Campaigns to Improve Community Attitudes towards Girls' Education Can Increase Math Scores and Enrolment

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Abstract. We show that information campaigns intended to improve the attitudes and beliefs about girls' education throughout communities can increase girls' mathematics performance and school enrolment. These campaigns also increase caregiver support for girls' education. Our analysis uses data from a large, randomized UKAid Girls' Education Challenge (GEC) project in rural Zimbabwe, where the staggered roll out of the project allows for us to isolate the impact of a community-wide information campaign to promote girls' education by shifting the attitudes and beliefs of girls, parents, teachers and other community members. An expansion of the program to provide resources including bicycles and books, and implement curriculum changes corresponded to improvements in literacy but did not correspond to any additional improvements in mathematics and enrolment beyond what was observed following the information campaign alone.

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1. Introduction

Girls, on average, tend to perform worse on mathematics tests than boys. This is true across many countries (Guiso et al., 2008) and within every strata of society (Fryer & Levitt, 2010). Furthermore, despite progress being made over the last several decades, there continues to exist gender gaps in the school enrolment and years of education in many countries.[1] Many research efforts have worked to understand the barriers to girls' education that contribute to these and other performance gaps (e.g., Benbow & Stanley, 1980; Hedges & Nowell, 1995; Duflo, 2012).

Across countries and cultures, there is a strong association between gender gaps and the beliefs, attitudes, and norms regarding girls' education and their empowerment more generally. Gaps tend to be larger in countries with less gender-equitable cultures (Guiso et al., 2008), and in North America, gaps are largest among students whose parents come from less-equitable cultures or countries with less female empowerment (Nollenberger et al., 2016; Rodriguez-Planas & Nollenberger, 2018).[2] It has also been shown that the gender stereotypes and biases of teachers are associated both with lower test performance of girls and minorities (Robinson-Cimpian et al., 2014; Alan et al., 2018), and with long-run schooling attainment and career choices (Lavy & Sand, 2018).[3] Such stereotypes, especially regarding relative mathematics ability, also exists within the beliefs of students themselves, potentially contributing to differences in effort and interests (Bian et al., 2017).[4] Furthermore, in high-risk settings, parents, teachers, community leaders, and youth often do not understand the strong association between education and future earnings, especially for girls (Jensen, 2010; Attanasio & Kaufmann, 2014).

It may be difficult to address such barriers to girls' education, especially when the stereotypes and attitudes are embedded in the cultures and communities in which the girls live and go to school. Although others have shown that increasing female leadership in villages (Beaman et al., 2012), exposing children to less biased teachers (Alan et al., 2018), or providing students and parents information about the financial returns from graduating (Jensen, 2010) can improve education outcomes, it remains unclear whether

[1]For a detailed description of recent gender gaps across countries, see OECD (2015). For a discussion of how gender gaps in attainment have been reduced in some environments including North American tertiary education, see Goldin et al. (2006); Hyde et al. (2008); Asadullah & Chaudhury (2009), and Rosenzweig & Zhang (2013).

[2]Dhar et al. (2019) also shows a significant association between parent gender attitudes and the gender attitudes of their children.

[3]See also Burgess & Greaves (2013) for related analysis involving racial minorities.

[4]In summarizing the recent data and literature, the OECD (2015) argued that "gender disparities in performance do not stem from innate differences in aptitude, but rather from students' attitudes towards learning and their behaviour in school, from how they choose to spend their leisure time, and from the confidence they have - or do not have - in their own abilities as students..." and that improving outcomes demands the greater involvement of parents, teachers, and students themselves.

interventions designed to improve general attitudes toward girls education within communities can themselves be effective at improving the education outcomes of girls.

Despite the lack of systematic evidence of the effectiveness of such projects, several major organizations have implemented programs intended to change attitudes throughout communities, empowering girls and increasing parent and community support for girls education. The largest of these efforts is the Department for International Development UK (UKaid/DFID)'s Girls' Education Challenge (GEC), a multi-year commitment to improve education outcomes for girls around the world that was started in 2012. The first phase of the challenge (2012-2017) spent £300 million (since expanded to £500 million) to fund multifaceted projects across 18 countries, with a major component of these projects focused on changing parent and community attitudes towards girls education.[5] Despite the GEC's focus on rigorous data collection, however, the analysis of project data has to date provided no evidence that such campaigns to improve attitudes are effective, often because such information campaigns intended to change attitudes and beliefs are implemented simultaneously with several other GEC intervention components such as infrastructure improvements, curriculum changes, and cash transfers, making it impossible to attribute causality to any specific intervention type. In 2018, the GEC concluded that there remains "a need for more detailed insights into how targeting community attitudes and behaviors on their own can affect learning, attendance and retention of girls" GEC (2018).

In this paper, we present evidence that information campaigns intended to improve the attitudes towards girls education throughout communities can lead to improvements in girls' mathematics performance and school enrolment. Our analysis uses data from a specific GEC project in which the way the program was rolled out allows for us to isolate the causal impact of providing information to girls, parents, teachers and others in an attempt to shift attitudes and beliefs.

The GEC's "Improving Girls' Access through Transformative Education" (IGATE) project worked to change attitudes and provide resources to ultimately improve education outcomes for tens-of-thousands of primary school girls in rural Zimbabwe. Implemented between 2014 and 2016, IGATE initially focused on a community information campaign in randomly selected locations, conveying information about the rights of adolescent girls, the importance of girls' education, the barriers girls face in their pursuit of education, and strategies for helping address some of the most-substantial barriers. Later, the program was expanded to introduce support to teachers in schools, and to provide books to classrooms and bicycles to girls living far from school. Rigorous data

[5]The first phase of the GEC included 31 intervention components specifically intended to change "community based awareness, attitudes and behaviour" towards girls education, as well as many other intervention components focused on the attitudes and behavior of parents and girls (GEC, 2018).

collection occurred in both treatment communities and control communities in which the program was not implemented. The treatment status of these communities was randomly assigned.

The staggered implementation of the project allows us to identify the impact of the information campaign on the academic performance of girls, before other program components providing resources and curriculum changes were implemented. The broad information campaign implemented during the initial phase of the IGATE project intended to disseminate information across villages, reaching girls, parents, teachers, and other community members. The project facilitated the organization of community- and school-based groups through which it provided information about the importance of supporting girls' education in their households, at school, or more broadly within their communities. By altering attitudes, the project hoped to improve support of girls' education among parents and teachers and the agency of girls themselves, leading to increased enrolment and school performance.[6]

The analysis shows that the information campaign resulted in a significant improvement in mathematics performance and school enrolment within a relatively short time frame, and that improvements in mathematics persisted through the life of the project. The improvement in mathematics occurred even though the information campaign did not specifically encourage math or STEM participation or performance.[7] We see no similar improvement in literacy that can be attributed to the information campaign.

We then compare the impact attributable to the information campaign alone with the ultimate impact of the IGATE project after all intervention components were implemented. Overall, the entire IGATE project led to significant improvements in mathematics, literacy, and enrolment among the girls in the treatment communities. The total impact on mathematics and enrolment appears to be caused by the information campaign alone, as no additional improvements on these dimensions were observed after the introduction of the later non-information project interventions. The later non-information based components, however, likely contributed to the observed improvements in literacy.

To our knowledge, this is the first paper to present causal evidence about the effectiveness of interventions aiming to improve knowledge, attitudes, and beliefs about girls'

[6]Quantitative data involving attitudes was not collected by the project. Rather, in its midline and endline evaluations, IGATE relied on qualitative assessments based on interviews with community members to argue that the program succeeded at improving attitudes and "girls empowerment." The qualitative data and methodology has not been shared with the research team; we therefore focus our analysis on the education outcomes for which we have reliable quantitative data.

[7]There are several reasons that a general campaign to encourage girls' education may have such impact on math performance. For example, the campaign may have encouraged greater effort or focus by girls on tasks that others have shown are traditionally viewed as difficult, masculine, and largely irrelevant (Gudyanga, 2016). It may also have led to increased teacher attention for girls after teachers were informed about gender gaps in student engagement in the classroom.

education throughout communities. Such interventions are substantial components of many projects being undertaken by NGOs and development agencies around the world in their efforts to improve girls' access to education and learning outcomes. In the case of the GEC IGATE intervention in Zimbabwe, our results suggest that such efforts to improve attitudes and benefits about girls' education within communities was likely the driving force behind the project's overall impact on many, but not all, learning outcomes.

Our results contribute to several literatures. First, as already discussed, our results show that efforts to reduce negative attitudes towards girls' education can be effective at improving education outcomes. This suggests that it may be possible, through community-wide information provision and discussion, to improve the general attitudes and beliefs regarding girls' education. This could mean that it is possible to make progress towards reducing the barriers associated with culture, stereotypes, or norms identified throughout the previous work discussed above, including Guiso et al. (2008), Nollenberger et al. (2016); Rodriguez-Planas & Nollenberger (2018), Robinson-Cimpian et al. (2014); Alan et al. (2018), Lavy & Sand (2018), Bian et al. (2017), and OECD (2015).

Second, our paper contributes to the literature showing how different types of information provision can improve education outcomes for at-risk or marginalized students. Jensen (2010) shows that youth in the Dominican Republic typically underestimated the returns to completing secondary school and that providing information regarding the returns to graduating led students to finish between 0.2 and 0.35 additional years of schooling, on average. Similarly, Nguyen (2008) explores the impact of providing information about the returns to education in Madagascar, showing that such information can increase student performance on tests. Others have considered the impact on academic performance from providing parents information about student performance (Berlinski et al., 2016; Dizon-Ross, 2019; Barrera-Osorio et al., 2020; Doss et al., 2018), or school quality (Andrabi et al., 2017; Banerjee et al., 2010; Hastings & Weinstein, 2008).[8]

Compared to this past work on the impact of information provision, our study is novel on several dimensions. It is the first study to isolate the impact of an information campaign from a major education-focused development aid project, allowing us to compare the contribution of information provision to the overall impact of the broader project. Moreover, our analysis focuses on a different type of information provision. The type of information considered here emphasizes the rights of marginalized girls to pursue education, highlights the general importance of additional schooling at the primary level,

[8]Additionally, Cortes et al. (2018); Doss et al. (2018) provide guidance on how to use the information they receive, which is also a feature of the IGATE intervention. Bettinger et al. (2012) explores the role of application assistance and information provision to parents on college applications. Additionally, (Oreopoulos et al., 2017; Lavecchia et al., in press) and (Walsh et al., 2014) examine youth mentorship programs that share some similarities to the intervention intervention components that provide information and encourage agency among a subset of girls within the IGATE treatment communities.

and increases awareness among girls, parents, teachers and other community members about types of barriers girls face in pursuit of education. Ours is also the first to study information provision tailored to girls' education. Our findings are consistent with the insights from the literature that information provision can improve education outcomes. At the same time, our analysis is able to consider several issues that were not present in the earlier work.[9]

The paper proceeds as follows. Section 2 describes the IGATE project. Section 3 describes the randomization of treatment, the process through which data was collected and literacy and numeracy performance measured, and the estimation strategy. Section 4 presents the results. Section 5 concludes.

2. Context and Program Description

In 2012, UKaid/DFID launched its GEC initiative, a multi-year commitment to improving access to education and learning for marginalized and at-risk youth, especially girls, in the developing world. The GEC is the largest-ever donor funded program focused on girls in developing countries through the implementation of 37 major education-focused projects across 18 countries. Projects were proposed and implemented by a diverse set of international organizations. As of April 2017, with the conclusion of its first wave of projects, the GEC had spent roughly £300 million and claims to have directly benefited more than a million girls through the training of almost 90 thousand teachers, the construction or renovation of nearly 6 thousand classrooms, the distribution of more than 12 million textbooks and student kits, the provision of nearly £25 million in bursaries, stipends and cash transfers, and the provision of many other services and resources.[10] The program has since been extended through 2022 with an additional budget of approximately £200 million to support the implementation or extension of 47 projects.

The GEC's IGATE project focused on improving attitudes and knowledge around girls education in rural Zimbabwe, in an effort to increase access to and quality of education for at-risk girls. It was implemented by a coalition of nongovernmental organizations (NGOs) led by World Vision.[11] IGATE involved a series of interventions intended to

[9]Our analysis is also related to other studies considering how information provision impacts other non-education outcomes in developing countries. Information-based interventions have been particularly successful in improving health outcomes. Such issues have been considered in the context of safe-sex practices (Dupas, 2011), and breastfeeding and nutrition (Fitzsimons et al., 2016; Krämer et al., 2019), for example. Additionally, information interventions have been shown to increase the number of small business that receive a loan (De Mel et al., 2011), to increase labor mobility for workers in poor work environments (Shrestha & Yang, 2019), and to increase the use of chlorine to improve water quality for households with a lower socioeconomic status (Brown et al., 2017).

[10]https://girlseducationchallenge.org/

[11]Partner organizations included CARE International, SNV Netherlands Development Organisation, Emthonjeni Women's Forum, Happy Readers, World Bicycle Relief, and the Union for the Development of the Apostolic Church in Zimbabwe Africa.

empower girls, increase community and household support for girls education, and provide resources to improve the academic and non-academic outcomes of adolescent girls. The program was implemented in randomly-selected schools across 10 primarily-rural districts in Zimbabwe. The project is estimated to have reached a total of 48,773 girls.

IGATE worked to deliver a variety of different interventions across the treatment locations from 2014 through 2016. The initial wave of the project comprised of interventions providing information to girls, parents, teachers and the community more broadly on girls' rights, the importance of girls attending school, and the barriers they face in doing so. Later, the program expanded to provide teacher support and books in the local primary schools, and to provide bicycles to girls who lived far from school.

The IGATE community-wide information campaign included the following components:

- **Community in Support of Girls' Education (CSGE)**–Implemented by Government of Zimbabwe employees in the Ministry of Primary and Secondary Education trained by IGATE staff, CSGE focused on providing information within communities about the Minimum Standards of Functionality that could be expected from local primary and secondary schools, and how communities could hold them accountable. These groups also promoted girls' education throughout the communities by providing participants with information about the importance of girls' education and the barriers they face in their pursuit of education. This program did not involve any policy changes; it only involved communicating existing policies to local communities. An average of 201 individuals participated in CSGE meetings in each treatment community.

- **Power Within Clubs (PWCs)**–The project recruited teachers to set up and run PWCs within schools. These teachers were mentors for each club, and often linked with with the local MG. They were designed to encourage girls' agency through the development of knowledge and understanding of girls' rights and how to navigate barriers to education. They encouraged girls to take an active role in decision making about their own lives by developing five skills: planning, organising, decision making, self-esteem, and visioning. They also provided participants with information on the importance of education, attending school and doing school work. Participation in the groups was voluntary, and participants were encouraged to actively share their knowledge with others in the school who did not directly participate in the groups. An average of 41 girls participated in PWCs in each treatment school.

- **Village Savings and Loan (VSL)**–The project recruited adults from the community to join local savings groups, proving participants guidance on how to set up a group in accordance with CARE International's VSL model. The project *did not* provide any financial assistant or other resources, only information. Participants in such groups were expected to meet regularly and contribute to a collective account from which participants could borrow when needed. Through these groups, IGATE also provided information on the importance of encouraging girls' education and tips for saving for future education needs. An average of 49 individuals participated in VSL groups in each treatment community.

- **Mothers Groups (MGs)**–The project recruited local female caregivers to participate in MGs, and provided the groups with information on the importance of girls' education and school attendance. These groups also highlighted the challenges girls face due to gender based violence, inequitable treatment, and hygiene and menstruation. The mothers were then provided information on how to mentor girls on these topics and trained on making reusable menstrual pads. In some places, fathers also participated in these groups. An average of 15 mothers and 5 fathers participated in MGs and FGs in each treatment community.

- **School Development Committees (SDCs)**–These school-based committees provided teachers and school officials information about how to create learning environments that were gender sensitive. This included information on how schools and teachers could support MG efforts relating to hygiene and menstruation. An average of 8 individuals participated in SDCs in each treatment school.

The 37 treatment schools in our sample communities had a total enrolment of 9,589 girls and 10,000 boys at baseline. The IGATE program directly engaged only a subset of girls, families, and other community members. For example, only 16% percent of all enrolled girls within the treatment schools participated in the PWCs.

Following the community-wide information provision, the IGATE project expanded to include other interventions that were not focused on information provision. This second stage of the project also involved the provision of resources through a Bicycle Education Empowerment Program (BEEP) in partnership with the World Bicycle Relief organization that provided bicycles to girls with long commutes to school, and a Happy Readers program that provided literacy and reading materials to schools that helped students learn to read.[12] When the program expanded after midline to provide books

[12]There were a small number of locations where girls received bicycles before midline data was collected. These locations have been dropped from this analysis to isolate the impact of the information-based interventions.

and bikes, an average of 96 bikes and 1,478 books were delivered at each treatment school.

Because direct exposure to the various interventions within communities was not random, we define treatment as being in a community that received treatment and not based on one's own direct exposure to the interventions.

As with the GEC initiative more generally, IGATE takes a multifaceted approach to improving girls' education outcomes. It's project design builds on a theory of change in which sustainable impact requires changing attitudes, beliefs and social norms within communities, and that the greatest impact will be had by projects that work to change attitudes while also working to increase resources, or improve infrastructure, teaching practices, policy, or institutions. See (Unterhalter et al., 2014) for the UKaid/DFID review of the suggestive evidence in support of such an approach undertaken at the beginning of the GEC. The atypical feature of the IGATE project compared to other GEC projects was not in its inclusion of efforts to change attitudes, but in the way that the timing of implementation allow us to isolate the impact of these intervention components.

2.1. **Dates.** The relationship between the data collection and program timing is summarized in Figure 1. Baseline data collection occurred before implementation began in February 2014. At the time of baseline data collection, none of the IGATE interventions were implemented within the treatment or control locations. Midline data collection occurred in June-August 2015, following the wide implementation of the community information campaigns, but before the non-information interventions were implemented. Before midline data was collected, each of the treatment locations in the sample had received all five of the community information interventions. Between midline and endline data collection, the project continued the information campaign and introduced of non-information interventions. Endline data collection occurred in November-December 2016 at the end of the project.

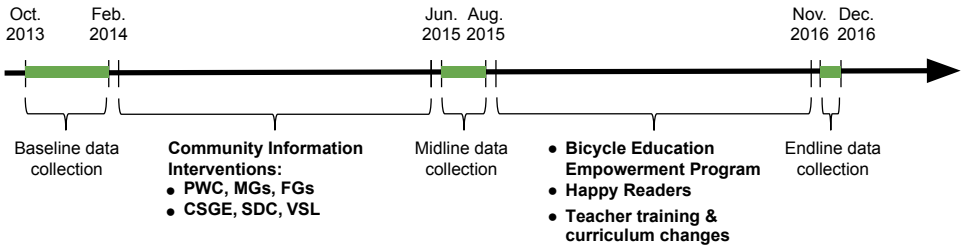

FIGURE 1. IGATE Data Collection and Program Implementation Timeline

3. Data and Methodology

3.1. **Sampling Framework.** The program was targeted to 467 schools in rural districts in Zimbabwe. From the 467 schools that were identified as eligible for the program, schools were randomly assigned to treatment and control groups. Of these, a total of 85 schools were selected for extensive data collection and evaluation, including 52 treatment schools and 33 control schools.[13] As we discuss later, additional observations have been dropped to remove girls who received bicycles from the BEEP intervention before midline. After these restrictions, there are 37 treatment locations and 28 control locations remaining in our sample. Baseline data collection took place between October 2013 and February 2014.[14] The map in Figure 2 in the online appendix shows the location of treatment and control schools across Zimbabwe.

The procedure used to select girls (and their caregivers) within these communities involved a sampling procedure in which teams of professional enumerators from a Zimbabwe-based firm started at a recognizable local landmark (e.g., community center) and then enumerators walked in different directions using a routine where they would pass three households and knock every fourth door. At the household they then would ask if any girls of the appropriate age lived there and if so proceed the questionnaires, returning later if a girl lived there but was not home.

For clarity of interpretation, we limit our data to girls who were in grade seven or below at baseline (i.e. in primary school at baseline). We do this for several reasons: IGATE was a primary-school focused program so we wouldn't expect the same impact on secondary aged students as on primary aged students; it was difficult to accurately determine the extent that secondary school students received access to program components; and a limited sample secondary school students prevented subgroup analyses, meaning that their inclusion would likely bias the estimates in unknown ways.[15]

After restricting the sample to only include students with completed numeracy tests, we observe 812 girls at baseline in total, with 453 in treatment locations and 359 in control locations. By midline, we were able to successfully reconnect with 710 girls in total. At endline we observe 615 girls in total. For each school in the panel data set, there

[13]Data was originally collected on an addition 16 schools, but these schools were dropped from the analysis because an additional GEC program, Campaign for Female Education ("CAMFED"), was also operating in those locations.

[14]Data from 62 of the schools were collected during an initial wave of data collection in October 2013, with data from the remaining 23 schools being collected in January and February 2014 after the program decided to expand its original sample size. The estimated effects are similar if the second set of schools is not included in the sample.

[15]We also limit attention to locations where only primary schools were treated, dropping the few locations where both local primary and secondary schools were treated. The main results can be estimated with and without this restriction and the results are similar.

are between three and twenty girls, with an average of 11 girls from each location. For each girl in the data set, we have information provided by their caregivers and teachers, as well as data from reading and mathematics tests.

3.2. **Tests.** The main data collected at baseline, midline, and endline included a girl's survey, a caregiver survey, and the Early Grade Reading Assessment (EGRA) and Early Grade Mathematics Assessment (EGMA). Originally designed for the United States Agency for International Development (USAID), EGRA has been used to assess reading skills in primary school-aged students in over 70 countries and by hundreds of projects worldwide. EGMA, which was developed after EGRA, has been used to assess mathematics skills in primary school-aged students in over 20 countries around the world. In one study by Friedman et al. (2016), EGRA and EGMA were found to be the most commonly used assessment systems in education evaluations in Eastern and Southern Africa.

The version of EGMA implemented here included the common subtasks of number identification, quantity discrimination, missing number, addition-level 1, and subtraction-level 1, along with additional subtasks for addition, subtraction, multiplication, and division subtask for grade six and above. In EGMA, the number identification, addition, and subtraction are timed, while the other subtasks are not.

The version of EGRA implemented as part of the IGATE project involved five subtasks: letter sound identification, invented word reading, reading fluency and reading comprehension. The standard EGRA tool was adapted for students in grades six and above (at baseline) to include a more difficult passage to assess reading fluency. We provide a detailed description and examples of EGMA and EGRA subtasks in the online appendix.

At midline, similar tests were administered with slight variations from the baseline versions. It is necessary to change the versions of the tests to separate learning from recall in the analysis. The EGRA and EGMA subtasks all follow very strict standard guidelines that ensure the difficulty level is standardized across versions.

3.3. **Sample Attrition.** The sample suffered from high rates of attrition. However, the attrition was similar across treatment and control locations with rates of 25% and 24% in the control and treatment regions, respectively, over the three years between baseline and endline data collection.[16]

Given the ex ante similarity of the girls who dropped out of the sample as demonstrated in table 7, we are not particularly concerned that girls that attrited from the

[16]Although we cannot distinguish between a girl who drops out of school and one who cannot be recontacted for some other reason, we should note that girls who have dropped out of the sample should not be assumed to be out of school since they may have moved to a new school in a different region.

sample are systematically different from girls who remain at midline or endline in any way that will clearly bias the analysis. Across the main household controls and test scores, the mean scores and standard deviations in the two groups are similar and well within a standard deviation of each other, as we see in Tables 6 and 7, which provide some summary statistics of baseline test scores. After restricting the sample to only include girls with completed learning assessments in grade seven or below at baseline, who could successfully be recontacted at midline, we are left with 305 and 405 girls in the control and treatment samples, respectively, at midline. The treatment and control groups exhibit similar observable characteristics at baseline, as shown in Table 1. The groups also have similar baseline test scores and grade distributions, as shown in Tables 8 and 9 in the Appendix.

TABLE 1. Baseline Summary Statistics

	Control	Treatment	Difference
Age	9.377	9.380	0.003
	(2.011)	(1.997)	
Grade	3.676	3.627	-0.049
	(1.746)	(1.779)	
Illness	0.103	0.112	0.009
	(0.305)	(0.316)	
Disability	0.174	0.191	0.017
	(0.380)	(0.394)	
Orphan	0.0676	0.0536	-0.014
	(0.252)	(0.226)	
Travel time to school (minutes)	32.96	35.12	2.16
	(23.16)	(27.30)	
Household often goes hungry	0.224	0.228	0.004
	(0.418)	(0.420)	
Household often goes thirsty	0.128	0.121	-0.007
	(0.335)	(0.327)	
Caregiver has no education	0.0676	0.0979	0.0303
	(0.252)	(0.298)	
Caregiver has primary education	0.523	0.550	0.027
	(0.500)	(0.498)	
Caregiver has secondary education	0.409	0.352	-0.057
	(0.493)	(0.478)	
Caregiver works outside of household	0.221	0.235	0.014
	(0.415)	(0.425)	
N	281	429	

Note these numbers measure baseline levels for girls who could be recontacted at midline.

3.4. **Econometric Strategy.** The randomization of treatment locations allows for an experimental approach to the evaluation. We use difference-in-differences (DiD) analysis to compare changes in outcomes within the treatment group with changes in outcomes within the comparison group, while verifying that the required common trends assumption between the groups is likely to hold. External factors such as the presence of droughts or other policy changes that occurred are likely to affect both the treatment and control groups similarly. In this way, the evaluation can be considered a causal analysis, identifying the changes in outcomes attributable to the IGATE project.

The impact of IGATE measured at midline can be attributed to the information interventions alone, as the non-information project interventions had not yet been implemented. On the other hand, the impact of IGATE measured at endline cannot be attributed to any subset of the program interventions as all components were implemented before that time.

The analysis focuses on the impact of the IGATE program on numeracy and literacy (as measured by EGMA and EGRA), and academic progression measured as advancing to the next grade as expected and enrolment. To provide additional insights, we also consider the impact of the project on specific subtasks of the learning assessments, and the number of questions attempted. We report results from an intent-to-treat analysis, classifying all girls in treatment locations as treated, regardless of whether they or their families report being directly exposed to the information campaign at midline or any program by endline.

4. Results

Our evaluation assesses the impact of the IGATE program on both academic progression, including enrolment, and mathematics performance and literacy.[17] We also consider the impact on girls' and caregivers' attitudes to girls' education.

4.1. **Progression.** The IGATE program's primary aim is to improve access to education for marginalized girls. To assess its effectiveness at doing so, we consider the impact of the program on the enrolment status of girls in the treatment communities. Additionally, we consider whether the program reduced grade repetition of those who remained enrolled in school throughout the program.

Table 5 shows that girls in treatment areas are 2.5 percentage points more likely to be enrolled in school than girls who did not receive treatment by midline. This difference between baseline and midline is statistically significant and also intrinsically meaningful

[17] As shown in Nordstrom & Cotton (2020), the impact on enrolment and learning can move in opposite directions, potentially leading to misleading conclusions about the benefits of a program to education outcomes. This motivates the evaluation of both progression and learning outcomes to confirm no adverse consequences to education overall.

as well. Specifically, at baseline over 99.0% of girls in the sample across treatment and control areas were enrolled in school. At midline, this fell to 96.1% in the control group, but only fell to 98.5% in the treatment group. This represents a substantial decrease in the drop out rate, with the drop out rate in the treatment group being less than 20% of what we observe in the control group between baseline and midline.

Because IGATE only provided information to the sample communities ahead of midline, the entirety of the program's impact on enrolment can be attributed to the information campaign and not to the other program components that were introduced later. Furthermore, no similar impact on enrolment is observed between midline and endline, suggesting that the subsequent interventions resulted in no additional improvement to enrolment beyond what was caused by the information provision alone.

Between baseline and midline, girls in the treatment schools were 3.6 percentage points less likely to repeat a grade between baseline and midline than those in the control group, while controlling for observable characteristics.[18] However, the difference is not significant. As was also the case with enrolment figures, the IGATE program was associated with no additional improvements in grade advancement between midline and endline.

TABLE 2. Probability of Successful Transition

	Repetition	Enrolment
BL to ML Progression		
Treatment	-0.0376	0.0248**
	(0.0264)	(0.0124)
Observations	710	591
Pseudo R-squared	0.1796	0.2734
ML to EL Progression		
Treatment	-0.00637	-0.00193
	(0.0204)	(0.0145)
Observations	615	568
Pseudo R-squared	0.1176	0.2062

Note: The table reports the marginal effect on progression outcomes. Controls include girl characteristics (Age, grade, illness, disability, orphan, travel time to school), household characteristics (indicators for whether a family member within the household often goes hungry or thirsty), and caregiver characteristics (Caregiver's education level). Cluster-robust standard errors are in parentheses. Standard errors are clustered at the school level.

[18]In Zimbabwe, schools follow a policy of automatic progression, meaning that advancing to the next grade is less indicative of girls learning at an appropriate level, and more indicative that the girls were enrolled for the entire year and attended school regularly enough to advance in grade.

4.2. **Mathematics.** The results in Table 3 show that the treatment group performance on EGMA improved by 3.27 percentage points (0.09 SD) compared to the control group. This statistically significant increase in mathematics performance occurred entirely between baseline and midline, and persisted until endline despite the fact that no further gains occurred between midline and endline. This suggests that the information campaign had a significant, positive impact on math performance of the girls while the later intervention components did not lead to significant increases in scores on numeracy tests.

TABLE 3. DiD Results: Mathematics

	Number Identification EGMA 1	Number Quantities EGMA 2	Missing Numbers EGMA 3	Addition EGMA 4	Subtraction EGMA 5	Average Total
ML-BL DiD						
Treatment	0.0294	0.0391*	0.0223	0.0428**	0.0300**	0.0327**
	(0.0191)	(0.0205)	(0.0143)	(0.0189)	(0.0123)	(0.0132)
Observations	710	710	710	710	710	710
R-Squared	0.246	0.249	0.196	0.099	0.092	0.240
EL - ML DiD						
Treatment	0.00593	-0.00371	0.0104	-0.0127	-0.00658	-0.00132
	(0.0145)	(0.0162)	(0.0145)	(0.0142)	(0.0119)	(0.00897)
Observations	615	615	615	615	615	615
R-Squared	0.150	0.085	0.056	0.104	0.071	0.160
EL - BL DiD						
Treatment	0.0334	0.0328	0.0220	0.0278	0.0163	0.0265*
	(0.0213)	(0.0235)	(0.0176)	(0.0189)	(0.0164)	(0.0145)
Observations	610	610	610	610	610	610
R-Squared	0.346	0.284	0.191	0.132	0.055	0.298
Timed	Yes	No	No	Yes	Yes	
Early Stop Rule	No	Yes	Yes	Yes	Yes	

Note: The table reports the coefficient on an indicator for belonging to an IGATE treatment school. Controls include girl characteristics (Age, grade, illness, disability, orphan, travel time to school), household characteristics (indicators for whether a family member within the household often goes hungry or thirsty), and caregiver characteristics (Caregiver's education level). Cluster-robust standard errors are in parentheses. Standard errors are clustered at the school level.

To explore the gains in math performance in more detail, we consider impact on the performance of girls on the EGMA subsections. Girls' scores on the Addition subtask experienced the biggest increase, followed by Number Quantities, and Subtraction with 4.3, 3.9, and 3.0 percentage point gains, respectively. It is worth noting that the subsections showing the greatest improvement in EGMA scores are those with time constraints, and participants had to complete as many questions as they could within a limited amount of time (60 seconds) and had early stop rules.[19] This suggests that the improvements

[19]In addition to achieving higher scores, girls in treatment locations increased the number of questions they answered on some of mathematics subtests. This is discussed in more detail in the Appendix.

in mathematics performance caused by the information campaign may not necessarily come from improvements in the understanding of mathematical concepts, but may alternatively come from a change in attitudes or increase in confidence leading to an improved ability to apply their understanding under time pressure.[20] The possibility that an information campaign changes performance by changing attitudes is particularly relevant in the Zimbabwe context, where rural female students tend to perceive math as difficult, masculine, and largely irrelevant (Gudyanga, 2016).

To further explore the mechanism through which girls improve their mathematics performance following the information campaign, the Appendix considers the impact of the IGATE program on the number of questions attempted on each subtask in the mathematics assessment.

4.3. **Literacy.** When we explore the impact of IGATE on literacy performance, we see no improvements between baseline and midline (see Table 4). This means that the information campaign promoting girls education did not have similar short-run impacts on literacy as they did on numeracy performance. However, gains do occur overall between the midline and endline analysis with a significant improvement observed in letter sound identification of 3.8 percentage points, and an overall improvement of 2.4 percentage points between midline and endline. This contributed to an overall gain in 3.2 percentage point gain between baseline and endline. At that stage the other treatment programs such as Happy Readers, which provided books and reading materials to schools, were in place. It is possible that the eventual gains in literacy occurred because of the information-based interventions offered before the midline but took more time to be realized. However, it is also likely that they were at least in part driven by the other intervention components introduced after the midline data collection.

4.4. **Attitudes.** In addition to test scores, the program's detailed household surveys offer a unique opportunity to evaluate the impact that the program has had on girls' and caregivers' reported attitudes towards girls' education. Nearly all caregivers report having positive aspirations for the girls in the sample and report believing girls can achieve just as much or more than their male peers at baseline,[21] which suggests self-reported questions are not a reliable indicator for attitudes on these topics. However, since a significant portion of the program is focused on making caregivers and girls aware of barriers girls face due to menstruation, a more relevant indicator of attitudes that may

[20]Similarly, Cotton et al. (2013) finds that gender gaps in mathematics performance depend at least partially on the time constraints and competitive pressure.

[21]At baseline, 99.5% of caregivers report having positive aspiration for the girls, 96.9% of caregivers report believing girls can achieve as much or more than their male peers.

TABLE 4. DiD Results: English Reading

	Letter Sound Identification EGRA 1	Invented Words EGRA 2	Oral Fluency EGRA 3/4	Reading Comprehension EGRA 5	Average Total
ML-BL DiD					
Treatment	-0.0139	-0.00706	0.00284	0.0104	-0.00192
	(0.0146)	(0.00561)	(0.0132)	(0.0236)	(0.0113)
Observations	506	506	506	506	506
R-Squared	0.075	0.063	0.055	0.077	0.066
EL - ML DiD					
Treatment	0.0380*	0.00903	0.0111	0.0382	0.0241**
	(0.0191)	(0.00707)	(0.00960)	(0.0246)	(0.0111)
Observations	454	454	454	454	454
R-Squared	0.066	0.059	0.098	0.113	0.110
EL - BL DiD					
Treatment	0.0208	0.00492	0.0273**	0.0768**	0.0324**
	(0.0170)	(0.00819)	(0.0133)	(0.0302)	(0.0130)
Observations	450	450	450	450	450
R-Squared	0.071	0.057	0.074	0.126	0.100
Timed	Yes	Yes	Yes	No	
Early Stop Rule	Yes	Yes	Yes	No	

Note: The table reports the coefficient on an indicator for belonging to an IGATE treatment school. Note that EGRA 3 and 4 both assess oral fluency, but EGRA 3 was only given to girls who were in grades 1-5 at baseline while EGRA 4 was given to girls in who were in grades 6 and above at baseline. Controls include girl characteristics (Age, grade, illness, disability, orphan, travel time to school), household characteristics (indicators for whether a family member within the household often goes hungry or thirsty), and caregiver characteristics (Caregiver's education level). Cluster-robust standard errors are in parentheses. Standard errors are clustered at the school level.

be affected by IGATE would focus on caregiver's actions towards providing girls with feminine hygiene products.

Indeed, as we show in table 5, when caregivers of girls who were around the age of menarche were asked whether they had purchased sanitary products in the past 12 months, caregivers in IGATE treatment areas were 3 percentage points more likely to have reported doing so after being exposed to IGATE. This appears to be a gradual change, so the impact is not isolate to one period between baseline to midline or midline to endline. This means we cannot specifically attribute this to the information campaigns alone. However, since the interventions that were added after midline were limited to curriculum changes and resources that targeted girls, and not their caregivers or communities, it seems likely that this overall improvement in caregiver attitudes can be attributed to the information campaigns which specifically emphasized barriers girls face from menstruation and access to sanitary products. This finding suggests that the program has not only made households aware of the barriers girls face due to menstruation, but has also motivated them to take action to mitigate these barriers to support girls education.

TABLE 5. Probability of Attitude Change

	Caregiver purchased sanitary products for girl in past 12 months
ML-BL Probit DiD	
Treatment	-0.0488
	(0.0573)
Observations	453
Pseudo R-squared	0.0800
EL-ML Probit DiD	
Treatment	0.0867
	(0.0686)
Observations	411
Pseudo R-squared	0.0822
EL-BL Probit DiD	
Treatment	0.0296**
	(0.0146)
Observations	412
Pseudo R-squared	0.0898

Note: The table reports the marginal effect on this attitude outcome. Controls include girl characteristics (Age, grade, illness, disability, orphan, travel time to school), household characteristics (indicators for whether a family member within the household often goes hungry or thirsty), and caregiver characteristics (Caregiver's education level). Cluster-robust standard errors are in parentheses. Standard errors are clustered at the school level.

5. Conclusion

Using data from the randomized implementation of a major development aid project in Zimbabwe, this paper represents the first study of the causal impact of an information campaign intended to improve community attitudes on the education of at-risk girls. We show that such information campaigns can result in relatively quick and persistent improvements in girls' mathematics performance on standardized assessments. They also improve enrolment rates, leading girls who would have otherwise left school to remain in school for one additional year, on average. We also find that caregivers are more likely to show support for girls' education by acting to remove barriers caused by menstruation and access to sanitary products. This suggests that interventions designed to reduce negative attitudes alone can improve girls' education outcomes without addressing other learning barriers specifically.

These results have important implications for the design of multifaceted international development projects being implemented by NGOs and donor agencies. Agencies such as USAID and UKaid/DFID typically incorporate efforts to engage communities and improve attitudes and beliefs about girls education into their gendered education projects GEC (2018). This approach is largely supported by suggestive evidence that improving such attitudes and beliefs is a necessary for building sustainable improvements in girls' access to education and learning, and that the most-effective interventions will improve efforts to improve attitudes and beliefs along side other intervention components providing resources, infrastructure improvements, or institutional and policy changes (Unterhalter et al., 2014). However, in its assessment of the GEC's campaigns to improve attitudes and beliefs about girls education, UKaid concluded that there remains a lack of evidence about whether such efforts are on their own effective at improving outcomes (GEC, 2018).

Using data one of the GEC's own projects that was rolled out in an atypical way that enables causal identification, we show that such community-wide campaigns to improve attitudes and beliefs are indeed effective at improving education outcomes for girls. This is true even before they are combined with other intervention components including curriculum changes and the provision of bicycles and books. What's more, the additional intervention components appear to have had no additional impact on mathematics scores or enrolment beyond what was observed after the information campaign alone. This suggests that the campaigns to change attitudes and beliefs were not just an important component of the GEC intervention, but rather the driving force behind the many of the project's key impacts.

This is not to say, however, that the community information campaigns were the only project components that improved education outcomes of girls. The project led to increases in literacy scores, but these improvements did not occur until after after the program expanded to include the introduction of a reading curriculum and the provision of bicycles to girls and books within schools. These additional intervention components likely contributed to the improvement in literacy. In other words, we see no evidence that improvements in early-grade literacy, perhaps the most-important measure of primary education effectiveness, were not responsive to the information campaign alone.

There are several limitations to our analysis that may be addressed in future work. First, because the IGATE project only collected data on girls and not boys, our analysis can only speak to the impact of the project on the absolute performance of girls and not to impacts on gender gaps. Second, our analysis is not able to isolate the impact of the individual intervention components aiming to improve attitudes and beliefs throughout the communities: We cannot, for example, separately identify the impact of the PWCs

engaging girls within schools, or the mothers groups encouraging engagement among mothers in the communities, or the CSGE groups providing information to a wider set of parents and community members. Understanding their relative importance would be of great interest for future research, and we encourage implementers to consider future randomization in the roll-out of specific program components to allow for such an analysis. Understanding the relative effectiveness of the different interventions would allow projects to focus their limited resources on the components that provide the greatest cost effectiveness.

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Appendix A. Appendix

A.1. **School Locations.** Figure 2 shows a map of the IGATE school locations across rural districts in Zimbabwe.

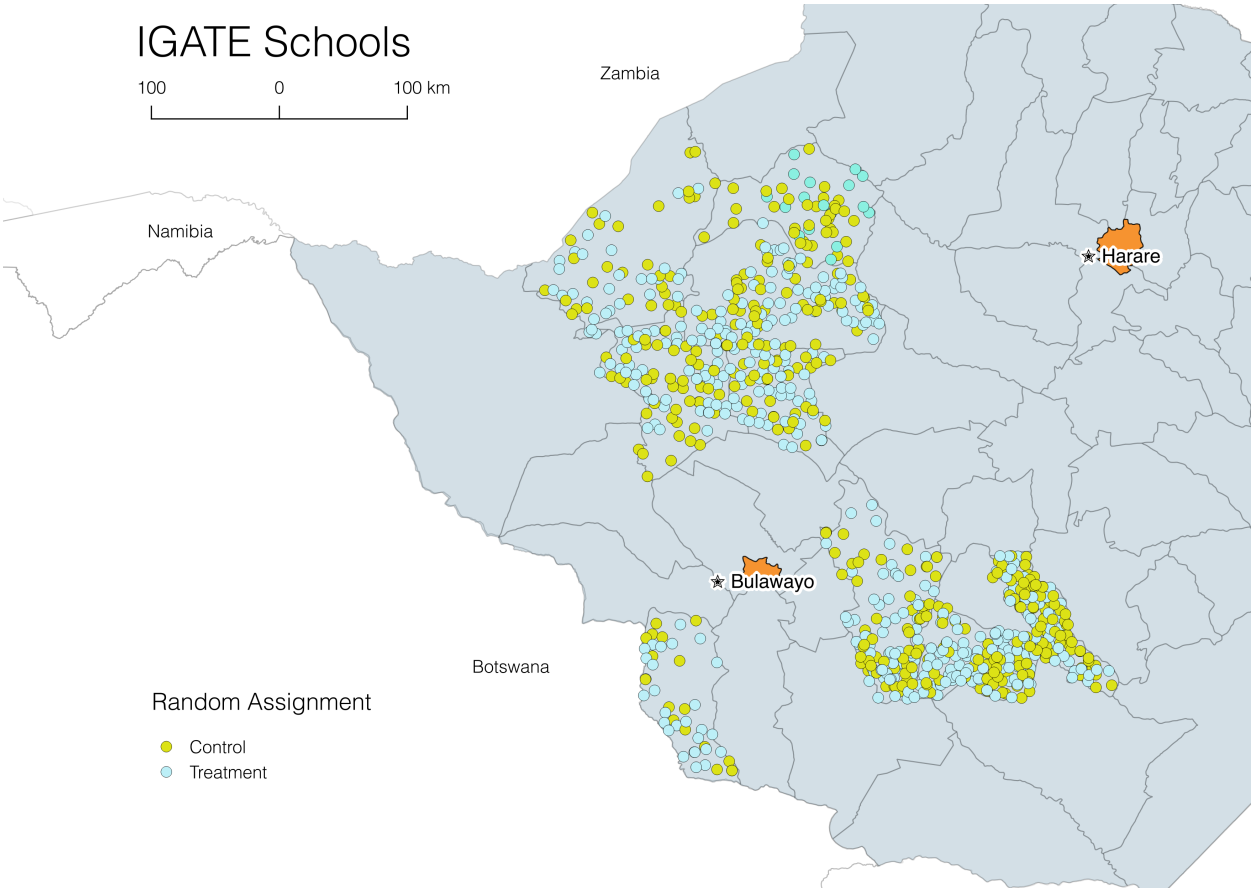

Figure 2. IGATE School Locations

Appendix B. EGRA/EGMA Test Details

As is standard with the EGRA and EGMA assessments, the questions in each test were described verbally, one by one, by a professional enumerator to individual students. Students then provided their answers verbally and enumerators record whether the student's answer was correct. During the test, students are given a visual stimuli to follow along and to see the specific numbers, letters, and words they are asked to say or analyse. There are five subtasks that make up the numeracy assessment: number identification, number quantities, missing numbers, addition, and subtraction. The number identification subtask consists of 20 numbers which students are asked to identify in one minute. An example of a typical EGMA number identification subtask as viewed by the enumerator is shown in figure 3.

FIGURE 3. EGMA 1 (Number Identification) Example

In the quantity discrimination subtask, a student is presented with a list of 10 pairs of numbers and is asked to identify the larger number. This exercise is not timed but ends after 4 incorrect answers in a row or hesitation of 5 seconds by the student. This stop rule trigger is shown in figure 4.

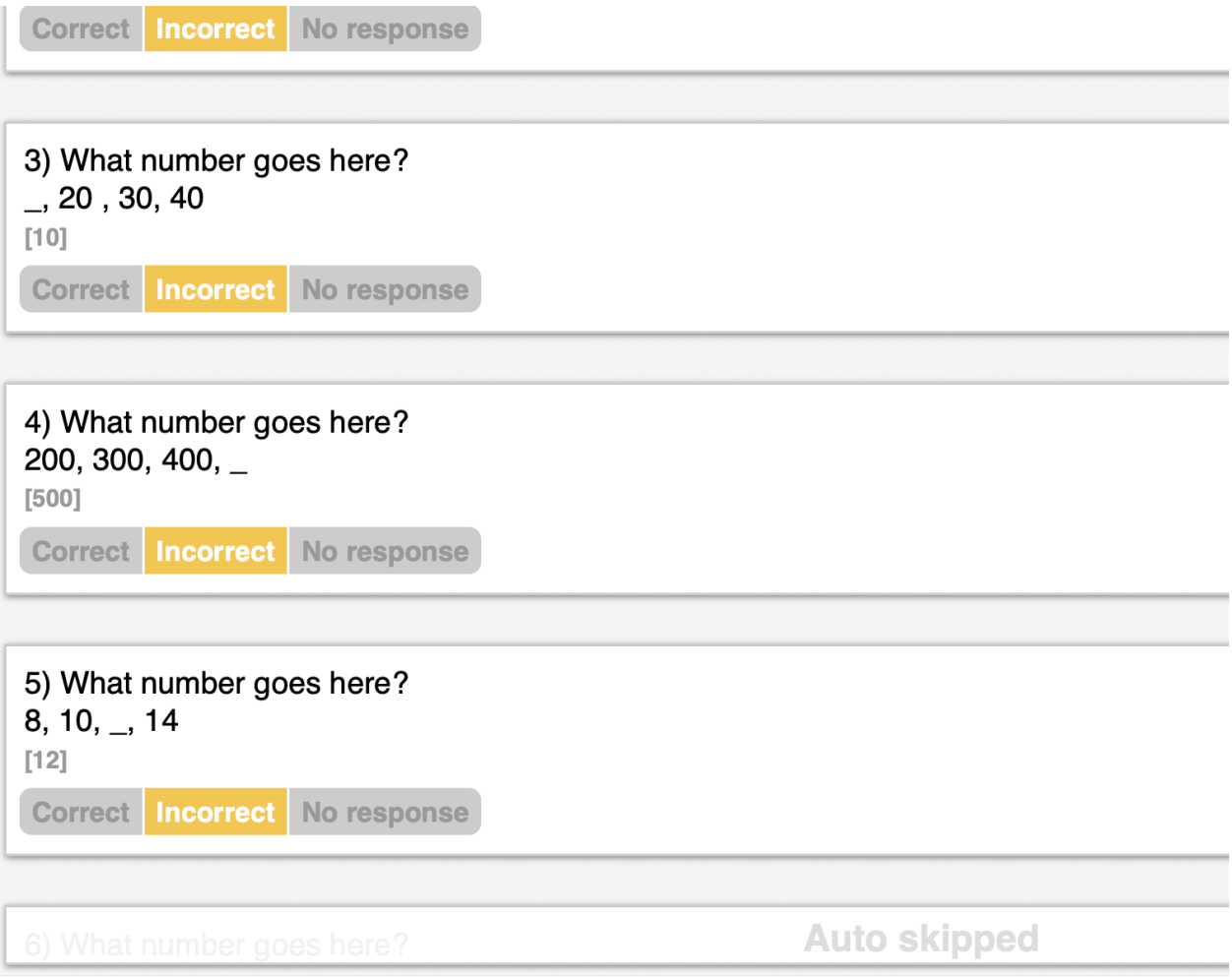

FIGURE 4. EGMA 3 (Missing Numbers) Example: Early Stop Rule Trigger

The addition and subtraction level 1 components include 20 problems each. According to the EGMA guidelines, subtraction questions must be the inverse of the addition questions. A stop rule after 5 incorrect answers applies to these tasks as well.

There are five literacy subtasks: letter and sound identification, invented words, oral fluency (grade 1-5, and grade 6-7), and reading comprehension. The letter and sound identification task involves students phonetically reading individual letters in the alphabet, much like the number identification task. The enumerator records each correct pronunciation. Invented word tasks involve 50 words that do not have a meaning in English or in the local languages. The student is asked to read each made up word aloud and the enumerator records each correct pronunciation. An example of an invented words subtask as viewed by the enumerator is shown in figure 5.

FIGURE 5. EGRA 2 (Invented Words) Example

The remaining subtasks, oral fluency and reading comprehension, ask students to read a short story aloud. Enumerators are instructed to record the words the students misidentified or mispronounced and to identify the last word the student correctly said aloud within the time limit. The reading comprehension task then asks the students questions about the passage to assess their understanding of the story they just read.

The test design guidelines specify all details about each question's difficulty level. This includes details about the number each sequence increases by in numeracy subtasks and the number of single, double, and triple-digit numbers to be used in the Missing Numbers and Number Identification subtasks; and subtraction problems are required to be the inverse of the addition problems. In the first two EGRA components the versions are made different by reordering of letters or words within the rows to retain the same level of difficulty. The EGRA story subtasks are written with the intention of remaining the same difficulty using the same number of words per sentence and per passage and using a similar vocabulary. Given this strict structure, different versions of the tests are not likely to be different difficulties.

B.1. **Additional Treatment and Control Comparison Tables.** Here, we provide additional tables comparing the treatment and control group baseline characteristics, illustrating that there are no substantial differences between the groups ahead of the IGATE implementation.

TABLE 6. Numeracy Test Subtasks - Attrited versus Remaining Samples

	Attrited		Remaining	
	Control	Treatment	Control	Treatment
EGMA 1: Number Identification	0.771	0.677	0.718	0.674
	(0.305)	(0.335)	(0.317)	(0.339)
% of questions attempted	0.956	0.948	0.955	0.953
	(0.0946)	(0.140)	(0.114)	(0.125)
% of time spent	0.667	0.764	0.715	0.742
	(0.244)	(0.233)	(0.236)	(0.238)
EGMA 2: Number Quantities	0.671	0.572	0.593	0.558
	(0.341)	(0.344)	(0.333)	(0.356)
% of questions attempted	0.955	0.898	0.915	0.877
	(0.131)	(0.211)	(0.186)	(0.224)
EGMA 3: Missing Numbers	0.452	0.360	0.395	0.377
	(0.302)	(0.239)	(0.263)	(0.266)
% of questions attempted	0.894	0.845	0.850	0.826
	(0.193)	(0.213)	(0.215)	(0.232)
EGMA 4: Addition	0.510	0.373	0.457	0.407
	(0.263)	(0.243)	(0.295)	(0.283)
% of questions attempted	0.705	0.642	0.723	0.683
	(0.142)	(0.143)	(0.149)	(0.166)
% of time spent	0.985	0.995	0.985	0.982
	(0.0637)	(0.0366)	(0.0609)	(0.0827)
EGMA 5: Subtraction	0.405	0.261	0.338	0.295
	(0.279)	(0.227)	(0.273)	(0.252)
% of questions attempted	0.689	0.635	0.674	0.645
	(0.151)	(0.177)	(0.141)	(0.170)
% of time spent	0.978	0.994	0.986	0.989
	(0.0889)	(0.0392)	(0.0661)	(0.0667)
Average Numeracy Score	0.562	0.449	0.500	0.462
	(0.273)	(0.238)	(0.263)	(0.266)
% of questions attempted	0.840	0.794	0.823	0.797
	(0.0907)	(0.104)	(0.108)	(0.115)

TABLE 7. Baseline Summary Statistics - Attrited and Remaining Samples

	Attrited		Remaining	
	Control	Treatment	Control	Treatment
Age	9.375	9.574	9.377	9.380
	(2.268)	(1.875)	(2.011)	(1.997)
Grade	3.781	3.607	3.676	3.627
	(1.827)	(1.584)	(1.746)	(1.779)
Illness	0.0938	0.115	0.103	0.112
	(0.296)	(0.321)	(0.305)	(0.316)
Disability	0.219	0.230	0.174	0.191
	(0.420)	(0.424)	(0.380)	(0.394)
Orphan	0.0938	0.0164	0.0676	0.0536
	(0.296)	(0.128)	(0.252)	(0.226)
Travel time to school (minutes)	27.56	33.20	32.96	35.12
	(15.60)	(27.02)	(23.16)	(27.30)
Household often goes hungry	0.406	0.426	0.224	0.228
	(0.499)	(0.499)	(0.418)	(0.420)
Household often goes thirsty	0.188	0.148	0.128	0.121
	(0.397)	(0.358)	(0.335)	(0.327)
Caregiver has no education	0.0625	0.115	0.0676	0.0979
	(0.246)	(0.321)	(0.252)	(0.298)
Caregiver has primary education	0.375	0.492	0.523	0.550
	(0.492)	(0.504)	(0.500)	(0.498)
Caregiver has secondary education	0.562	0.393	0.409	0.352
	(0.504)	(0.493)	(0.493)	(0.478)
Caregiver works outside of household	0.281	0.180	0.221	0.235
	(0.457)	(0.388)	(0.415)	(0.425)

TABLE 8. Numeracy Test Subtasks - Summary Statistics

	Control	Treatment	Difference
EGMA 1: Number Identification	0.718	0.674	-0.044
	(0.317)	(0.339)	
% of questions attempted	0.955	0.953	-0.002
	(0.114)	(0.125)	
% of time spent	0.715	0.742	0.027
	(0.236)	(0.238)	
EGMA 2: Number Quantities	0.593	0.558	-0.035
	(0.333)	(0.356)	
% of questions attempted	0.915	0.877	-0.038
	(0.186)	(0.224)	
EGMA 3: Missing Numbers	0.395	0.377	-0.018
	(0.263)	(0.266)	
% of questions attempted	0.850	0.826	-0.024
	(0.215)	(0.232)	
EGMA 4: Addition	0.457	0.407	-0.05
	(0.295)	(0.283)	
% of questions attempted	0.723	0.683	-0.04
	(0.149)	(0.166)	
% of time spent	0.985	0.982	-0.003
	(0.0609)	(0.0827)	
EGMA 5: Subtraction	0.338	0.295	-0.043
	(0.273)	(0.252)	
% of questions attempted	0.674	0.645	-0.029
	(0.141)	(0.170)	
% of time spent	0.986	0.989	0.003
	(0.0661)	(0.0667)	
Average Numeracy Score	0.500	0.462	-0.038
	(0.263)	(0.266)	
% of questions attempted	0.823	0.797	-0.026
	(0.108)	(0.115)	
N	281	429	

Note these numbers measure baseline levels for girls who could be recontacted at midline.

TABLE 9. Sample Grade Distribution

Baseline Grade	Control	Treatment	Difference
1	13%	15%	2%
2	17%	16%	-1%
3	15%	17%	2%
4	20%	16%	-5%
5	20%	20%	-1%
6	8%	10%	2%
7	6%	7%	1%
N	281	429	

B.2. **Questions Attempted on EGMA.** Table 10 reports results from an analysis considering the impact of IGATE on the number of questions attempted on the EGMA exam. The first panel shows that the relevant coefficients from the DiD analysis of question attempts are positive and significant. This suggests that the community information interventions led girls to answer more questions between baseline and midline. Note that in the case of the number quantities subtask, this should be interpreted as an indication of improved ability rather than increased effort since this subtask was stopped after participants incorrectly answered four questions in a row.

TABLE 10. DiD % of Questions Attempted

	EGMA 1	EGMA 2	EGMA 3	EGMA 4	EGMA 5	Total
ML-BL DiD						
Treatment	0.00201	0.0365**	0.0143	0.0352*	0.0211	0.0218**
	(0.0106)	(0.0167)	(0.0160)	(0.0199)	(0.0234)	(0.00912)
Observations	710	710	710	710	710	710
R-Squared	0.036	0.180	0.154	0.171	0.196	0.090
EL - ML DiD						
Treatment	0.00519	-0.00114	0.0167	0.0164	0.00977	0.00938
	(0.00504)	(0.00942)	(0.0104)	(0.0151)	(0.0168)	(0.00687)
Observations	615	615	615	615	615	615
R-Squared	0.062	0.125	0.080	0.090	0.059	0.145
EL - BL DiD						
Treatment	0.00624	0.0362**	0.0261	0.0518**	0.0328	0.0306***
	(0.0111)	(0.0169)	(0.0174)	(0.0225)	(0.0286)	(0.00989)
Observations	610	610	610	610	610	610
R-Squared	0.075	0.263	0.224	0.128	0.158	0.111
Timed	Yes	No	No	Yes	Yes	
Early Stop Rule	No	Yes	Yes	No	No	

Note: The table reports the coefficient on an indicator for belonging to an IGATE treatment school. Controls include girl characteristics (Age, grade, illness, disability, orphan, travel time to school), household characteristics (indicators for whether a family member within the household often goes hungry or thirsty), and caregiver characteristics (Caregiver's education level). Cluster-robust standard errors are in parentheses. Standard errors are clustered at the school level.