WIDER Working Paper 2017/133

Reducing early pregnancy in low-income countries

A literature review and new evidence

Lars Ivar Oppedal Berge,[1,2] Kjetil Bjorvatn,[1] Amina Mohamed Maalim,[1] Vincent Somville,[1,2] and Bertil Tungodden[1,2]

June 2017

Abstract: Many adolescent girls in low-income countries face the challenge of early pregnancy and lifelong dependence upon family and partners. In this paper, we review the literature on field interventions aimed at reducing early pregnancies in low-income countries and report from a randomized control trial in rural Tanzania. From an analysis of more than 3,000 essays written by adolescent girls about their hopes for the future, we find that health training and entrepreneurship training affect two key mechanisms determining early pregnancy, namely internal locus of control and economic opportunity.

---

[1] NHH Norwegian School of Economics, Bergen, Norway; [2] Chr. Michelsen Institute, Bergen, Norway. Corresponding author: vincent.somville@cmi.no

1   Background

> My first priority in life is to educate myself and, once I do, I will use my education to prevent cruel practices that other girls are being subjected to such as child marriage, circumcision and arranged marriages. […] Since I started Form one, it was very difficult for my parents to pay my fees or buy school uniform. I have many problems that bother me, for instance I am completing Form four and to date my parents have not paid the school fees. Sometimes when I go back home, I often cry. Therefore, I would like to say that I have many aspirations in life. However, I feel that I will not be successful due to the difficulties I am encountering. […] I do not have much more to say but I do have one worry. I would like you to give me advice. Once I finish school, what should I do in order to avoid the pressures of unwanted pregnancy and the expectation of early marriage? (Adolescent girl, Morogoro region of Tanzania)

This quote is from one of the participants in a research project on female empowerment that we conducted in Tanzania, and on which we will have more to say later in the paper. It illustrates the challenges facing many adolescent girls in low-income countries, where early pregnancy and lifelong dependence upon family and partners threaten both their social and their economic development.[1] Figure 1 shows the age of childbearing in Tanzania, and indicates that by the age of 19, more than 40 per cent of the girls have had their first child.

Early pregnancies are generally associated with negative effects on women's health and education (Goldin and Katz 2002; Rasul 2008), as well as their economic achievement (Bailey 2006; Miller 2010). They are also associated with poor health outcomes for the child: children born to adolescent mothers generally have lower birth weight, and the risk of being still born or dying in the first weeks is 50 per cent higher when the mother is under 20 years old than when she is 20–29 years old (World Health Organization 2014).

It is therefore of great importance to understand which interventions are effective in delaying pregnancies among adolescent girls in developing countries, and the present chapter offers a review of the rich set of interventions that have been studied in the literature.

---

[1] In the age group 15–19 years, the fertility rate is 108 per 1,000 women in Sub-Saharan Africa compared with 25 per 1,000 women in the OECD (data.worldbank.org).

Figure 1: Women who have started childbearing in Tanzania, by age (%)
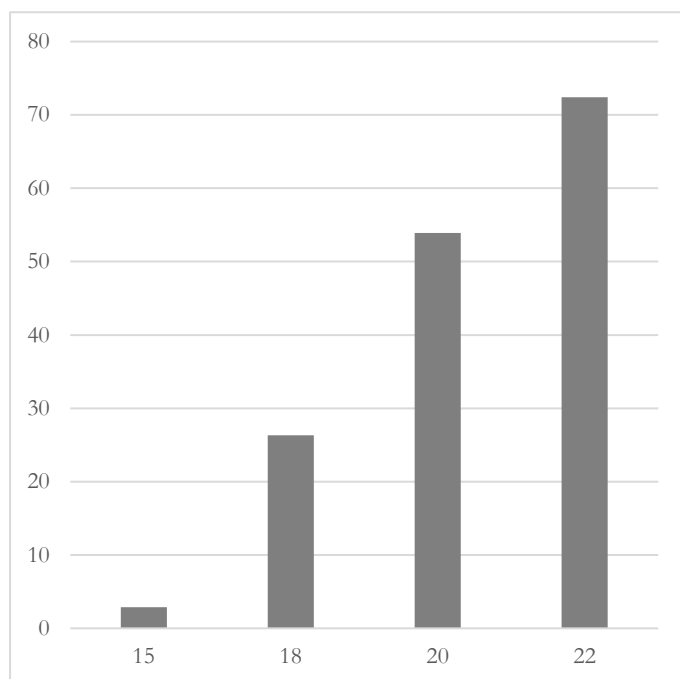
Source: Authors' construction, based on figures from the final report of the Tanzania Demographic and Health Survey 2015–2016, Table 5.9, p.117.

In this review, we offer a novel approach to evaluating this type of intervention by distinguishing interventions that target girls' *mindset* (preferences and beliefs) from those that relieve constraints and expand girls' set of *opportunities*. The underlying idea is that early pregnancies may reflect both a certain mindset and a lack of alternatives. Changing the mindset, for instance by making girls more aware of the risks of early pregnancy or increasing their sense of being their own locus of control, can take place through educational training, as illustrated by the following statement by an adolescent girl in the Morogoro region of Tanzania, reflecting on a training programme on reproductive health:

> I have received training on fertility and health and been taught how to say no when a man asks you to have sex with him. You should have a firm stand in saying no and not fear him and start to bite your nails or dig your foot into the ground. You have to stare at him in the face and be serious. All the girls should receive education on how to say no.

On the other hand, girls may also delay pregnancies if they face greater economic opportunities, as a result of either cash transfers or vocational or entrepreneurship training programmes, as illustrated by the following statement by another adolescent participant in our research project:

> In August, I received training on entrepreneurship, which has enabled me to understand the opportunities available to me as a girl. […] After the training, I became more informed on how to start my own business, which will make me work hard for my future. In the next 5 years, I will have a huge business, which I know will bring in income. After completing my education, my life will be based in Morogoro. I do not expect to have children during this time until when I am employed or running my own business that will bring in income and independence from anyone else.

The quote reveals that the entrepreneurship training programme not only expanded this girl's economic opportunities, but also changed her mindset, in the sense that she expresses a desired future orientation and independence. Hence, as will be illustrated throughout this paper, there is not always a sharp distinction between field interventions that aim to change the mindset and field interventions that aim to improve the opportunities of adolescent girls; often they do both.

The most common approach to addressing early pregnancies has been to target the mindset dimension by providing adolescent girls with health and family planning information, sometimes combined with initiatives to improve access to contraceptives. But more recently, there has been a greater focus on expanding economic opportunities, in the form of both conditional cash grants and entrepreneurship training programmes. The increased focus on economic opportunities is also reflected in policy circles; for example, the WHO stresses the importance of improving economic opportunities and increasing the negotiation and life skills of adolescent girls to allow them to make safer sexual decisions and avoid unwanted sex.[2]

In the first part of the paper, we survey the literature on field interventions targeting early pregnancies and risky sexual behaviour. We limit ourselves to research on low-income countries from this century and to studies that include evidence on adolescents, which we define as young people below 18 years of age. We organize the survey in three sections: (i) interventions targeting mindset, (ii) interventions creating economic opportunities, (iii) interventions that target both dimensions. Recent reviews, which include evidence from high-income countries, consistently conclude that interventions that combine sexual education and improved access to contraceptives give better results than single interventions (Oringanje et al. 2016; World Bank 2012). We argue in this paper that even those combined interventions do not lead to clear and consistent results and that increasing economic opportunities, perhaps in tandem with health training, may be needed.

A weakness in the literature is the lack of evidence on the mechanisms through which the interventions work. Addressing this weakness, the second part of the paper reports from an RCT that we are currently conducting in rural Tanzania with adolescent girls, and from which the above quotes are taken. We show how health training and entrepreneurship training have affected two key mechanisms determining early pregnancy, namely internal locus of control and economic opportunities. In our study, the latter is reflected by the girls having plans to start their own business. Here, we move beyond studying responses to survey questions by conducting a text analysis of more than 3,000 essays written by adolescent girls about their hopes for the future. We believe that this innovative approach provides a promising tool for attaining a better understanding of how such interventions shape the mindset and behaviour of adolescent girls.

2   Literature

In this section, we review 30 papers that differ in several dimensions, such as context (countries and time), sample characteristics (gender, age), and research design (difference-in-difference, randomized control trials). Table 1 provides an overview of the papers, organized by the nature of the intervention (affecting mindset, opportunities, or both) and ordered by publication date. For each paper, the table provides the reference, a description of the interventions (type, country, year), the method, and the main impacts.

---

[2] See World Health Organization on Gender: http://www.searo.who.int/entity/gender/en/ (accessed 6 June 2017).

Table 1: Literature overview

Paper	Intervention	Country (time)	Sample	Method	Main results
Mindset					
Eggleston et al. 2000	Health information in schools (promotion of both abstinence and safer sex)	Jamaica (1995–1997)	945 girls/boys Age: 11–14	DiD	After one year: - Almost no impact on reproductive health knowledge - No impact on attitudes towards sexual activity - No impact on contraceptive use
Kim et al. 2001	Multimedia campaign to promote sexual responsibility and increase reproductive health services by training providers	Zimbabwe (1997–1998)	1,400 women/men Age: 10–24	DiD (control site partly exposed to intervention)	- Little impact on general reproductive health knowledge - Positive impact on 'saying no to sex', abstinence, 'avoiding sugar daddies'
Magnani R.J. et al. 2001	School- and health-clinic-based adolescent reproductive health initiative: - Training courses for health workers in reproductive health services for adolescents - School sexual and reproductive health education curriculum	Brazil (1997–1999)	4,777 women/men Age: 11–19	DiD	- No impact on sexual or contraceptive-use behaviour - No impact on use of public clinics
Agha 2002	Subsidized condoms and promoting the use of condoms (peer educators, youth clubs, media campaigns)	Cameroon, Botswana, South Africa, Guinea (1994–1998)	Cameroon: 1,606 women/men Age: 12–22 South Africa: 221 women/men Age: 17–20 Botswana: 1,002 (increased to 2,396 at follow-up) women/men Age: 13–18 Guinea: 2016 women/men Age: 'young adults'	DiD	- Ambiguous effects on perceptions and beliefs, improving some but not others - Ambiguous effects on number of partners and condom use, with some significant impact on some of the indicators in some of the countries
Okonofua et al. 2003	Community participation, peer education, public lectures, health clubs in schools, and training of STD treatment providers The treatment is compared to a control with no intervention	Nigeria (1997–1998)	1,896 women/men Age: 14–20	RCT in 12 schools (4 treated, 8 control)	- Improvements in knowledge of STDs, condom use, awareness that the partner had an STD, and STD treatment-seeking behaviour - Reduction in reported STD symptoms
Lou C.-H. et al. 2004	Build awareness and offer counselling and services related to sexuality and reproduction	China (2000–2001)	2,227 women/men Age: 15–24	DiD	- Increase in condom use

Tu et al. 2008)	Follow-up to Lou et al. 2004.	China (2000–2001)		- No long-term impacts
Agha & Van Rossem 2004	Peer sexual health education intervention in secondary schools The treatment is compared to a control with no intervention	Zambia (2000–2001)	416 women/men Age: 14–23	RCT (3 treated schools, 2 control)	- Positive changes in normative beliefs about abstinence - Reductions in multiple regular partnerships - No change in condom use
Cabezón et al. 2005	'TeenStar' abstinence-centred sex education programme The treatment is compared to a control with no intervention	Chile (1996–1997)	1,259 girls Age: 15–16	RCT	- Reduced pregnancies
Magnani R. et al. 2005	Life skills education programme for all students in middle and secondary schools	South Africa (1999)	2,222 women/men Age: 14–24	Observational/ IV	- Positive effects on sexual and reproductive health knowledge, perceived condom self-efficacy, and condom use at first and last sex - No consistent effects on age at sexual initiation, secondary abstinence, or partnering behaviours
Cartagena et al. 2006	Sexual health peer education	Mongolia (2004)	1,367 women/men Age: 15–19	Observational	- Increase in knowledge, reduction in traditional attitudes, and greater awareness of self-efficacy regarding HIV and sexual health - No increase in likelihood of practising safe sex
Walker et al. 2006	The intervention had three arms: - HIV prevention course that promoted condom use - The same course with emergency contraception as back-up - The existing sex education course (control)	Mexico (2001)	10,954 students in 40 schools Age: 15–18	Cluster RCT	- No effect on condom use - Improved knowledge of HIV in both intervention groups - Improved knowledge of emergency contraception in corresponding group - Reported sexual behaviour similar in the intervention and control groups
Ross et al. 2007	The intervention had four components: - Community activities - Teacher-led, peer-assisted sexual health education in years 5–7 of primary school - Training and supervision of health workers to provide 'youth-friendly' sexual health services - Peer condom social marketing The treatment is compared to a control with no intervention	Tanzania (1998)	9,645 adolescents in 20 communities Age: 12–19 (a few above 19)	RCT	- Significant impact on knowledge, attitudes, and reported sexually transmitted infection symptoms - No consistent impact on biological outcomes

Doyle et al. 2010	Follow-up to Ross et al. 2007	Tanzania (1998)	13,814 women/men Age: 15–30	RCT	- Clear and consistent beneficial impact on sexual and reproductive health knowledge - Generally no significant impact on attitudes to sexual risk, pregnancies, or other reported sexual behaviours, except for some specific outcomes and sub-groups of subjects
Daniel et al. 2008	- Promoting delaying birth of first child until the mother is 21, and birth of second child until 36 months after first birth - Promoting contraception	India (2002–2004)	1,995 women Age: <25	DiD	- Increased contraceptive use
Dupas 2011	Four groups: - (a) Providing information on the relative risk of HIV infection by partner's age - (b) The government's official abstinence-only HIV curriculum - (a) and (b) combined - No intervention	Kenya (2003–2005)	2,422 girls/boys Age: 13–17	RCT	- Risk info: 28 per cent decrease in teen pregnancy - Official abstinence-only HIV curriculum: no impact on teen pregnancy
Dupas et al. 2017	Four groups: - Teacher training on the regular HIV prevention curriculum - 60-minute session on the regular HIV prevention curriculum delivered by an outside consultant - 60-minute session on the regular HIV prevention curriculum delivered by an outside consultant + 'Sugar Daddy Risk Awareness' information from Dupas (2011) - Control group without interventions	Cameroon (2010–2011)	3,154 girls from 318 schools Age: 15 on average	RCT	- Childbearing reduced by 25–48 per cent in all treatments

Opportunities

Stecklov et al. 2007	CCT (conditional on children enrolling in and attending school and that family members obtain health care)	Honduras (2000–2002) Nicaragua (2000–2002) Mexico (1998–2003)	Honduras: 1,997 women Nicaragua: 2,000 women Mexico: 2,000 women Age: 12–47	DiD	- Honduras: CCT increased fertility (eligibility criteria incentivized childbearing) - No significant impacts in the other two countries
Feldman et al. 2009	Oportunidades Mexico Compared to no intervention	Mexico (1998–2003)	8,568 women Age: 15–49	RCT	- No effect on contraceptive use or birth spacing
Baird et al. 2010	CCT Zomba (conditional on school attendance) Compared to no transfers	Malawi (2007–2008)	3,805 women Age: 13–22	RCT	- Significant declines in early marriage, teenage pregnancy, and self-reported sexual activity
Alam et al. 2011	The Punjab Female School Stipend Programme: - Female CCT Compared to no stipend	Pakistan (2003–2009)	4,000 women Age: 12–19	RD DiD	- No effect on marriage delays or births
Baird et al. 2011	Three arms: - UCT - CCT (conditional on school attendance) - No transfers	Malawi (2008–2010)	2,907 schoolgirls Age: 13–22	RCT	- Teenage pregnancy and marriage rates substantially lower in the UCT than the CCT group, entirely due to the impact of UCTs on these outcomes among girls who dropped out of school
de Walque et al. 2012	CCT (conditional on negative STD test) Two treatments: - Low-value transfer - High-value transfer The study also includes a control group without transfers	Tanzania (2010–2011)	10 villages, 2,399 of Age: 18–30	RCT	- High-value transfer reduced STD prevalence, directly measured using biological samples.
Jensen 2012	Three years of recruiting services to help young women in randomly selected rural Indian villages to get jobs in the business process outsourcing industry The treated villages are compared to control villages without recruiting services	India (2003–2006)	3,200 households, Age: 15–21	RCT at village level	- Women from treatment villages 5–6 percentage points less likely to get married or to have given birth over the three-year period of the intervention
Handa et al. 2014	UCT of US$20 per month. The treatment is compared to a control with no transfers	Kenya	1,433 women and men Age: 15–25	RCT	- Delay in age of sexual debut - No effect on HIV-risk-related behaviours such as condom use, number of partners and transactional sex
Heath & Mobarak 2015	Compare girls and boys living in villages that have gained, or have not gained, access to garment factories	Bangladesh (1980–2014)	30,180 women	DiD	- Women exposed to the garment sector delay marriage and childbirth

Mindset & Opportunities

Bandiera et al. 2015	Vocational training and information on reproductive health in youth clubs The treatment is compared to a control with no intervention	Uganda (2008–2012)	5,000 girls Age: 14–20	RCT	- Increased likelihood of girls engaging in income-generating activities (driven by increased self-employment) - Increased private consumption - Decrease in teen pregnancy and early entry into marriage/cohabitation - Drop in share of girls reporting sex against their will
Buehren et al. 2015	Vocational training and information on reproductive health in youth clubs, combined with microfinance services	Tanzania (2009–2011)	150 villages	RCT	- No significant impact on childbearing, or other outcomes related to sexual behaviour
Duflo et al. 2015	The study has four components: - Education subsidies - Abstinence curriculum - Education subsidies and abstinence curriculum - Control group with no particular intervention	Kenya (2003–2010)	328 schools Age: average at baseline 13.5 years	RCT	Education subsidy programme: - Statistically significantly reduced teen pregnancy rate (from 16 to 13 per cent). - No impact on HSV-2 prevalence Abstinence curriculum alone: - No impact Combined treatment: - Reduction in both fertility and HSV-2 infection
Buchmann et al. 2016	The study has four components: - (a) Empowerment programme - (b) Financial incentive to delay marriage - (a) and (b) combined - Control group with no particular intervention	Bangladesh (2008–2013)	19,060 women in 446 communities Age: 10–19	RCT	Financial incentive: - Reduced the likelihood of teenage childbearing by 14 per cent. Empowerment programme and combined treatments: - No effect on childbearing

Note: CCT = conditional cash transfer, DiD = difference-in-difference, IV = instrumental variable, RCT = randomized controlled trial, RD = regression discontinuity design, UCT = unconditional cash transfer.

Source: The above-mentioned studies, as well as the authors' interpretation of these studies.

Figure 2 summarizes the studies by year of intervention, type of intervention, and impact.

Figure 2: The studies reviewed by date of intervention, type of intervention, and impact reported
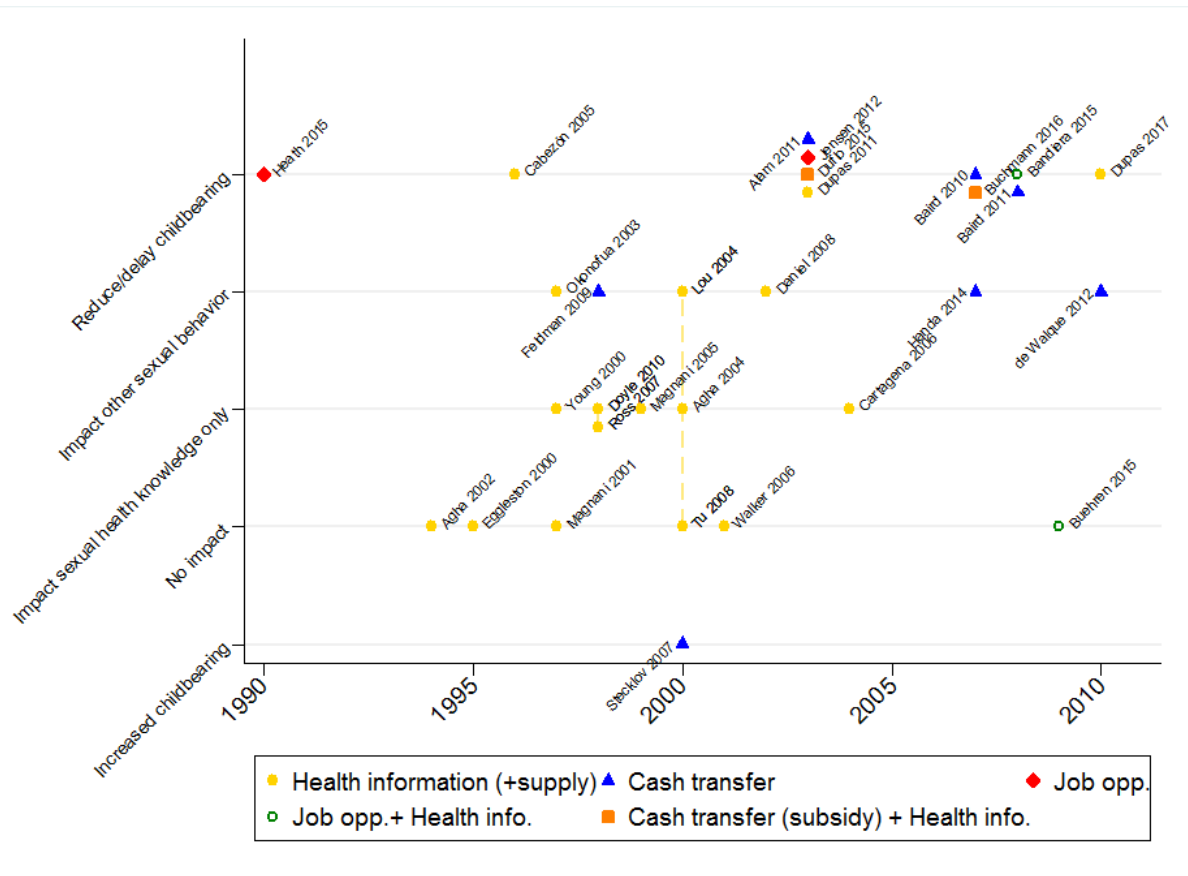
Source: Authors' own classifications.

2.1   Changing the mindset

The provision of health-related information, including family planning information, has traditionally been the most common method of reducing both early pregnancies and risky sexual behaviour. Some of these interventions focus on providing basic knowledge, assuming the targeted girls lack an understanding of both how to protect themselves against pregnancy and how STIs are transmitted.[3] Other studies address the social dimension, for instance by considering the impact of teaching abstinence until marriage.

We discuss the impact of the different interventions in three dimensions: knowledge and attitudes, sexual behaviour, and pregnancies. Overall, we shall see that the studies suggest that it is possible to influence knowledge and attitudes, but that inducing changes in sexual behaviour and reducing early pregnancies are much more difficult, in line with what is argued in an overview article by Gallant and Maticka-Tyndale (2004).

---

[3] Note the difference between 'STI' (sexual transmittable *infection*) and STD (sexual transmittable *disease*). Depending on the strain of the bacteria, virus, or protozoa, infections can (but may not always) cause a disease. Therefore, not all STIs cause STDs, but an STD is classified as an STI (https://www.medinstitute.org/2011/11/std-sti-sti-std-whats-the-difference/, accessed 31 March 2017).

Knowledge and attitudes

Several studies report a positive impact on knowledge and attitudes. The HIV prevention programme in Mongolian secondary schools (Cartagena et al. 2006) made students more knowledgeable with regard to HIV and sexual health; the information campaign in Nigeria increased reported knowledge about STIs, condom use, and treatment-seeking behaviour (Okonofua et al. 2003); the health education project in Tanzania (Doyle et al. 2010; Ross et al. 2007) had a significant impact on the participants' health knowledge; a cluster RCT offering an HIV-prevention course in Mexico improved knowledge about HIV (Walker et al. 2006); and students in Zambia who followed a peer education programme in secondary schools were more positive as to the use of condoms and abstinence shortly after the programme (Agha and Van Rossem 2004).

Sexual behaviour

Media-based reproductive health campaigns have proven effective in increasing women's contraceptive use, as shown in Cameroon, Botswana, South Africa, and Guinea (Agha 2002). Similar results were found from a multimedia campaign in Zimbabwe, where young people in campaign areas were much more likely to report saying no to sex, to visit a health centre, and to use contraceptives (Kim et al. 2001). An information campaign in Nigeria also increased condom use, awareness that the partner had an STD, and STD treatment-seeking behaviour (Okonofua et al. 2003). In South Africa, R. Magnani et al. (2005) used an instrumental variables approach to estimate the impacts of a life skills education programme in middle and secondary schools. They report significant increases in condom use at first and last sex. The PRACHAR Project in Bihar (India) also increased the demand for and use of contraceptives through communication interventions (Daniel et al. 2008).

There are, however, several studies with less positive findings. In their evaluation of a sexual education programme in Jamaica, Eggleston et al. (2000) do not find significant impacts on contraceptive use after one year. In Brazil, a combination of school-based sexual education and youth-friendly health services did not affect reported sexual behaviours or contraceptive use (R.J. Magnani et al. 2001). A sexual education intervention in secondary schools in Zambia did not cause significant changes in condom use (Agha and Van Rossem 2004). C.-H. Lou et al. (2004) base their report on an intervention that promotes contraception use among unmarried youths in Shanghai by building awareness and offering counselling and services related to sexuality and reproduction. They find a large, positive impact on contraception use shortly after the programme, but the effect vanishes three years later (Tu et al. 2008).

In Mongolia, Cartagena et al. (2006) evaluate the results of an HIV-prevention programme in secondary schools. Four years after the programme, they found no clear impact on (reported) safe sex practices. In Mexico, Walker et al. (2006) report from a cluster randomized trial with three groups, undergoing an HIV-prevention course with promotion of condom use, the same course including emergency contraception as a back-up, and the existing sexual education course. Reported condom use and sexual behaviour were similar in all groups. Finally, in another randomized trial, Ross et al. (2007) document the effects of a health education project in Tanzania with four components: community activities; teacher-led, peer-assisted sexual health education in primary schools; training and supervision of health workers to provide 'youth-friendly' sexual health services; and condom marketing. They observe a significant impact on reported STI symptoms, but not on biological outcomes. The follow-up study did not find significant impacts on reported sexual behaviours. Finally, in a randomized experiment involving 328 schools in Kenya, Dupas (2011) compares two groups: a control group in which the students received the standard national HIV curriculum, and a treatment group in which the students received

information on the relative risk of HIV infection by partner's age and gender. Compared with the control group, the treatment group reported increased sexual activity (but reduced risky sex). The study further suggests that girls moved away from older partners and toward younger partners.

Pregnancy

Cabezón et al. (2005) evaluate an abstinence-centred sex-education programme (TeenSTAR) in a Chilean high school in the mid-1990s. They randomized the programme within student cohorts, and followed the students for four years. They report a very large reduction in pregnancy rates: from 18.9 per cent to 3.3 per cent in the 1997 cohort and from 22.6 per cent to 4.4 per cent in the 1998 cohort.

In a randomized experiment involving 328 schools in Kenya, Dupas (2011) compares two groups: a control group in which the students received the standard national HIV curriculum, and a treatment group in which the students received information on the relative risk of HIV infection by partner's age and gender. Compared with the control group, the HIV risk treatment decreased the likelihood that girls started childbearing within a year by 28 per cent, while the abstinence programme had no impact. An additional important finding is that the treatment also increased reported sexual activity (but reduced risky sex). The study further suggests that girls moved away from older partners and toward younger partners.

Interestingly, Dupas et al. (2017) report from a similar experiment in Cameroon, where they compared a control group with groups (i) undergoing a one-hour HIV prevention session delivered by external consultants, (ii) undergoing the same one-hour session with additional information about the relative risk of HIV infection by partner's age, (iii) completing a one-hour self-administered HIV questionnaire, and (iv) following a classical HIV curriculum with their teacher. All treatments in this study reduced teen pregnancy by around 25 per cent.

In contrast to these positive findings, Doyle et al. (2010) report from a randomized intervention that provided sexual and reproductive health information, combined with 'youth-friendly' health services and subsidized condoms, in Tanzania. They do not find any impact on pregnancies or other sexual behaviours, despite strong improvements in knowledge. Similarly, Duflo et al. (2015), in Kenya, do not find any evidence of an impact on early pregnancy (or STIs) of an HIV curriculum stressing abstinence until marriage.

2.2 Expanding economic opportunities

During the last few decades, there has been a rise in interventions primarily aimed at changing economic opportunities in several development domains, including reproductive health. Interventions range from various cash-transfer schemes, conditioned or not on school enrolment and medical testing, to business or vocational training programmes.

There is limited evidence on the extent to which expanding economic opportunities also affects the mindset dimension, for instance in terms of locus of control. This may be important, since a change in the mindset has the potential to create a more durable effect of the intervention, going beyond the period of subsidies or training. We address this issue in the second part of this paper, where we report from our ongoing study in Tanzania. Here, we limit ourselves to studying the impact on sexual behaviour and pregnancy. The overall impression is that the expansion of economic opportunities, particularly through financial incentives, can be effective, but that programme design matters.

Sexual behaviour

Feldman et al. (2009) evaluate the effect of the conditional cash transfer (CCT) programme Oportunidades in Mexico, where the transfer was tied to regular health check-ups and school attendance, and report short-term, but no long-term, effects on contraceptive use. De Walque et al. (2012) study a randomized CCT programme where treated participants were eligible to receive a cash transfer if they tested negative for curable STIs. They compared high- and low-value transfers and find that that the high-value transfers reduced STI prevalence, measured by biomedical tests. Finally, Handa et al. (2014) report that a UCT of US$20 per month in Kenya leads to a significant postponement in the age of sexual debut.

Pregnancy

Several studies find that interventions that change economic incentives affect early pregnancies. In Pakistan, Alam et al. (2011) studied female-targeted cash transfers in the form of school stipends, where the transfer was made conditional on a minimum school attendance of 80 per cent. They find increased school enrolment among eligible girls, which appears to cause fewer teenage births and delayed marriage.

In their evaluation of the Zomba cash transfer programme for school attendance in Malawi, Baird et al. (2010) find large reductions in teenage pregnancy, early marriage, and self-reported sexual activity. In this study, school attendance was the only condition for the transfer, and the transfer as such was given in part to the student and in part to her guardian. In another experiment in Malawi, Baird et al. (2011) compare a CCT on school attendance with a UCT and a control group. Compared with the control group and the CCT, the UCT reduced the proportion of ever-pregnant women by 6.7 percentage points. They further show that the UCT effect comes from the girls who dropped out of school.

In India, another type of intervention had a large and significant impact on childbearing: it consisted of three years of recruiting services to help young women in randomly selected rural villages to get jobs in the business process outsourcing industry. Jensen (2012) find that the intervention reduced the likelihood of getting married or giving birth over the three-year period by 5–6 percentage points. In the same vein, Heath and Mobarak (2015) report that the expansion of the garment industry in Bangladesh in the 1980s and 1990s pushed women to pursue further education and delay marriage and childbearing.

Some studies do not find evidence that economic incentives reduce early pregnancies. Stecklov et al. (2007) evaluate the impact on fertility of the Oportunidades programme in Mexico as well as similar programmes in Nicaragua and Honduras, and do not find any impact on fertility of the programmes in Mexico or Nicaragua, and, surprisingly, an increase in fertility by 2 to 4 percentage points in Honduras. The authors argue that the increased fertility in Honduras could be due to the fact that eligibility for the programme required the household to include a pregnant woman or a child below three years old.

2.3   Combined treatments: changing the mindset and expanding opportunities

We have identified four studies that clearly target both mindset and economic opportunities. First, Duflo et al. (2015), in an RCT involving 328 schools in Kenya, compare the effects of (i) education subsidies (free uniforms), (ii) an HIV curriculum stressing abstinence, and (iii) both interventions combined. While the HIV curriculum had no impact, the education subsidy significantly reduced the teenage pregnancy rate, from 16 per cent to 13 per cent. Surprisingly, however, when the two programmes were implemented jointly, the pregnancy rate fell less than with the subsidy alone.

The authors report that the HIV prevention curriculum, which focuses on an abstinence-until-marriage message, in fact increased early marriage. The effect of earlier marriage therefore probably counteracted the positive opportunity effect from the education subsidies on childbearing.

Second, Buchmann et al. (2016) set up an RCT clustered by communities in rural Bangladesh. They compared a control group with (i) an empowerment programme, (ii) a financial payment conditional on marriage delay, and (iii) the combination of the two. More than four years after treatment, they find that the girls in the conditional payment group are 14 per cent less likely to have given birth before the age of 20. On the other hand, the empowerment programme has no separate or additional effect.

Finally, Bandiera et al. (2015), in Uganda, and Buehren et al. (2015), in Tanzania, evaluated an out-of-school adolescent club organized by BRAC, which provided both health training (life skills) (affecting *mindset*), business training (vocational skills) (affecting *opportunities*) and a safe social space for the girls to gather and socialize. In Uganda, the authors find a sharp increase in the participants' incomes and consumption after a two-year period, and correspondingly substantial reductions in rates of childbearing and marriage or cohabitation. The intervention indeed raised the likelihood that girls engage in income-generating activities by 72 per cent, while early pregnancy fell by 26 per cent. The Uganda study by Bandiera et al. (2015) suggests that acting on both the *mindset* and *opportunities* fronts may be very effective. They do not, however, find significant impacts in Tanzania, which they ascribe to challenges related to the implementation of the programme. These studies are, however, not able to disentangle the effects caused by the different parts of the programme. Our project in Tanzania, to which we shall shortly turn, is designed to address exactly that question.

2.4   Overall remarks on the literature

In evaluating the impact of interventions targeting early pregnancies and risky sexual behaviour, the literature has largely relied on self-reported measures of pregnancies, sexual behaviour, knowledge, and attitudes, with a few exceptions when biological outcomes are measured. The overall picture is mixed, but, perhaps not surprisingly, it is easier to foster changes in knowledge and attitudes than in sexual behaviour and pregnancies. Still, the more recent trend focusing on expansion of economic opportunities shows a lot of promise, with several evaluations documenting sustained improvements in behaviour and reductions in early pregnancies. This may indicate that lack of opportunities is a more binding constraint to healthy lives than lack of knowledge.

3   New evidence from Tanzania

To supplement the review of the literature, we provide a more detailed discussion an ongoing research project in Tanzania that evaluates the impact of health training and entrepreneurship training for young females (Berge et al. 2016). The overall aim of this project is to study how different interventions, separately and in combination, may reduce early pregnancies by changing the girls' mindset and by providing them with economic opportunities. We do not yet have data on pregnancies, and thus our analysis will focus on the intermediate question of whether, in the short term, these interventions managed to empower the girls. In this respect, we focus on how the interventions affect the participants' *mindset*, in the form of *locus of control* and *sexual discourse*, and perceived future economic *opportunities*, in the form of business plans.

We focus on locus of control because it is commonly used as a measure of girls' control over their body and sexuality.[4] Individuals with an internal locus of control expect things in their lives to happen because of their own efforts, skills, and ability rather than through external factors such as luck or fate (Rotter 1966). It has also been argued that people with an internal locus of control are more likely to engage and succeed in entrepreneurial activities, as they have a more positive outlook towards life, they are more likely to take action, and are more persistent (Rauch and Frese 2007). Arguably, therefore, strengthening internal locus of control can be important for improving both economic and health outcomes of adolescent girls, including delaying first pregnancy. At the same time, for an increase in internal locus of control to actually initiate changes in health and economic behaviour, the girls need knowledge about what represents risky sexual behaviour and economic opportunities that allow them to choose differently. Hence, targeting early pregnancies involves tackling an intricate set of relationships involving mindset, knowledge, and opportunities.

The following discussion also aims to illustrate an alternative approach to evaluating this type of intervention, by showing how the use of text analysis of essays written by the girls can shed light on underlying mechanisms and supplement more traditional survey approaches.

3.1 The study design

We sampled 80 schools with at least 20 girls in the last year of secondary school (Form IV) in the regions of Tabora, Singida, Morogoro, and Dodoma in Tanzania, reaching almost 3,500 girls. The baseline data were collected in April–May 2013, and the follow-up with the essay writing in October–November 2013. The schools are all public (i.e. state) schools. They have on average 60 girls registered in Form IV, but only 43 regularly attending. The girls mostly live in rural areas and were in the age range 16–18 at baseline, which is the age group for which we observe a sharp increase in fertility in rural Tanzania.

The average household of the girls consists of six members, and 20 per cent of households are headed by a woman. Half of the heads of households are farmers, the others either self-employed or public servants. At baseline, the majority declared that girls of their age typically have had their sexual debut. Eighty per cent also agreed with the statement '*Girls of my age sometimes receive money or gifts for having sex with older men*', and 60 per cent declared that the girls of their age are often sexually harassed. Most of them also knew other girls who had dropped out of school because they were pregnant. Their knowledge of reproductive health was limited: one-third thought that it is not possible to get pregnant from a first sexual intercourse.

Among the schools in our study, we randomly allocated 20 schools to entrepreneurship training, 20 schools to health training, 20 schools to receive both entrepreneurship and health training, and 20 schools to control. Two teachers per school in the treatment groups attended an instructor session organized by our local partner, the non-governmental organization Femina Hip. After these instructor sessions, in July–September 2013, the teachers implemented the training sessions with all the Form IV girls in their schools. Both the health training and the entrepreneurship training involved eight weekly training sessions of 1.5 to 2 hours, while those who got both types of training had two sessions per week over the eight weeks. The entrepreneurship programme trained the girls in customer care, marketing, record-keeping, pricing of products, and personal finance, and they were challenged to develop an entrepreneurial mindset and strengthen their self-

---

confidence. The health programme provided information and guidance about contraception and the consequences of risky sexual behaviour, as well as gender equality.

3.2   Text analysis of essays

A few weeks after the completion of the training programmes, we asked the girls to write a short essay about where they envisioned themselves in five to ten years' time in terms of education, livelihood, marriage, and the challenges they expected to face.[5]

To shed light on how the intervention shaped the girls' ambitions and visions, we report from two types of text analysis, one in-depth and the other based on a word count. For the in-depth analysis, we translated 192 essays, written by girls from four schools in the Morogoro region, from Swahili to English. The remaining essays were digitized and used for the word-count analysis so as to reveal the occurrence of words relating to locus of control and business plans.

The strength of the in-depth analysis of the text, compared with the word count, is that it provides a more nuanced and reliable categorization of the essays. The strength of the word count is that it can be more easily implemented on a large scale. As we show below, the results from both methods are consistent.

In the in-depth analysis, along the locus of control dimension, we assign a score of 1 to essays that reveal a strong sense of internal locus of control through the use of positive words such as '*I am confident*' and '*I am capable*'. In contrast, essays that have no positive words or have negative words such as '*I will not make it*' are assigned a score of 0 and are considered neutral.

For the text analysis, we first digitized the full sample of 3,128 hand-written essays, manually typing them into Microsoft Word documents. The documents were then converted and imported into Stata 14 for processing. All the analysis was done in the original language, Swahili, but we provide an English translation of the words used in this chapter.

The essays contained a total of 475,089 words. We removed all uninformative words (such as 'and', 'they', 'a' …) as well as punctuation (',', '.', '!' …). Finally, we removed all words that appeared fewer than 30 times in total. After this trimming, we were left with 112,648 words. These are the data that we use in the text analysis.

We scanned all the unique words and decided which ones should be included in each index:

- The general business index is equal to 1 if the essay contains the following words (and their variations): *business, entrepreneur, establish, self-employed, entrepreneurship.*
- The specific business index is equal to 1 if the essay contains the following words (and their variations): *funds, capital, sell, goods, shop, profit, gain, savings, customers, products, vegetable, sewing machine, poultry, fruit.*
- The locus of control index is equal to 1 if the essay contains the following words (and their variations): *I can, extrovert, confidence, independent, focus, toward the goal, I blossomed, opportunities, respect, self-respect.*

---

[5] One may of course worry that the participants report what they believe the researchers want to hear. The risk of such reporting bias applies to all studies based on self-reported information. One could argue, however, that essays are less prone to this bias than specific survey questions, since it is less clear what exactly the surveyor would like the respondent to put in the essay.

- The sexuality index is equal to 1 if the essay contains the following words (and their variations): *baby, maternity, love, sex.*

Text analysis: Locus of control

Figure 3 presents the locus of control index, by treatment group. In the in-depth analysis, we observe that the girls in the entrepreneurship training group appear to have the highest number of essays (49 per cent) with a score of 1, indicating a strong sense of internal locus of control, and the control group has the lowest. Most of the essays are neutral and there is no use of positive or affirming words. For the business group, most of the girls appear to be confident in their essays and optimistic about the future with the use of words such as '*I am capable*' and '*I believe that I will succeed*'.[6]

By using the word counts on the full sample of essays, we gain a very consistent picture, with all treatment groups showing a greater sense of *internal locus of control*. Both the health and the entrepreneurship interventions have the same impact on the locus of control index, which is equal to 0.06 (p-value of 0.011). The combined intervention has an impact of 0.09 (p-value <0.01)

---

[6] In the appendix, we show the corresponding regressions from Figures 3, 4, and 5, where we regress the indices on a dummy for each treatment group.

16

Figure 3: Locus of control across treatment groups
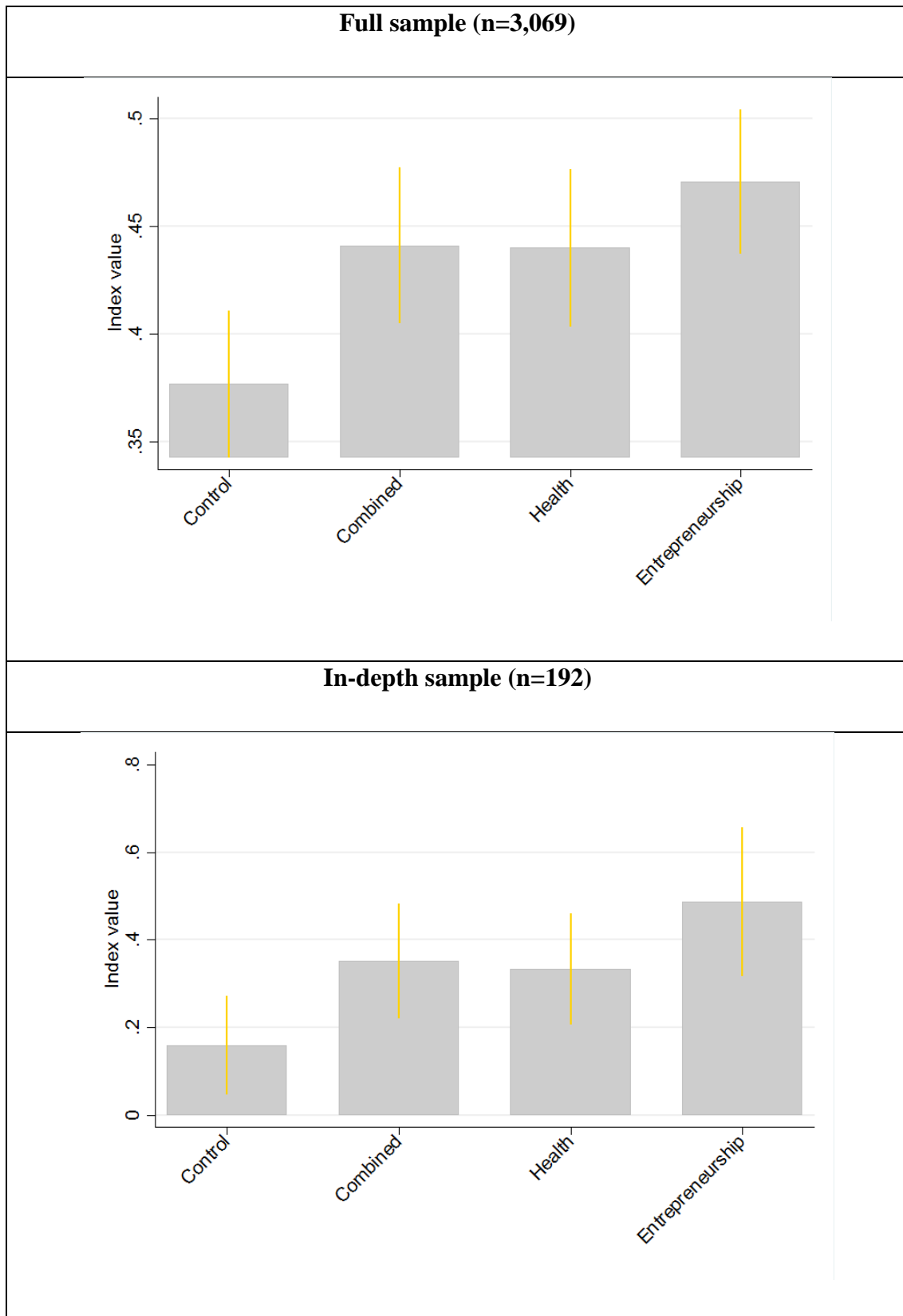
Note: The bars correspond to the mean index in each group, and the spikes show the 95% confidence intervals around those means.

Source: Data from the authors' research project.

Text analysis: Sexuality

Analysis of the sexuality index shows that while in the control group 42 per cent of the girls talk about sex, the proportion rises to 47 per cent in the health treatment group (impact of 0.05, p-value of 0.05), and decreases to 38 per cent in the entrepreneurship training treatment group (impact of -0.04, p-value of 0.08). It barely changes in the combined treatment group. This suggests that the health treated have integrated the sexual issues discussed in the training. By contrast, the entrepreneurship treated ignore sexuality to a larger extent when they describe their near future.

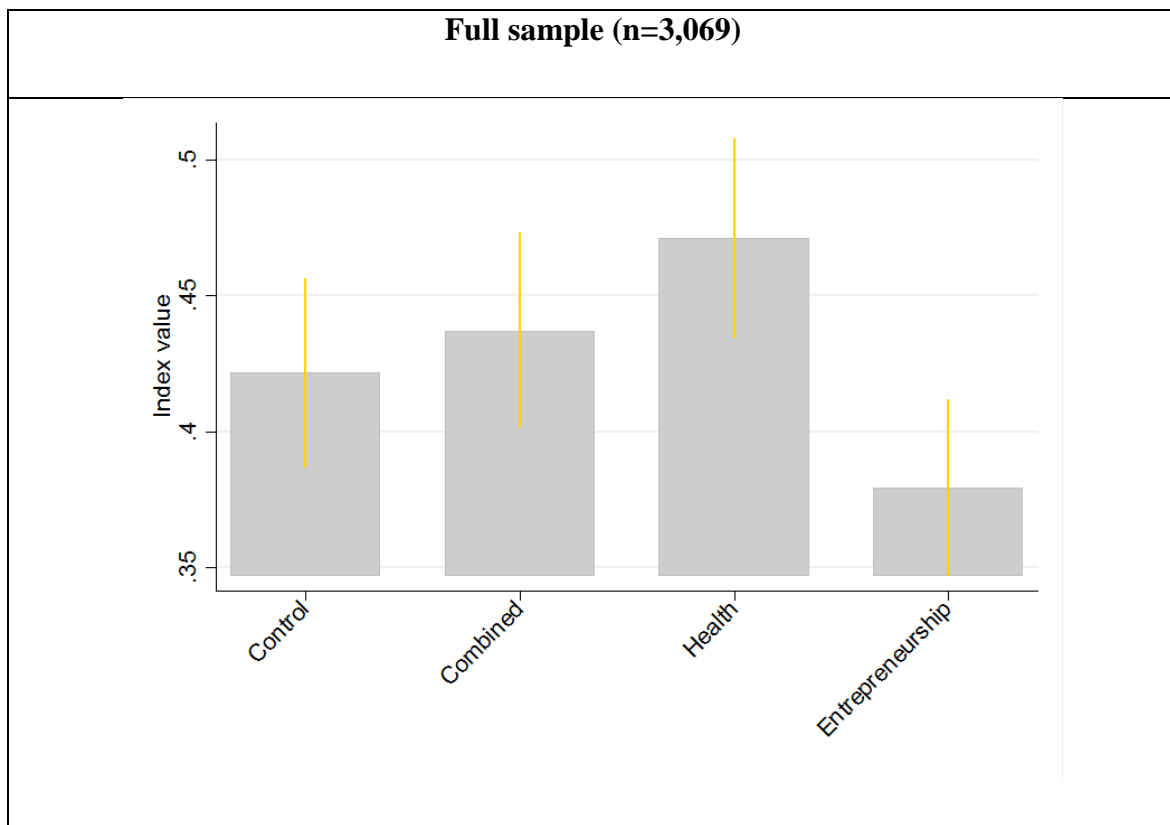Figure 4: Sexuality index across treatment groups

Note: The bars correspond to the mean index in each group, and the spikes show the 95% confidence intervals around those means.

Source: Data from the authors' research project.

Text analysis: Business plans

Figure 5 presents the results across treatment groups. Evidently, the entrepreneurship training programme and the combined health and entrepreneurship programme yield more essays in which business plans for the future are mentioned. Interestingly, compared with the control group, the health group has a much larger number of essays mentioning business plans, even though this group did not receive any form of business training. This could be due to a general empowerment and mindset effect from the health training, as suggested by the increased sense of internal locus of control shown above. The fact that we find a stronger impact of entrepreneurship training (impact of 0.33, p-value <0.01) than the combined training (impact of 0.27, p-value <0.01) could suggest that adding health training takes some of the students' attention away from the business training.

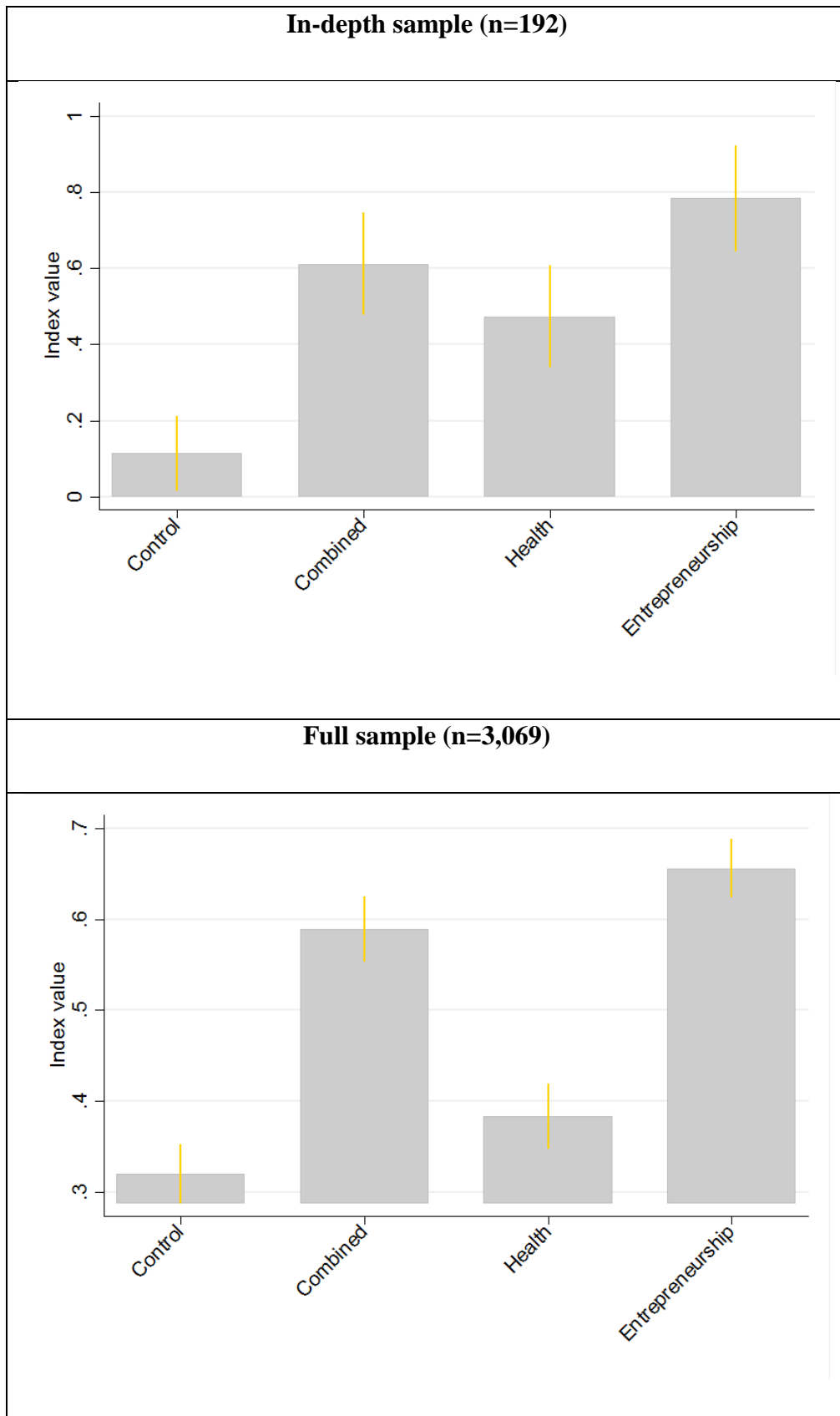Figure 5: General business plans across treatment groups

Note: The bars correspond to the mean index in each group, and the spikes show the 95% confidence intervals around those means.

Source: Data from the authors research project.

Furthermore, we also categorize, and distinguish between, essays mentioning business plans in general terms and those with more specific or detailed business plans. A business plan is regarded as general when there is mention of starting a business but no precision about the type of business. For instance, the statement '*In the future I would like to have my own business that will provide me with income*' was categorized as a general business plan. On the other hand, the statement '*I will start a business selling vegetables*' was regarded as a specific business plan.

The rationale behind this distinction between general and specific business plans is to separate girls who have thought more carefully about setting up a business, for instance as a result of the business training module, and those who have only vague ideas about their business future. Potentially, those with more developed business ideas are also more likely to set up a business once out of school. Figure 6 presents results of the essay scores based on the business plan criterion. The picture is very similar to the one obtained with general business plans (see Figure 6). As seen from the appendix, the scores for all treatment groups, except health training in the full sample, are different from the control group.

Figure 6: Specific business plans across treatment groups
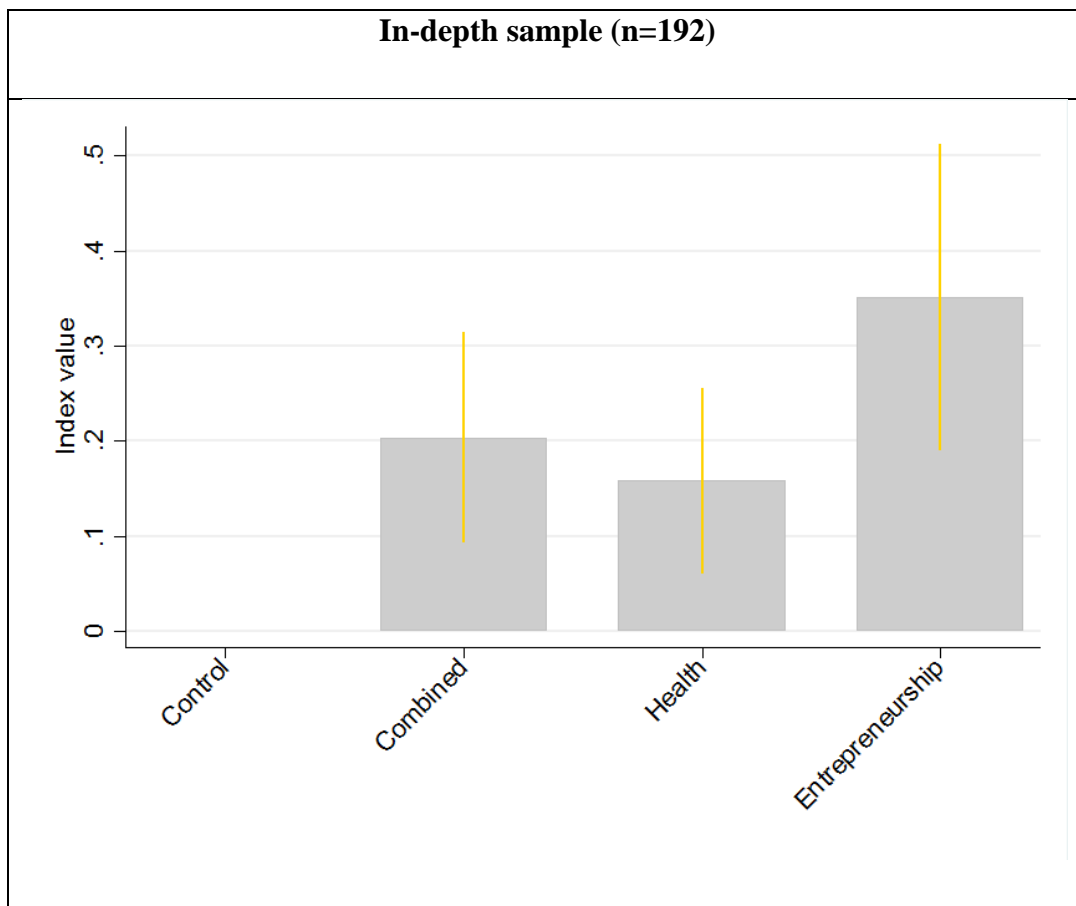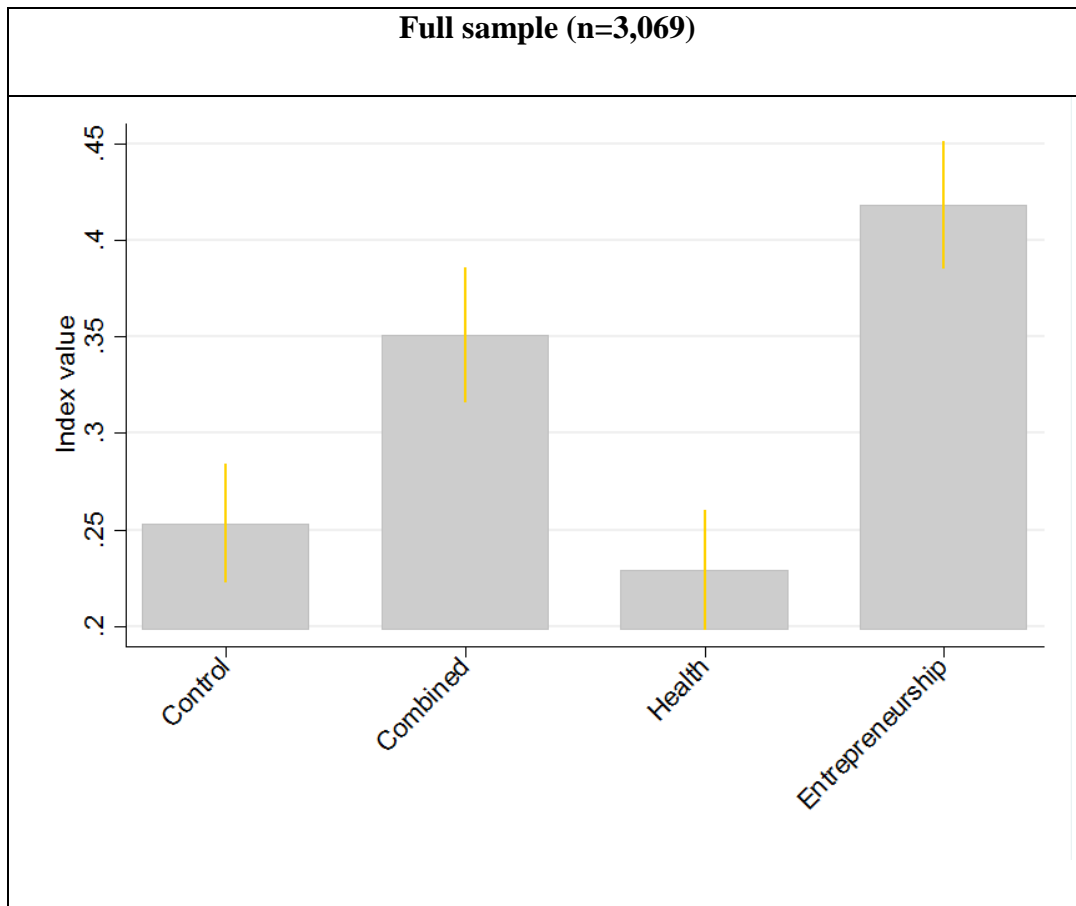
Full sample (n=3,069)

Note: The bars correspond to the mean index in each group, and the spikes show the 95% confidence intervals around those means.

Source: Data from the authors' research project.

3.3   Text analysis: overall findings

We observe that the girls who have been in different treatment groups have very different hopes for the future. Compared with the control, the health group treated exhibit a much higher sense of *internal locus of control* and are more likely to discuss *issues of sexuality*. On the other hand, only those who received the business treatment (the single treatment or together with health) mention clear *economic plans* and *opportunities*. The business treated also demonstrate a higher sense of *internal locus of control*, but they mention sex-related issues to a lesser extent.

If the delaying of pregnancies requires changes in both mindset (preferences and beliefs relating to sexual activity, pregnancy, and their consequences) and opportunities (economic alternatives to early marriage and motherhood), our findings suggest that entrepreneurship training, alone or in combination with health training, is more effective than health training alone. The long-run follow-up data in this project, which will contain information on pregnancy, will establish whether this actually is the case.

4   Conclusion

Early pregnancies are associated with negative effects on young women's health outcomes, educational attainment, and future employment and economic opportunities. Interventions to reduce this problem typically target the young women's mindset, through educational programmes

about reproductive health and family planning. In addition, interventions have targeted economic opportunities through cash transfers and, more recently, through business or vocational training.

The literature on interventions targeting the mindset dimension shows that success cannot be taken for granted. While such programmes typically manage to improve knowledge and change attitudes, the impact on pregnancies and sexual behaviour is rather mixed. One reason why changes in mindset do not necessarily result in changes in outcomes could be the lack of economic alternatives. If entering into a relationship with an older man is the only viable path to making a living, then changing the mindset will not achieve much.

This is why interventions that seek to expand economic opportunities for adolescent girls are a promising policy agenda. Indeed, during the last few decades, there has been a surge in such interventions, ranging from conditional cash transfers to entrepreneurship training programmes. Again, the evidence on the effectiveness of such programmes to reduce early pregnancy and change sexual behaviour is rather mixed, and some of the positive impacts have proven to be short-lived. One possible reason why expanding economic opportunities does not necessarily lead to lasting changes in outcomes is that such changes need to be combined with a change in girls' awareness. The opportunities must be there but the girls also need the confidence to seize them.

A few studies consider the impact of interventions that target both mindset and opportunities, and the results are encouraging. But given the complexity of such interventions, we do not know enough about the mechanisms of change. Do programmes such as youth clubs in Uganda, evaluated by Bandiera et al. (2015) and found to be highly successful in reducing early pregnancy, primarily work through a mindset change or through increasing economic opportunities? Or is there some other channel, such as providing girls with a safe space in which to socialize?

Our analysis of essays written by more than 3,000 girls in rural Tanzania addresses the question of the mechanism of change. It indicates that training in both health (targeting the mindset) and entrepreneurship (targeting economic opportunities) has had an impact on the girls' sense of being the locus of control. Also, the entrepreneurship programme has been successful in stimulating new business plans, which can be seen as a first step towards economic empowerment. Since this is an ongoing project, we do not yet have evidence on how the intervention in the end affected pregnancy. We show, however, not only that entrepreneurship training expands the feeling of greater future opportunities, as expressed though business plans, but that both interventions shape the mindset. Our findings may thus contribute to explaining why economic interventions may be more successful than pure health interventions, and shed light on the mechanisms underlying such field interventions.

More work, however, is needed in order to understand what types of intervention are more effective in reducing early pregnancies in developing countries, and about the mechanism of change. This, we propose, is a promising area for future research.

References

Agha, S. (2002). 'A Quasi-experimental Study to Assess the Impact of Four Adolescent Sexual Health Interventions in Sub-Saharan Africa'. *International Family Planning Perspectives*, 28(2): 67–70, 113–18. DOI: 10.2307/3088237.

Agha, S., and R. Van Rossem (2004). 'Impact of a School-based Peer Sexual Health Intervention on Normative Beliefs, Risk Perceptions, and Sexual Behavior of Zambian Adolescents'. *Journal of Adolescent Health*, 34: 441–52. DOI: 10.1016/j.jadohealth.2003.07.016.

Alam, A., J.E. Baez, and X.V. Del Carpio (2011). *Does Cash for School Influence Young Women's Behavior in the Longer Term? Evidence from Pakistan*. Policy Research Working Paper 5669. World Bank.

Bailey, M.J. (2006). 'More Power to the Pill: The Impact of Contraceptive Freedom on Women's Life Cycle Labor Supply'. *The Quarterly Journal of Economics*, 121(1): 289–320. DOI: 10.1093/qje/121.1.289.

Baird, S., E. Chirwa, C. McIntosh, and B. Özler (2010). 'The Short-term Impacts of a Schooling Conditional Cash Transfer Programme on the Sexual Behavior of Young Women'. *Health Economics*, 19(S1): 55–68. DOI: 10.1002/hec.1569.

Baird, S., C. McIntosh, and B. Özler (2011). 'Cash or Condition? Evidence from a Cash Transfer Experiment'. *The Quarterly Journal of Economics*, 126(4): 1709–53. DOI: 10.1093/qje/qjr032.

Bandiera, O., N. Buehren, R. Burgess, M. Goldstein, S. Gulesci, I. Rasul, and M. Sulaiman (2015). *Women's Empowerment in Action: Evidence from a Randomized Control Trial in Africa*. EnGender Impact: the World Bank's Gender Impact Evaluation Database. Washington, DC: World Bank Group. (Updated version available at: http://www.ucl.ac.uk/~uctpimr/research/ELA.pdf, accessed 12 June 2017).

Berge, L.I.O., K. Bjorvatn, T. Kida, L. Helgesson Sekei, V. Somville, and B. Tungodden (2016). *Barriers to Female Empowerment: Evidence from a Field Experiment in Tanzania* (unpublished).

Buchmann, N., E. Field, R. Glennerster, and S. Nazneen (2016). 'The Effect of Conditional Incentives and a Girls' Empowerment Curriculum on Adolescent Marriage, Childbearing and Education in Rural Bangladesh: A Community Clustered Randomized Controlled Trial' (unpublished).

Buehren, N., M. Goldstein, S. Gulesci, M. Sulaiman, and V. Yam (2015). 'Evaluation of Layering Microfinance on an Adolescent Development Programme for Girls in Tanzania' (unpublished).

Cabezón, C., P. Vigil, I. Rojas, M.E. Leiva, R. Riquelme, W. Aranda, C. García, et al. (2005). 'Adolescent Pregnancy Prevention: An Abstinence-centered Randomized Controlled Intervention in a Chilean Public High School'. *Journal of Adolescent Health*, 36(1): 64–9. DOI: 10.1016/j.jadohealth.2003.10.011.

Cartagena, R.G., P.J. Veugelers, W. Kipp, K. Magigav, and L.M. Laing (2006). 'Effectiveness of an HIV Prevention Programme for Secondary School Students in Mongolia'. *Journal of Adolescent Health*, 39(6): 925.e9–16. DOI: 10.1016/j.jadohealth.2006.07.017.

Daniel, E.E., R. Masilamani, and M. Rahman (2008). 'The Effect of Community-based Reproductive Health Communication Interventions on Contraceptive Use among Young Married Couples in Bihar, India'. *International Family Planning Perspectives*, 34(4): 189–97. DOI: 10.1363/ifpp.34.189.08

Doyle, A.M., D.A. Ross, K. Maganja, K. Baisley, C. Masesa, A. Andreasen, M.L. Plummer, et al. (2010). 'Long-term Biological and Behavioural Impact of an Adolescent Sexual Health

Intervention in Tanzania: Follow-up Survey of the Community-based MEMA kwa Vijana Trial'. *PLoS Medicine*, 7(6): e1000287. DOI: 10.1371/journal.pmed.1000287.

Duflo, E., P. Dupas, and M. Kremer (2015). 'Education, HIV, and Early Fertility: Experimental Evidence from Kenya'. *American Economic Review*, 105(9): 2757–97. DOI: 10.1257/aer.20121607.

Dupas, P. (2011). 'Do Teenagers Respond to HIV Risk Information? Evidence from a Field Experiment in Kenya'. *American Economic Journal: Applied Economics*, 3(1): 1–34. DOI: 10.1257/app.3.1.1.

Dupas, P., E. Huillery, and J. Seban (2017). 'Risk Information, Risk Salience, and Adolescent Sexual Behavior: Experimental Evidence from Cameroon' (unpublished).

Eggleston, E., J. Jackson, W. Rountree, and Z. Pan (2000). 'Evaluation of a Sexuality Education Programme for Young Adolescents in Jamaica'. *Pan American Journal of Public Health*, 7(2): 102–12.

Feldman, B.S., A.M. Zaslavsky, M. Ezzati, K.E. Peterson, and M. Mitchell (2009). 'Contraceptive Use, Birth Spacing, and Autonomy: An Analysis of the Oportunidades Programme in Rural Mexico'. *Studies in Family Planning*, 40(1): 51–62.

Gallant, M., and E. Maticka-Tyndale (2004). 'School-based HIV Prevention Programmes for African Youth'. *Social Science & Medicine*, 58(7): 1337–51. DOI: 10.1016/S0277-9536(03)00331-9.

Goldin, C., and L.F. Katz (2002). 'The Power of the Pill: Oral Contraceptives and Women's Career and Marriage Decisions'. *Journal of Political Economy*, 110(4): 730–70.

Handa, S., C.T. Halpern, A. Pettifor, and H. Thirumurthy (2014). 'The Government of Kenya's Cash Transfer Programme Reduces the Risk of Sexual Debut among Young People Age 15–25'. *PLoS ONE*, 9(1): e85473. DOI: 10.1371/journal.pone.0085473.

Heath, R., and A.M. Mobarak (2015). 'Manufacturing Growth and the Lives of Bangladeshi Women'. *Journal of Development Economics*, 115: 1–15. DOI: 10.1016/j.jdeveco.2015.01.006.

Jensen, R. (2012). 'Do Labor Market Opportunities Affect Young Women's Work and Family Decisions? Experimental Evidence from India'. *The Quarterly Journal of Economics*, 127(2): 753–92. DOI: 10.1093/qje/qjs002.

Kim, Y.M., A. Kols, R. Nyakauru, C. Marangwanda, and P. Chibatamoto (2001). 'Promoting Sexual Responsibility among Young People in Zimbabwe'. *International Family Planning Perspectives*, 27(1): 11–19. DOI: 10.2307/2673800.

Lou, C.-H., B. Wang, Y. Shen, and E.-S. Gao (2004). 'Effects of a Community-based Sex Education and Reproductive Health Service Programme on Contraceptive Use of Unmarried Youths in Shanghai'. *Journal of Adolescent Health*, 34(5): 433–40. DOI: 10.1016/j.jadohealth.2003.07.020

Lou, C.-H., X. Wang, X. Tu, and E. Gao (2008). 'Impact of Life Skills Training to Improve Cognition on Risk of Sexual Behavior and Contraceptive Use among Vocational School Students in Shanghai, China'. *Journal of Reproduction & Contraception*, 19(4): 239–51.

Magnani, R., K. MacIntyre, A.M. Karim, L. Brown and P. Hutchinson (2005). 'The Impact of Life Skills Education on Adolescent Sexual Risk Behaviors in KwaZulu-Natal, South Africa'. *Journal of Adolescent Health*, 36: 289–304.

Magnani, R.J., L. Gaffikin, E.M. de Aquino, E.E. Seiber, M.C. Almeida, and V. Lipovsek (2001). 'Impact of an Integrated Adolescent Reproductive Health Programme in Brazil'. *Studies in Family Planning*, 32(3): 230–43.

Miller, G. (2010). 'Contraception as Development? New Evidence from Family Planning in Colombia', *Economic Journal*, 120(545): 709–36.

Okonofua, F.E., P. Coplan, S. Collins, F. Oronsaye, D. Ogunsakin, J.T. Ogonor, J.A. Kaufman, et al. (2003). 'Impact of an Intervention to Improve Treatment-seeking Behavior and Prevent Sexually Transmitted Diseases among Nigerian Youths'. *International Journal of Infectious Diseases*, 7(1): 61–73. DOI: 10.1016/S1201-9712(03)90044-0.

Oringanje, C., M.M. Meremikwu, H. Eko, E. Esu, A. Meremikwu, and J.E. Ehiri (2016). 'Interventions for Preventing Unintended Pregnancies among Adolescents'. In C. Oringanje (ed.), *Cochrane Database of Systematic Reviews*. Chichester, UK: John Wiley & Sons. DOI: 10.1002/14651858.CD005215.pub3.

Rasul, I. (2008). 'Household Bargaining over Fertility: Theory and Evidence from Malaysia'. *Journal of Development Economics*, 86(2): 215–41. DOI: 10.1016/j.jdeveco.2007.02.005.

Rauch, A., and M. Frese (2007). 'Let's Put the Person Back into Entrepreneurship Research: A Meta-analysis on the Relationship Between Business Owners' Personality Traits, Business Creation and Success'. *European Journal of Work and Organizational Psychology*, 16: 353–85.

Ross, D.A., J. Changalucha, A.I. Obasi, J. Todd, M.L. Plummer, B. Cleophas-Mazige, A. Anemona, et al. (2007). 'Biological and Behavioural Impact of an Adolescent Sexual Health Intervention in Tanzania: A Community-randomized Trial'. *AIDS*, 21(14): 1943–55. DOI: 10.1097/QAD.0b013e3282ed3cf5.

Rotter, J.B. (1966). 'Generalized Expectancies for Internal versus External Control of Reinforcement'. *Psychological Monographs*, 80(1): 1–28.

Stecklov, G., P. Winters, J. Todd, and F. Regalia (2007). 'Unintended Effects of Poverty Programmes on Childbearing in Less Developed Countries: Experimental Evidence from Latin America'. *Population Studies*, 61(2): 125–40. DOI: 10.1080/00324720701300396.

Tu, X., C. Lou, E. Gao, and I.H. Shah (2008). 'Long-term Effects of a Community-based Programme on Contraceptive Use Among Sexually Active Unmarried Youth in Shanghai, China'. *Journal of Adolescent Health*, 42(3): 249–58. DOI: 10.1016/j.jadohealth.2007.08.028.

Walker, D., J.P. Gutierrez, P., Torres, and S.M. Bertozzi (2006). 'HIV Prevention in Mexican Schools: Prospective Randomised Evaluation of Intervention'. *BMJ*, 332(7551): 1189–94. DOI: 10.1136/bmj.38796.457407.80.

de Walque, D., W.H. Dow, R. Nathan, R. Abdul, F. Abilahi, E. Gong, Z. Isdahl, et al. (2012). 'Incentivising Safe Sex: A Randomised Trial of Conditional Cash Transfers for HIV and Sexually Transmitted Infection Prevention in Rural Tanzania'. *BMJ Open*, 2(1): e000747. DOI: 10.1136/bmjopen-2011-000747.

World Bank (2012). *World Development Report 2012 – Gender Equality and Development. World Development Report 2012*. DOI: 10.1080/13552070512331332273.

World Health Organization (2014). 'Adolescent Pregnancy'. *WHO Fact Sheet*. World Health Organization. Available at: http://www.who.int/mediacentre/factsheets/fs364/en/#.WL0uYzXWtwY.email (accessed 6 March 2017).

Appendix A: Regression tables

We estimate the following regression:

$$Y_i = \alpha + \beta_1 {}^* H_i + \beta_2 {}^* E_i + \beta_3 {}^* C_i + \varepsilon_i$$

where Y_i is equal to one if word Y is used in essay I, and equal to zero otherwise; H_i is an indicator equal to one if i is in the Health arm; E_i is an indicator equal to one if i is in the Entrepreneurship arm; and C_i is an indicator equal to one if i is in the Combined arm.

Table A1: Locus of control and sexuality

	Locus of control		Sexuality
	All essays	In-depth	All essays
Health	0.06**	0.17*	0.05*
	(0.03)	(0.09)	(0.03)
Entrepreneurship	0.09***	0.33***	-0.04*
	(0.02)	(0.10)	(0.02)
Combined	0.06**	0.19**	0.02
	(0.03)	(0.09)	(0.03)
Mean in control group	.38	.16	.42
Obs.	3,069	192	3,069
R2	0.01	0.05	0

Note: Standard errors in parentheses, significant at *10%, **5% and ***1%.

Source: Data from the authors' research project.

Table A2: Entrepreneurship

	Entrepreneurship: general		Entrepreneurship: specific	
	All essays	In-depth	All essays	In-depth
Health	0.06**	0.36***	-0.02	0.16**
	(0.02)	(0.09)	(0.02)	(0.07)
Entrepreneurship	0.34***	0.67***	0.16***	0.35***
	(0.02)	(0.10)	(0.02)	(0.08)
Combined	0.27***	0.50***	0.10***	0.20***
	(0.02)	(0.09)	(0.02)	(0.07)
Mean in control group	.32	.11	.25	0
Obs.	3069	192	3069	192
R2	0.08	0.21	0.03	0.09

Note: Standard errors in parentheses, significant at *10%, **5% and ***1%.

Source: Data from the authors' research project.