pregnant at first intercourse or with occasional sexual relations" as true or false. The HIV knowledge index is based on the number of statements correctly identified as true or false. The relevant statements are "A person who has HIV is different from a person who is ill with AIDS", "During vaginal sex, it is easier for a woman to receive the HIV virus than for a man", "Pulling out the penis before a man climaxes keeps a woman from getting HIV during sex", "A woman cannot get HIV if she has sex during her period", "Taking a test for HIV one week after having sex will tell a person if she or he has HIV." and "A Pregnant woman with HIV can give the virus to her unborn baby". The gender empowerment index is a variable that cumulates the number of times a respondent answers "Both/Same" to the following questions: "Who should earn money for the family?", "Who should have a higher level of education in the family?", "Who should be responsible for washing, cleaning and cooking?", "If there is no water pump or tap, who should fetch water?", "Who should be responsible for feeding and bathing children?", "Who should help the children in their studies at home?" and "Who should be responsible for looking after the ill persons?" The other possible answers given to the respondent were "Male" and "Female". The index is then rescaled such that 100 indicates that the respondent answered that the female should (at least partly) be responsible for all the activities. All variables indicating ages are trimmed at 15 years or younger.

Table A3: Participants and Non-participants**Sample: Adolescent Girls Tracked to Endline (N = 3474)****Means, standard errors in parentheses, standard deviations in brackets**

	(1) Participants	(2) Non Participants	(3) Difference	(4) Normalized Difference
Age	16.3 [2.82]	16.3 [2.69]	.010 (.156)	.003
Currently enrolled in school [yes=1]	.690 [.463]	.687 [.464]	.003 (.029)	.004
Gender empowerment index [0- 100 score]	28.1 [23.4]	29.9 [24.5]	-1.73 (1.42)	-.051
Entrepreneurial ability [0-100 score]	69.6 [23.8]	70.5 [24.5]	-.879 (1.45)	-.026
Self-employment [yes=1]	.068 [.253]	.066 [.248]	.003 (.010)	.008
Wage-employment [yes=1]	.048 [.215]	.050 [.218]	-.002 (.008)	-.006
Satisfaction with earnings/income [0-6 score]	1.08 [1.61]	1.30 [1.72]	-.220 (.141)	-.093
Never worry to get a good job in adulthood [yes=1]	.405 [.491]	.392 [.488]	.013 (.026)	.019
Has child(ren) [yes=1]	.105 [.307]	.115 [.319]	-.010 (.017)	-.023
Married or cohabiting [yes=1]	.094 [.293]	.113 [.317]	-.019 (.014)	-.044
Had sex unwillingly in the past year [yes=1]	.203 [.404]	.187 [.390]	.017 (.038)	.029
Pregnancy knowledge [0-1 score]	.760 [.428]	.727 [.446]	.033 (.023)	.054
HIV knowledge [0-6 score]	3.84 [1.29]	3.81 [1.22]	.033 (.063)	.019
If sexually active, always uses condom [yes=1]	.465 [.501]	.425 [.495]	.040 (.050)	.057
Number of Observations	676	2606		

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. The sample is based on those adolescent girls observed at baseline, midline and endline (N = 3474). The standard errors on the differences are estimated from running the corresponding least squares regression allowing for the errors to be clustered by community. The normalized difference is computed following Imbens and Wooldridge [2009]. The gender empowerment index is a variable that cumulates the number of times a respondent answers "Both/Same" to the following questions: "Who should earn money for the family?", "Who should have a higher level of education in the family?", "Who should be responsible for washing, cleaning and cooking?", "If there is no water pump or tap, who should fetch water?", "Who should be responsible for feeding and bathing children?", "Who should help the children in their studies at home?" and "Who should be responsible for looking after the ill persons?" The other possible answers given to the respondent were "Male" and "Female". The index is then rescaled such that 100 indicates that the respondent answered that the female should (at least partly) be responsible for all the activities. The entrepreneurial ability index is the cumulative and rescaled score aggregating the self-assessed ranks to the following activities (where 10 was the highest rank and 1 the lowest): "Run your own business", "Identify business opportunities to start up new business", "Obtain credit to start up new business or expand existing business", "Save in order to invest in future business opportunities", "Make sure that your employees get the work done properly", "Manage financial accounts", "Bargain to obtain cheap prices when you are buying anything for business (inputs)", "Bargain to obtain high prices when you are selling anything for business (outputs)", "Protect your business assets from harm by others", "Collecting the money someone owes you". The index for satisfaction with earnings/income is the reversed and rescaled respondent's self-assessment on a 7 point score (where originally "1" is completely happy and "7" is not at all happy). The pregnancy knowledge index equals 1 if the respondent correctly identifies the statement "A woman cannot become pregnant at first intercourse or with occasional sexual relations" as true or false. The HIV knowledge index is based on the number of statements correctly identified as true or false. The relevant statements are "A person who has HIV is different from a person who is ill with AIDS", "During vaginal sex, it is easier for a woman to receive the HIV virus than for a man", "Pulling out the penis before a man climaxes keeps a women from getting HIV during sex", "A women cannot get HIV if she has sex during her period", "Taking a test for HIV one week after having sex will tell a person if she or he has HIV." and "A Pregnant woman with HIV can give the virus to her unborn baby".

Table A4: Welfare and Education

Coefficients, standard errors in parentheses, standard deviations in brackets

Lower and upper Lee bounds and associated standard errors shown in smaller font in Columns 5 and 6

Outcome	(1) Baseline Levels, Control	(2) Sample Size at Midline/Endline	(3) ITT Midline, With Controls	(4) ITT Endline, With Controls	(5) ITT Midline, No Controls	(6) ITT Endline, No Controls
1. Annual Earnings [UGX]	27,443	4,824 / 3,466	5,189	84,732**	9,090	83,429
	[139,968]				(17,498)	(41,793)
					-46,438***	11,605
					(15,822)	(13,813)
2. Currently enrolled in school [yes=1]	.685	4,831 / 3,475	-.018	.001	-.013	.0010
	[.465]				(.017)	(.020)
					-.022	.004
					(.015)	(.017)
3. If enrolled, hours spent on going to and attending school, homework and study per week	61.1	3,243 / 1,972	1.59*	1.69	2.36*	1.63
	[20.3]				(.892)	(1.18)
					1.31	4.16***
					(.918)	(1.17)
4. If dropped out, plan to start/go back to school [yes=1]	.573	1,537 / 1,393	.076**	.044	.102***	-.008
	[.496]				(.037)	(.043)
					.071**	.139***
					(.033)	(.035)

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. Standard errors are clustered by community. In Columns 3 and 4, the control variables include the adolescent girl's age and a series of indicator variables for branch areas. The top 1% outliers of the income variables have been removed. The Lee bounds in Column 5 are estimated considering girls included in the midline as the selected sample. The lower and upper bounds in Column 6 are estimated considering girls included in the midline and endline as the selected sample. In January 2008 \$1 was worth approximately UGX1700.

Table A5: Pooled ANCOVA Specification

Coefficients, standard errors in parentheses

Outcome	(1) Sample Size	(2) ITT, With controls at midline	(3) ITT, With controls at endline
<i>Economic Empowerment Index</i>	6,948	.196*** (.052)	.140** (.053)
<i>Control Over the Body Index</i>	6,948	.437*** (.043)	.269*** (.043)
<i>Aspirations Index</i>	6,948	.254*** (.054)	.049 (.060)

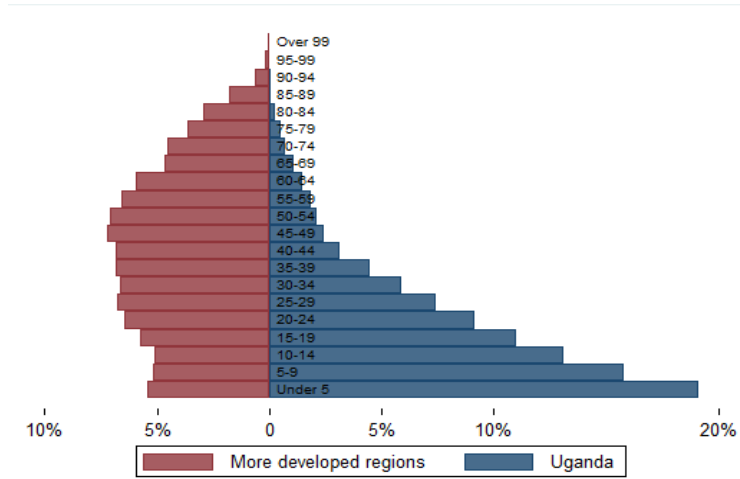
Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. Standard errors are clustered by community. The control variables include the adolescent girl's age and a series of indicator variables for branch areas. The Economic Empowerment Index is based on the entrepreneurship ability and the indicators for any IGA, self-employment and wage employment outcomes in Table 3. The Control Over the Body Index is based on all the listed outcomes in Table 4. The Aspirations Index is based on all the listed outcomes in Table 5. Each index is constructed by converting each component into a z-score, averaging these and taking the z-score of the average. z-scores are computed using means and standard deviations in control at baseline.

Table A6: Impact Heterogeneity
Coefficients, standard errors in parentheses

	Rural		Urban		Above Median HH Asset Value		Below Median HH Asset Value		Younger than 16yrs		Older than 16yrs	
	(1) ITT, Midline	(2) ITT, Endline	(3) ITT, Midline	(4) ITT, Endline	(5) ITT, Midline	(6) ITT, Endline	(7) ITT, Midline	(8) ITT, Endline	(9) ITT, Midline	(10) ITT, Endline	(11) ITT, Midline	(12) ITT, Endline
<i>Economic Empowerment Index</i>	.179*** (.048)	.106 (.071)	.301*** (.069)	.180** (.076)	.260*** (.055)	.127** (.064)	.214*** (.053)	.151** (.060)	.229*** (.045)	.191*** (.049)	.251*** (.057)	.101 (.075)
<i>Control Over the Body Index</i>	.526*** (.053)	.318*** (.048)	.534*** (.054)	.211*** (.049)	.516*** (.045)	.331*** (.050)	.539*** (.046)	.214*** (.041)	.553*** (.042)	.139*** (.043)	.509*** (.051)	.355*** (.048)
<i>Aspiration Index</i>	.270*** (.061)	.119* (.061)	.257*** (.047)	-.021 (.066)	.216*** (.048)	.049 (.052)	.295*** (.051)	.055 (.057)	.243*** (.061)	.015 (.063)	.281*** (.045)	.078 (.053)
Currently enrolled in school [yes=1]	-.029 (.022)	.014 (.026)	-.010 (.027)	-.013 (.030)	-.025 (.021)	.00009 (.028)	-.011 (.023)	.003 (.025)	-.023 (.017)	-.030 (.025)	-.018 (.024)	.026 (.025)
If enrolled, hours spent on going to and attending school, homework and study per week	2.16 (1.44)	.052 (1.31)	.969 (1.02)	3.55* (1.97)	1.85 (1.30)	2.70 (1.77)	1.25 (.942)	.613 (1.35)	1.39 (.957)	-.037 (1.16)	1.78 (1.57)	5.03** (2.33)
If dropped out, plan to start/go back to school [yes=1]	.036 (.050)	.068 (.060)	.139** (.053)	.009 (.048)	.040 (.068)	.027 (.073)	.100** (.041)	.055 (.046)	.292* (.165)	.327 (.221)	.062 (.038)	.033 (.044)

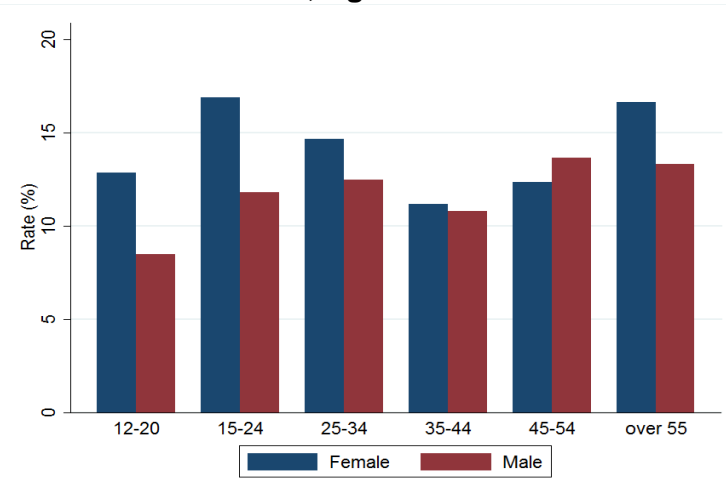
Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. Standard errors are clustered by community. The control variables throughout include the adolescent girl's age and a series of indicator variables for branch areas. The Economic Empowerment Index is based on the entrepreneurship ability and the indicators for any IGA, self-employment and wage employment outcomes in Table 3. The Control Over the Body Index is based on all the listed outcomes in Table 4. The Aspirations Index is based on all the listed outcomes in Table 5. Each index is constructed by converting each component into a z-score, averaging these and taking the z-score of the average. z-scores are computed using means and standard deviations in control at baseline.

Figure 1A: Female Population by Age, 2010



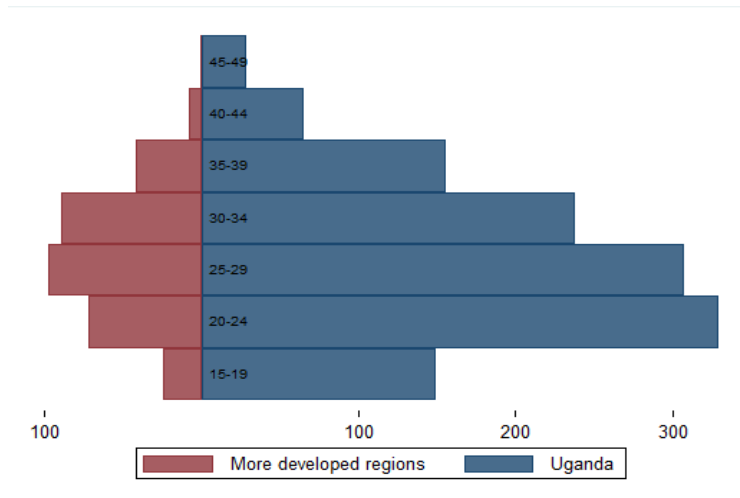
Notes: The data stems from the 2010 UN World Population Prospects data base. More developed regions comprise Europe, Northern America, Australia/New Zealand and Japan.

Figure 1B: Unemployment Rates (%), by Age and Gender, Uganda 2005/6



Notes: The data source is the Uganda National Household Survey (UNHS). Unemployment is defined as those who actively wanted a job but did not participate in any employment activities, inclusively self-employment and agricultural works). The UNHS is a nationally representative sample of 7246 households.

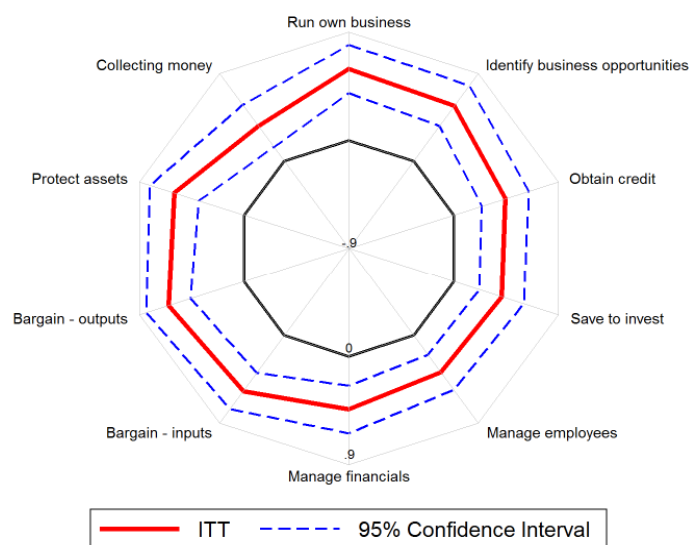
Figure 1C: Age-Specific Fertility Rate, 1995-2010



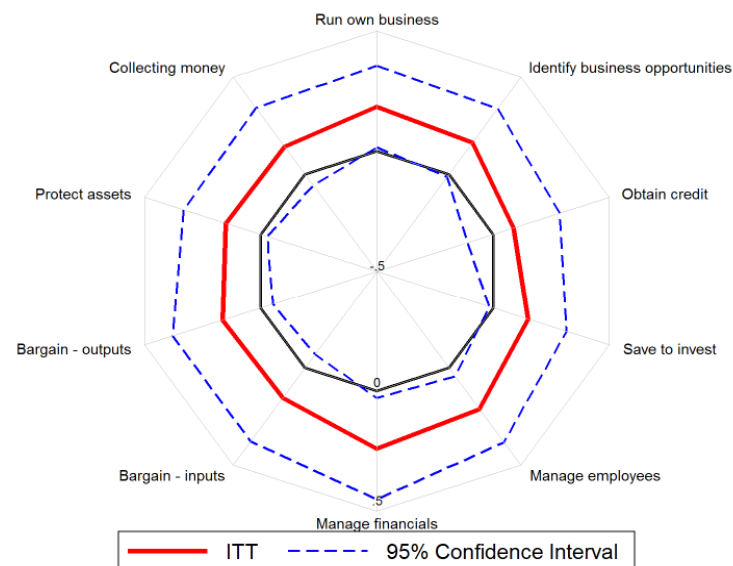
Notes: The data stems from the 2010 UN World Population Prospects data base. The fertility rate is measured by the number of births per 1,000 women. More developed regions comprise Europe, Northern America, Australia/New Zealand and Japan.

Figure 2: The ITT Impact of the ELA Program on Entrepreneurship Measures

A. Midline



B. Endline



Notes: Adolescent girls were asked to rank their ability on how well they can do the following activities on a scale of 1 to 10, 1 means they cannot do this activity and 10 is they definitely can (clockwise, beginning with the spoke on top): "Run your own business", "Identify business opportunities to start up new business", "Obtain credit to start up new business or expand existing business", "Save in order to invest in future business opportunities", "Make sure that your employees get the work done properly", "Manage financial accounts", "Bargain to obtain cheap prices when you are buying anything for business (inputs)", "Bargain to obtain high prices when you are selling anything for business (outputs)", "Protect your business assets from harm by others", and "Collecting the money someone owes you".