

Title: The Impact of Social and Emotional Learning: Experimental Evidence from Adolescent Girls in Liberia

Authors: Tricia Koroknay-Palicz, Joao Montalvao

Affiliation: World Bank

Abstract: We experimentally test the impact of a mentorship intervention that attempted to foster social and emotional learning amongst adolescent girls aged 12-15 in Liberia. Relative to control girls, in just under a year, treatment girls are about 4 percentage points and 3 percentage points more likely to have completed primary school and to have ever enrolled in secondary school. This push in the transition from primary to secondary school was accompanied by a significant improvement in the quality of girls' relationships with their peers and parents. These impacts are concentrated among the younger girls aged 12-13. Results suggest that policy interventions aimed at increasing social and emotional skills among adolescent girls in fragile environments can be effective in the critical period when girls hit puberty.

1. Introduction

Differential investment in human capital during adolescence is a key driver of gender gaps in social and economic empowerment during adulthood. Premature school drop-out, early marriage, and the onset of childbearing are all associated with the onset of adult responsibilities, and curtailed human investment. Around the world girls marry younger and begin childbearing earlier than their male counterparts. And while it is decreasingly so, historically girls have been less likely to be enrolled in school than boys, and more likely to drop-out early.

Possible contributing factors include norms and preferences (e.g. about gender, family formation, occupation, etc.); information (e.g. about pregnancy, contraceptives, income generating opportunities, etc.); and resources (including money, time, networks, formal schooling, vocational skills, work experience, and social and emotional skills).

Understanding the relative importance of each of these mechanisms, and how to effectively address those factors that are most critical, is of utmost importance to policymakers. Unfortunately, given that many interventions address multiple factors simultaneously, identifying the relative contribution of each factor, and the causal pathways through which these interventions achieve their desired outcomes, is extremely difficult. For instance, if a program provides a mix of vocational skills, social and emotional skills, and

material support, and has positive impacts on income, it is difficult to know the extent to which each component of the intervention contributed to this outcome.

This study is designed to capture the impacts of a social and emotional learning program for delivered through mentors and girls groups on adolescent girls. This study is rooted in two key hypotheses. First, that delivering social and emotional skills or non-cognitive skills) may potentially be powerful in and of itself. And second, that targeting younger adolescents may be more impactful than targeting older adolescents

First, one important note on terminology. Social and emotional skills are often referred to as soft skills, life skills, or non-cognitive skills. But not all life skills are social and emotional skills.¹

Recent advances in development and behavioral economics as well as in personality psychology and neurosciences have put forward the salience of individuals' socio-emotional abilities for living a productive life. While there is a relatively established literature on the impact of social-emotional skills on schooling and labor market outcomes in developed country settings (Borghans et al 2006, Deming 2017, Edin et al 2017, Heckman et al 2006, Lindqvist and Vestman 2011), the literature on the role of social and emotional skills in developing countries is more limited. In Uganda, life skills have been found to positively impact Ugandan adolescent girls' outcomes ranging from risky behaviors to occupational choice (Bandiera et al 2018). In Zambia, Ashraf et al (2018) find that a negotiation skills training for adolescent girls improved girls education outcomes, and had greater effects than two alternative treatments (offering girls a safe physical space with female mentors and offering girls information about the returns to education), suggesting that negotiation skills themselves drive the effect. In Togo, in a program for entrepreneurs, Campos et al (2018) find that personal initiative training was far more impactful than standard business training, and that the training has even stronger positive impacts on men than on women. In Uganda, Gertler et al (ongoing study) randomly assign high school graduates to hard-skill intensive training or a soft-skill intensive training. They find that although both hard and soft skills training are rewarded in the wage sector, and both increase business start-ups, only soft skills increase profitability. And in Malawi, Montalvao et al (2017) find a positive link between the noncognitive skills of women farmers and the adoption of a cash crop.

¹ The term life skills is often used to encompass everything from financial literacy trainings to sexual education to trying to change norms and preferences to tips on communication.

Our hypothesis that targeting younger rather than older adolescents may be more impactful is supported by several lines of reasoning. First, research in neuroscience indicates that adolescence offers a window of opportunity in terms of malleability of the brain, in particular of the pre-frontal cortex – the area of the brain responsible for emotional and social regulation [Dahl 2014]. Second, that actions taken during adolescence can have long lasting consequences (e.g. sex, pregnancy, school drop-out). Third, that providing girls with social and emotional skills will multiply the value of other investments made in and by the girls during adolescence. A final rationale for targeting younger adolescents comes from literature that suggests that it is much easier to change behavior before that behavior is established, as well as literature that supports just-in-time information and learning as critical for that information and learning to impact behavior. In Liberia, the average age at which girls first have sexual relations is 16 (LISGIS 2014).

It is also worth noting that the design of the Sisters of Success (SOS) program, whose impact we evaluate, was informed by, and in response and in intentional contrast to a previous program in the same country and city that targeted 16-24 year old girls. Also worth noting is that that previous program that targeted older adolescent girls, the Economic Empowerment of Adolescent Girls (EPAG) program, was one of a set of programs supported by the World Bank’s Adolescent Girls Initiative, most of which focused on older adolescents. The organizations that designed and implemented SOS were also involved in the implementation of EPAG, and voiced suspicions that it may be reaching girls too late.

2. Intervention and Research Design

2.1. Intervention

This study analyzes the impact of the Sisters of Success (SOS) Program, in which mentors and girls’ groups were used to deliver life skills (specifically social and emotional skills) to adolescent girls aged 12-15. The program theory of change was that increasing girls’ endowments of social and emotional skills would help girls’ deal more effectively with the demands and challenges of everyday life and adversity; increase the quality of their interpersonal relationships; help them make better decisions; and help them set and achieve goals. And that this in turn would impact girls’ life outcomes, potentially including educational attainment, age at first pregnancy, and beyond (e.g. employment and earnings, selection of spouse, and age at marriage).

The program conceptualized the girl as an active agent in her own life, able to act on her environment, and influence her own life outcomes. And although the program did provide some information (i.e. about contraception), the program's main focus was helping the girl develop social and emotional skills, so that the girl could use these skills to further her goals, whatever those goals might be. This program theory was inspired by the ideas of social and emotional skills as foundational skills and protective assets. The delivery of the social and emotional skills curriculum by mentors in a group setting was intentional: in this setting, mentors could model the skills, and girls could practice the skills, both with the mentors and with each other. However, it is also important to note that the relationships developed during SOS, both with the mentors as well as with other girls, could in theory impact girls through a variety of other non-skill-based channels, including by altering girls' norms, preferences, aspirations, as well as the networks and relationships themselves serving as a valuable asset for program beneficiaries.

Mentors were recruited² from the same neighborhoods as the girls and were unpaid volunteers. All mentors were female, aged 18 and older, and secondary school graduates³. The average (median) mentor was 27 years old, and they ranged in age from 20 to 50. Mentors received eight days of training, were provided with a curriculum, and a stipend of approximately \$30 USD each month to cover costs incurred while fulfilling their responsibilities as mentors. To put the stipend in perspective, mentor survey data shows that mentors' median monthly income is \$49 USD, and that their monthly spending on expenses related to fulfilling their responsibilities as mentors is \$18 USD on average.⁴

Each of the 144 mentors was paired with approximately ten girls, and the girls and their mentor jointly comprised a "mentor group". Each mentor group was comprised of either younger girls (those aged 12-13 at baseline), or older girls (those aged 14-15 at baseline). Mentor groups within the same zone and age group were paired together to form a sisterhood. Most sisterhoods were comprised of two mentor groups, although some were comprised of three. Each sisterhood met twice a month for fifteen months, for a total of thirty sessions. Sisterhood meetings were designed to last two hours. Of the two hours, 45

² Potential candidates were identified based on recommendations from local authorities, chiefs, elders, religious groups, women's groups, teachers, business people, youth and girls' groups.

³ In addition to meet the basic eligibility criteria (gender, age, and education level), additional eligibility criteria included that mentors be persons of integrity, honesty, and trust in the eyes of the community; no criminal record; person who will uphold confidentiality; reliable/dependable; gracefully willing to create change amongst girls; genuinely interested in community/girls development work; respect for others especially girls and women; and an opinion shaper and role model.

⁴ \$5.21 on phone calls; \$4.66 on own transport; \$5.58 for refreshments for girls; and \$2.56 on transport for girls.

minutes were notionally allocated for the mentors to follow the curriculum and present the topic of the day, nearly all of which were focused on social and emotional learning. The rest of the time was dedicated to discussion, bonding, and practicing the new skills. Topics covered in the curriculum included trust building, communication and listening, managing emotions, resolving conflict, problem solving, and establishing and maintain healthy relationships. Although there were modules dedicated to “my body and healthy relationship skills”, and “money, saving, and future goals”, in addition to conveying information, both modules focused on applying the newly learned social and emotional skills in these contexts.

The Sisters of Success program took place from February 2014 through April 2015. Three months after the SOS program began, all of Liberia, and the city of Monrovia, in particular, were affected by an ebola epidemic. The program continued despite the epidemic - after careful discussion, the mentors decided to continue the SOS program in spite of the ebola outbreak. They saw the SOS program as even more important during this time. And they introduced measures to reduce the risk of ebola spread during the program (by introducing bleach water for handwashing and eliminating all bodily contact, including hugs and holding hands from the program), and used the SOS program as an opportunity to provide girls with information on how to reduce the risk of ebola infection.

2.2. Research Design

We test our hypotheses by conducting a randomized controlled trial with girls in Liberia who registered for the Sisters of Success Program. Registration was open to all girls aged 12-15 residing within targeted neighborhoods of Monrovia, Liberia’s capital city.⁵ Inclusion in the study sample was conditional on the girl having registered for the SOS program; the girl and her guardian completing baseline surveys; and the guardian consenting to the girl’s participation in the SOS program, should she be selected. In total, the study sample is comprised of 2,884 girls.

Half of the girls in the study sample were randomly selected to participate in the SOS program and became the treatment group, and the other half were used as the control group. We stratified the randomization

⁵ Bassa Community, Battery Factory, Bentol, Brewerville, Chicken Soup Factory, Clara Town, Congo Town’s Peace Island, Doe Community’s Freeport, Duport Road’s Voka Mission and Zubah Town, Logan Gown, Morris Farm, New Kru Town, Old Road’s Gaye Town, Pipeline, Redlight’s Soul Clinic and Wood Camp, and West Point.

by girls age, schooling status, and geography.⁶ Although we randomized at the individual girl-level, girls who were close friends, sisters, or living in the same household were randomized jointly to either treatment or control⁷. In total, 1,420 girls were randomized to treatment, and 1,464 to control.

The average treatment girl attended 19 out of 30 SOS group sessions. This corresponds to an average take-up rate of 63%. Figure 1 shows the distribution of attendance, by age group. We see that about 95% of the girls attended at least one session, and more than half attended more than 20 sessions.

As discussed above, program implementation was also stratified by age. And our sample size was large enough to allow us to capture differential program impacts by age.

The cut-off point between younger and older girls, both in the program and in our analysis, is informed by the average age of menarche (13.5 within our study sample), as well as by the child development literature, which highlights important differences between 11-13 year-old girls, and 13-16 year-old girls. These include physical development (sexual maturity); cognitive development (transition from concrete, present focused thinking to abstract, future-oriented thinking); psycho-social development and independence (movement away from and questioning/rejection of parents' values/rules, towards increased focus on self and friends); and intimacy (onset of dating and sexual activity)⁸.

We conduct survey interviews with girls and their guardians both before the program (a baseline survey) and after the program (an endline survey). We estimate program impacts by comparing the control group and treatment group at endline. We designed the survey instruments not only to capture program impacts, but also to help us identify the mechanisms and pathways through which these impacts were achieved.

When we began the study, we identified numerous potential mechanisms through which the SOS program might impact girls, including skills (social and emotional skills), information (e.g. about reproduction and

⁶ *Age*: 12, 13, 14, 15. *Schooling status*: Above or below median level of schooling for girls her age in our sample. *Geography*: We defined zones as a geographic area with a radius no greater than 20 minutes walking distance. Four of the eighteen target neighborhoods were small enough to be considered zones, and the others we subdivided, for a total of 36 zones.

⁷ Of the 2,884 girls, only 490 were co-randomized with a household member or friend. All co-randomizations involved sets of two or three girls, save for one group of four, and one of five.

⁸ Gould, Meridith, 2013. Excerpt from Sisters of Success Mentor Handbook.

contraception), and altering girls' (or even potentially their guardians') norms, preferences, or aspirations. Based on the baseline data, we ruled out norms, preferences, and aspirations as potential pathways of program impact. At baseline, when we looked for gender gaps in boys and girls schooling, we instead found equality. In study households, there was no gender gap in school enrolment or educational attainment for girls and boys. Girls and parents in the study sample highly valued education, knew the economic returns to education, and were investing it. Educational aspirations for the girls, amongst girls and their guardians, were extremely high. And girls already planned to delay marriage and childbearing until their 20s. Given this baseline data, we ruled out norms, preferences, and aspirations as important potential pathways of program impact, since there was no need or room for improvement on these fronts.

We also designed our surveys to capture program impacts across the common outcome spaces that people are typically interested in with regards to adolescent girls – sex, early marriage, and childbearing; education; and employment.

Given measurement challenges associated with directly measuring levels of and changes in social and emotional skills at the individual level, we focus instead on capturing behavioral measures and the quality of girls' interpersonal relationships. In the interpersonal space, we focus on three types of relationships: relationships with peers (which explicitly excludes the SOS mentors), relationships with parents, and relationships other adults (which for treatment girls may include the SOS mentors).

The context in which this program took place is a large urban area in a very poor country. Liberia is one of the ten poorest countries in the world, as it is still recovering from a long period of civil war that stretched from 1989 to 2003. Girls in our study sample would have been between two and five years old when the civil war ended. While Liberia's GDP grew rapidly between 2003 and 2013 (between 5 and 10% per annum), during 2014-2016, annual GDP growth averaged was lower than 1%], partially in response to a major ebola epidemic that lasted from mid-2014 through mid-2016 (Trading Economics). Schooling was also interrupted during this period. In September 2014, the government ordered that schools should not open for the new school year but should rather remain closed to reduce the spread of ebola⁹.

⁹ From September 2013 – June 2014 there was a normal school year. The next school year was mostly missed, as due to the ebola epidemic schools only re-opened for a four-month (rather than the regular ten-month) school year, from February 2015 – May 2015. Schools then re-opened for a normal school year from September 2015 – June 2016. Key informant interview with Dackermue Dolo.

2.4. Data

All girls in our sample were first surveyed between October 2013 and January 2014 for the baseline. The endline survey took place between December 2015 and April 2016. We were able to track about 95% of the sample for the endline survey.¹⁰ Table 1 presents summary statistics on characteristics of the girls in our sample at baseline, by treatment status and age group. We see that the sample is balanced between treatment and control groups. The majority (94%) of the girls are currently enrolled in school. There are sharp differences between younger (12-13 years old) and older (14-15 years old) girls, both in terms of educational attainment and sexual initiation. Among older girls, about 41% have completed primary school, 24% have ever enrolled in school, and 16% have ever had sex. In contrast, among younger girls only about 11% have completed primary school, 4% have ever enrolled in school, and 1% have ever had sex.

3. Results

We estimate the following OLS ANCOVA specification for the intent-to-treat (ITT) impact on outcome y_{i1} for adolescent i at endline ($t = 1$):

$$y_{i1} = \alpha + \beta \text{treat}_i + \gamma X_{i0} + \delta y_{i0} + \varepsilon_{it}. \quad (1)$$

treat_i equals one if individual i was assigned to the SOS intervention and zero otherwise. β is the coefficient of interest, measuring the ITT impact of the SOS program. X_{i0} includes a series of dummies for our randomization strata. y_{i0} is the outcome measured at baseline ($t = 0$), if available. ε_{it} is a disturbance term. Since randomization is at the individual level, we use robust standard errors. Tables 2-4 present the results for the full sample, as well as separately for the younger girls (aged 12-13 at baseline) and the older girls (aged 14-15 at baseline).

3.1. Impacts on Educational Attainment

Table 2 reports impacts on educational attainment. Estimates for the combined sample of younger and older girls, reported in Column 3, show that at endline treatment girls are 3.6 percentage points (6.5% of

¹⁰ To achieve such low endline attrition rate we had to conduct a supplementary extensive tracking effort a few months after the end of the endline survey in April 2016. This effort took enumerators all over Liberia and resulted in an additional 315 girls being located and interviewed.

the control mean) more likely to have completed primary school, and 3.4 percentage points (9.6% of the control mean) more likely to have ever enrolled in secondary school relative to control girls. On average, at endline the SOS program has led to a 0.15 year increase in total years of education on average, mostly driven by an increase in years spent in primary school. We find no evidence that the program affected overall school enrolment, implying that the educational attainment gains are driven not by a reduction in school drop-outs, but by a push in the transition from primary to secondary school.

Separate analysis by age show sharp differences in effects for younger and older girls. Treatment effects on educational attainment are concentrated among the younger girls. The estimates for this group, reported in Column 6, show that treatment girls are 5.9 percentage points (13% of the control mean) more likely to have completed primary school, 5.5 percentage points (27% of the control mean) more likely to have ever enrolled in secondary education, and obtained .214 additional years of schooling. In contrast, the estimates for older girls, reported in Column 9, are small and insignificant.

3.2. Impacts on Educational Expenditures

Secondary education entails extra tuition fees and other schooling expenditures (such as school materials) compared to primary education. Table 2 thus also examines program impacts on schooling expenditures, as reported by the girls. Since self-reported expenditures are noisy variables, we use the inverse hyperbolic sine transformation of expenditures, which is similar to a log transformation but allows for zero values.

On average, the impacts on the inverse hyperbolic sine of total school expenditures are positive and significant, driven by increases in both tuition and non-tuition expenditures. The program increased tuition expenditures by approximately 17%, and non-tuition school expenditures by approximately 14%. Again, these effects are concentrated among the younger girls. While the program has not affected overall school enrolment, for this group we also find that at endline treatment girls are 4.7 percentage points (7% of the control mean) more likely to be enrolled in a private school.

3.3. Impacts on Sexual Behaviors and Knowledge

Table 3 reports impacts on outcomes related to sexual behaviors and knowledge. On balance the program seems to have no significant impact on these outcomes. There is however some important heterogeneity. In terms of sexual behaviors, conditional on being sexually active, the program increases the percentage

of younger girls using non-condom contraception methods by 10.2pp (32% of the control mean), and the percentage of older girls who have multiple sexual partners by 8.1pp (18% of the control mean). The program also significantly increases younger girls' health related knowledge, both as measured by a contraception methods knowledge index and an STI knowledge index.¹¹

3.4. Impacts on Girl-Peer Relationships

Table 4 reports impacts on the quality of relationships between the girl and her peers. We use three measures. First, we measure communication about sex-related matters by adding six indicators for whether the girl asked/received information about menstruation, getting pregnant, and preventing pregnancy to/from a peer. Second, we measure communication about school-related matters by asking if the girl has a friend that she can talk to when facing problems at school, measured on a 0-2 scale running from "not true at all" (0), "somewhat true" (1), and "very true" (2). Third, we asked the extent to which the girl has friends that can provide her with good life advice, measured on a 0-3 scale running from "never" (0), "one-one time" (1), "sometimes" (2), and "every time" (4). Given the multiplicity of measures, we also construct a standardized index of girl-peer relationship quality, by adding the four measures and standardize the score to have mean zero and standard deviation one.

On average, the SOS program increased the girl-peer relationship quality index by .08 standard deviations. Separate analysis by sex show this result is concentrated among younger girls. For this group, the girl-peer relationship quality index increases by .17 standard deviations. In contrast, the estimates for older girls are small, negative, and not significantly different from zero.

3.5. Impacts on Girl-Parent Relationships

Table 4 also reports impacts on the quality of relationships between the girl and her parents. We use four measures. The first two measures capture communication about sex- and school-related matters, and these measures are based on similar questions and constructed in the same way as the ones capturing girl-peer communication described above. The third measure is self-reported level of parental supervision, capturing the extent to which the girl's parents are aware of 3 aspects of her life: where she is at night, who her friends are, and what she does with her free time. Each is measured on a 0-2 scale

¹¹ The contraception methods index is based on the number of modern contraception methods that the girl can identify. The STI knowledge index ranges from 0-7 and is based on questions related to awareness and knowledge of sexually transmitted diseases and symptoms, and where to get tested for STIs. The relevant contraception methods include male condoms, birth control pills, morning after pills, injections, under-the-skin implants, intra-uterine devices, and female condoms. The STI symptoms include discharge, pain during urination, ulcers/sores, rash/itchiness, no menstrual period.

running from “does not know” (0), “sometimes knows” (1), and “always knows” (2). The fourth measure is about the level of parental involvement in financing her education. We asked the girl whether her parents put the most money towards her school expenditures in the last 6 months. In the control group, 67% of the sample answered yes to this question at endline. Again, we also construct a standardized index of girl-parent relationship quality using these four measures.

On average, the SOS program increased the girl-parent relationship quality index by .19 standard deviations. This impact is again concentrated among younger girls. For this group, the girl-peer relationship quality index increases by .17 standard deviations. This result is driven by significant increases in the levels of girl-parent sexual and school communication, as well as the level of parental contribution for school expenditures. For older girls, while we see that treatment girls report significantly higher levels of parental supervision than control girls, the overall girl-parent relationship quality is not significantly affected by the program.

4. Conclusion

In recent years there has been increased attention among researchers and policy makers to the importance of social and emotional skills for success in life. There is however little rigorous evidence on the impact policy interventions specifically designed to foster social and emotional learning. Using a randomized control trial, we evaluate one such intervention in Liberia, targeted to adolescent girls aged 12-15. The intervention significantly increased primary school completion rates and enrolment in tertiary education at the time of our endline (just under one year). The intervention also improved the quality of the relationships between the girls and their parents and peers. We find that these positive treatment effects are concentrated among the younger girls aged 12-13. One possible hypothesis is that the onset of puberty offers a window of malleability of the prefrontal cortex (Dahl 2014), the region of the brain that governs emotional and social regulation.

References

Ashraf, Nava, Erica Field and Jean Lee. 2014. “Household Bargaining and Excess Fertility: An Experimental Study in Zambia.” *American Economic Review*, 104(7): 2210-37.

Bandiera, Buehren, Burgess, Godstein, Gulesci, Rasul and Sulaiman, 2018. “Women’s Empowerment in Action: Evidence from a Randomized Control Trial in Africa”. Working paper.

- Borghans, L., Duckworth, A. L., Heckman, J. J., & Weel, B. ter. (2006). The Economics and Psychology of Personality Traits. *The Journal of Human Resources*, (December 2006), 972– 1059.
- Campos, Francisco;Frese, Michael; Goldstein, Markus; Iacovone, Leonardo; Johnson, Hillary; McKenzie, D. (2017). Teaching personal initiative beats traditional training in boosting small business in West Africa. *Science*, (357), 1287–1290.
- Dahl, Ronald E. 2004. “Adolescent Brain Development: A Period of Vulnerabilities and Opportunities.” In *Annals of the New York Academy of Sciences*, edited by Ronald E. Dahl and Linda Patia Spear. New York: New York Academy of Sciences, 1–22.
- Deming, D. J. (2017). The Growing Importance of Social Skills in the Labor Market*. *The Quarterly Journal of Economics*. <https://doi.org/10.1093/qje/qjx022>
- Edin, P., Fredriksson, P., Nybom, M., & Ockert, B. (2017). The rising return to socio-emotional skill. Discussion Paper Series, (IZA DP No. 10914), 1–30.
- Heckman, J. J., Stixrud, J., & Urzua, S. (2006). The Effects of Cognitive and Noncognitive Abilities on Labor Market Outcomes and Social Behavior. *Journal of Labor Economics*, 24(3), 411– 482.
- Lindqvist, E., & Vestman, R. (2011). The labor market returns to cognitive and noncognitive ability: Evidence from the swedish enlistment. *American Economic Journal: Applied Economics*, 3(1), 101–128. <https://doi.org/10.1257/app.3.1.101>
- Liberia Institute of Statistics and Geo-Information Services - LISGIS, Ministry of Health and Social Welfare/Liberia, National AIDS Control Program/Liberia, and ICF International. 2014. Liberia Demographic and Health Survey 2013. Monrovia, Liberia: LISGIS and ICF International.
- Montalvao, J., Frese, M., Goldstein, M., & Kilic, T. (2017). Soft Skills for Hard Constraints Evidence from High-Achieving Female Farmers, (June).
- Trading Economics. Website. Accessed October 26, 2018. <https://tradingeconomics.com/liberia/gdp-growth-annual>.

Table 1: Descriptive Statistics

Means, standard deviations reported in parentheses, p-values in brackets

	Full Sample			12-13 Years Old			14-15 Years Old		
	(1) Control	(2) Treatment	(3) Difference	(4) Control	(5) Treatment	(6) Difference	(7) Control	(8) Treatment	(9) Difference
Age	13.4 (.059)	13.4 (.032)	[.432]	12.4 (.019)	12.5 (.020)	[.141]	14.5 (.029)	14.6 (.028)	[.660]
Years of schooling completed	3.85 (.059)	3.97 (.062)	[.132]	3.07 (.067)	3.14 (.070)	[.414]	4.85 (.090)	5.03 (.095)	[.170]
Currently enrolled in school [yes=1]	.943 (.006)	.956 (.005)	[.129]	.950 (.008)	.963 (.007)	[.186]	.934 (.010)	.946 (.009)	[.401]
Completed primary school [yes=1]	.240 (.011)	.256 (.012)	[.334]	.108 (.011)	.111 (.011)	[.876]	.409 (.019)	.440 (.020)	[.271]
Ever enrolled in secondary school [yes=1]	.127 (.333)	.137 (.344)	[.424]	.041 (.199)	.035 (.185)	[.520]	.235 (.425)	.266 (.442)	[.224]
Ever had sex [yes=1]	.081 (.007)	.083 (.007)	[.913]	.017 (.005)	.013 (.004)	[.461]	.164 (.015)	.171 (.015)	[.725]
Ever been pregnant [yes=1]	.008 (.002)	.009 (.003)	[.784]	.001 (.001)	.001 (.001)	[.981]	.017 (.005)	.019 (.006)	[.789]
Household size	7.33 (.079)	7.44 (.086)	[.336]	7.24 (.108)	7.31 (.116)	[.672]	7.45 (.116)	7.62 (.129)	[.331]
Lives with both biological parents [yes=1]	.478 (.013)	.459 (.013)	[.301]	.493 (.018)	.469 (.018)	[.332]	.460 (.020)	.447 (.020)	[.645]

Notes: Columns 1-3 uses data from the full sample of girls. Columns 4-6 and 7-9 use data from the sample of younger (12-13 years old) girls and the sample of older (14-15 years old), respectively. The p-values in Columns 3, 6, and 9 on the treatment-control differences are estimated from an OLS regression for the corresponding outcome measured at baseline on a dummy for whether the respondent was assigned to the SOS intervention using the corresponding sample, and using robust standard errors.

Table 2: Impacts on Education

Coefficients, standard errors reported in parentheses, standard deviations in brackets

	Full Sample			12-13 Years Old			14-15 Years Old		
	(1) Control Mean	(2) Sample Size	(3) ITT Estimate	(4) Control Mean	(5) Sample Size	(6) ITT Estimate	(7) Control Mean	(8) Sample Size	(9) ITT Estimate
Currently enrolled in school [yes=1]	.835 [.371]	2,738	.001 (.014)	.882 [.322]	1,537	.000 (.016)	.773 [.419]	1,201	.002 (.023)
Completed primary school [yes=1]	.578 [.494]	2,738	.036** (.015)	.439 [.496]	1,537	.059*** (.022)	.749 [.433]	1,201	.010 (.021)
Ever enrolled in secondary school [yes=1]	.354 [.485]	2,738	.034** (.015)	.206 [.422]	1,537	.055*** (.019)	.547 [.496]	1,201	.013 (.022)
Years of schooling completed	5.68 [2.20]	2,738	.152*** (.050)	4.92 [1.98]	1,537	.214*** (.063)	6.67 [2.10]	1,201	.080 (.080)
Years of primary schooling completed	5.05 [1.40]	2,738	.114*** (.039)	4.70 [1.53]	1,537	.175*** (.054)	5.51 [1.06]	1,201	.047 (.052)
Years of secondary schooling completed	.761 [1.20]	2,738	.036 (.028)	.372 [.789]	1,537	.055* (.032)	1.26 [1.43]	1,201	.013 (.049)
Positive tuition expenditures [yes=1]	.807 [.395]	2,449	.033** (.016)	.824 [.381]	1,326	.043** (.021)	.787 [.410]	1,123	.023 (.024)
Tuition expenditures [inverse hyperbolic]	3.44 [2.07]	2,449	.171** (.081)	3.42 [2.03]	1,326	.332*** (.110)	3.46 [2.12]	1,123	-.008 (.122)
Positive other educational expenditures [yes=1]	.884 [.320]	2,314	.020 (.013)	.910 [.287]	1,238	.023 (.017)	.855 [.352]	1,076	.016 (.021)
Other educational expenditures [inverse hyperbolic]	3.66 [1.68]	2,314	.138** (.069)	3.65 [1.55]	1,238	.178** (.088)	3.66 [1.82]	1,076	.093 (.108)
Currently enrolled in private school [yes=1]	.578 [.494]	2,737	.008 (.018)	.631 [.483]	1,536	.047** (.023)	.510 [.500]	1,201	-.040 (.029)

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. Robust standard errors reported in parentheses. The control variables include a series of stratification dummies.

Table 3: Impacts on Sexual Behaviors and Knowledge

Coefficients, standard errors reported in parentheses, standard deviations in brackets

	Full Sample			12-13 Years Old			14-15 Years Old		
	(1) Control Mean	(2) Sample Size	(3) ITT Estimate	(4) Control Mean	(5) Sample Size	(6) ITT Estimate	(7) Control Mean	(8) Sample Size	(9) ITT Estimate
Has child(ren) [yes=1]	.072 [.258]	2,738	-.002 (.009)	.027 [.149]	1,537	-.010 (.008)	.124 [.336]	1,201	.010 (.019)
Ever had sex [yes=1]	.433 [.496]	2,736	.002 (.016)	.235 [.424]	1,537	-.012 (.021)	.686 [.464]	1,199	.020 (.026)
If had sex, more than one sexual partner [yes=1]	.402 [.491]	1,183	-.050* (.028)	.296 [.457]	362	.035 (.053)	.449 [.498]	821	-.081** (.035)
If had sex, ever used condoms [yes=1]	.432 [.496]	1,187	-.010 (.028)	.359 [.480]	362	-.026 (.055)	.464 [.499]	825	-.002 (.034)
If had sex, ever used other contraceptives [yes=1]	.421 [.494]	1,187	.019 (.028)	.318 [.466]	362	.102** (.051)	.467 [.499]	825	-.003 (.034)
STI knowledge [0-5 score]	1.03 [.134]	2,737	.069 (.049)	.796 [.123]	1,536	.127** (.039)	1.33 [1.42]	1,201	-.013 (.079)
Contraceptives knowledge [0-7 score]	2.22 [1.36]	2,738	.079 (.050)	1.98 [1.35]	1,537	.140** (.068)	2.53 [1.32]	1,201	-.009 (.075)

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. Robust standard errors reported in parentheses. The control variables include a series of stratification dummies. The STI knowledge index is based on the number of symptoms of sexually transmitted infections that the girl can identify. These symptoms are vaginal discharge, pain during urination, ulcers/sores around genital area, and missed period. The contraceptive knowledge index is based on the number of modern contraceptive methods that the girl can identify. The relevant contraceptives are male condoms, birth control pills, morning-after pills, contraceptive injection, contraceptive implants, intra-uterine devices, and female condoms.

Table 4: Impacts on Interpersonal Relationships

ITT coefficients, standard errors reported in parentheses, standard deviations in brackets

	Full Sample			12-13 Years Old			14-15 Years Old		
	(1) Control Mean	(2) Sample Size	(3) ITT Estimate	(4) Control mean	(5) Sample Size	(6) ITT Estimate	(7) Control mean	(8) Sample Size	(9) ITT Estimate
Peer-girl relationship quality [z-score]	.000 [1.00]	2,727	.077** (.038)	.000 [1.00]	1,531	.171*** (.050)	.000 [1.00]	1,196	-.053 (.058)
School communication [0-2 score]	1.29 [.839]	2,738	.042 (.032)	1.26 [.862]	1,537	.115*** (.044)	1.33 [.807]	1,201	-.055 (.046)
Sexual communication [0-6 score]	2.31 [2.16]	2,728	.055 (.080)	1.97 [2.07]	1,531	.157 (.105)	2.74 [2.18]	1,197	-.081 (.125)
Peers give good life advice [0-3 score]	2.09 [.904]	2,737	.077** (.034)	2.07 [.926]	1,537	.112** (.047)	2.11 [.875]	1,200	.026 (.050)
Parent-girl relationship quality [z-score]	.000 [1.00]	2,709	.141*** (.038)	.000 [1.00]	1,519	.198*** (.050)	.000 [1.00]	1,190	.091 (.057)
School communication [0-2 score]	1.66 [.657]	2,738	.028 (.026)	1.70 [.640]	1,537	.061* (.032)	1.60 [.714]	1,201	-.010 (.041)
Sexual communication [0-6 score]	2.18 [2.06]	2,709	.211*** (.078)	2.02 [1.99]	1,519	.325*** (.100)	2.39 [2.14]	1,190	.055 (.122)
Parental supervision [0-6 score]	4.93 [1.07]	2,738	.099** (.040)	5.07 [1.02]	1,537	.014 (.051)	4.75 [1.11]	1,201	.206*** (.062)

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. Robust standard errors reported in parentheses. The control variables include a series of stratification dummies.

Figure 1: Program Take-Up

