The Impact of an Adult Education Program for Mothers: Evidence from India[*]

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We use a randomized controlled trial to evaluate the impacts of an adult education program, targeting mothers in rural India, on investments in health and education of one's children and family one year later. The program increased involvement in their children's education (but did not affect schooling outcomes), and impacted investment in family health and hygiene practices. We note that the program made the mothers more knowledgeable about health matters and document positive changes in some measures of bargaining power. The program increased the mothers' confidence in dealing with people outside their family, and increased their mobility.

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1. Introduction

Adult literacy in South Asia has shown a steady improvement from 46 percent in 1990 to 72 percent in 2020.[1] However, the literacy levels of women still lag considerably behind those of men in the region. In India, where this study is set, the literacy rate of adult men is 82 percent, compared to 66 percent for women (World Development Indicators 2020).

Literacy is important for self-worth and personal development; additionally, female literacy has an instrumental value, and is known to be associated with lower fertility, improved health, hygiene and education, better saving practices and increased gender equity (Glewwe (2002) and Robinson-Pant (2005)). There are two tools to impart literacy: school education and adult education, i.e. adult literacy programs. The effects of school education have been well studied.[2] We know less about the impacts of adult literacy programs. This distinction between school education and adult education is important as the relationship between education and outcomes might be non-linear (as suggested by Behrman et al. (1999)). In addition, it might matter as to when skills are acquired, i.e. does imparting literacy during adulthood have the same effect as imparting literacy through childhood?

In this paper we study the impacts of a discrete change starting at zero - going from no formal education to (some degree of) functional literacy and numeracy through an adult education program. We worked together with an NGO, Development Alternatives (DA). They have developed an innovative adult education program, called Tara Akshar+ (TA+), in which laptop-aided instructors teach in an interactive manner to groups of ten women for a period of three months. The program builds on insights from cognitive psychology and uses memory tricks to teach the alphabet. Importantly, and quite common in these programs, it also includes teachings on numeracy, and features many examples related to family and

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[1]Adult literacy is defined as the percentage of men and women above the age of 15 years who can read and write.

[2]See, among others, Schultz (1988), Rosenzweig and Kochar (2004), Thomas, Strauss and Henriques (1991), Rosenzweig (1995), Foster and Rosenzweig (1996), Behrman et al. (1999), Handa (1996), Paxson and Schady (2007), Andrabi, Das and Khwaja (2012), Aslam and Kingdon (2012), Alderman and Heady (2017).

child health.

We visited ten villages in India in the north Indian state of Uttar Pradesh, and invited adult illiterate women to participate in this program. Through a public lottery, we randomly divided this group into a treatment group and a control group. The treatment group participated in the TA+ program that year, while the control group women were enrolled after a one year lag. We collected baseline data prior to the randomization and endline data seven months after the treatment group finished the program and, before the control group was enrolled. We also conducted a midline survey immediately after the program was completed by the treatment group. Our analysis sample consists of 391 women. Our sampling and data collection strategy is complementary to a previously published pilot study Deshpande et al.(2017) to which we return later. In this paper, we look at the impact of TA+ on health and education of the participant's family.

We find that women who participated in the program made significantly more investments in the education and health of their family. They practiced improved hygiene (washed hands more often, covered water vessels) and were more likely to visit health clinics. We also note an increased involvement in their children's education, in particular by reminding children to complete their homework, and doing homework with the younger children. We do not document any significant impacts on school enrollment, attendance or child test scores. Nor do we document any significant impacts on child morbidity. Both the small sample and short time frame likely played a role in the lack of effects.

Understanding why a program works, or why certain components work and others do not, is of utmost importance from a policy perspective. The TA+ program combines several features: The program not only teaches reading, writing and numeracy, but also brings a group of women together on a daily basis, with a role model, i.e., the teacher. The curriculum is adjusted to adult students, and includes health and hygiene topics as examples.

We collected detailed data on the plausible mechanisms. We included a test documenting the woman's knowledge of health and educational matters, as well as self-confidence, and

information on the woman's status and position in the household. An innovative feature of our data collection is a bargaining game in which we asked the woman and her spouse to negotiate over the value of water tablets. By comparing the woman's valuation of the water tablet, with her husband's, and their joint valuation, we are able to determine her exact bargaining position.

We find large and significant impacts on knowledge of health and educational matters. We find that the women displayed an increased self-confidence in talking to outsiders. We document small, but not insignificant, changes in the woman's bargaining position in the household. We cannot detect any significant effect on the woman's assets or whether or not the woman is the main (or any of the) decision-maker(s) in the household regarding various day-to-day decisions. But we note an increased involvement in purchases at the local market, and positive changes in the woman's mobility; specifically, whether she visited or needed permission to visit local markets. In addition, we noted some subtle changes in the bargaining game. At the start of the game, the preferences of the spouses were more aligned, and during the game, the woman's husband was more likely to actively seek her opinion.

This paper builds on a pilot study conducted by our team in a smaller, different, set of villages a few years prior. In Deshpande et al.(2017), we evaluated the impacts of an earlier version of TA+ on the literacy and numeracy skills of the participants using tests developed by Pratham and based on DIBELS (Dynamic Indicators of Basic Early Literacy Skills) (Good et al. 2001). We document statistically significant, but small, effects on literacy, stopping short of making participants fully functionally literate. TA+ participants performed approximately at the first-grade level of schoolchildren. The effects on numeracy are also statistically significant, and more substantial in size, allowing participants to recognize numbers and add and subtract with confidence.

The results reported in Deshpande et al. (2017) are in line with the literature. Blunch (2017) summarizes the evidence we have on adult literacy programs (see also Abadzi (1994, 2003a, 2013), Blunch (2006), Blunch and Pörtner (2011), Ortega and Rodríguez (2008)).

He notes that though most adult literacy programs show limited impacts on literacy, impacts are often higher with novel approaches. For instance, Aker, Ksoll and Lybbert (2012) allocated mobile phones to a (randomized) subset of a traditional adult literacy program participants, and found substantial impacts on both writing and numeracy skills. Ghana's National Functional Literacy Program is another example of a relatively successful approach, lasting longer, 21 months, and classes meeting more frequently than most literacy programs. Aoki (2005) documents significant increases in reading outcomes from the program, although more modest effects are noted by Blunch and Pörtner (2011) who take into account aspects of program placement and self-selection.

The expectation of the TA+ program, as of many such programs, is however that they would not only impart literacy and numeracy, but also improve the material outcomes of the participants, and more broadly, enhance the welfare of their families. Adult literacy programs are seen as an important vehicle for social and economic development as participants acquire new knowledge, and sometimes vocational skills.[3]

Evidence on these broader effects are again provided by Blunch and co-authors for the Ghanian National Functional Literacy Program. They note significant effects, after about ten years, on labor market participation (in particular the update of self-employment), household consumption, and child mortality (in Blunch (2009, 2013), and Blunch and Pörtner (2011)). As the effects on literacy outcomes were more modest, they suggest that these effects are taking place through other channels. In Blunch (2013) the increase in health knowledge played a significant role in improving child health, while in Blunch and Pörtner (2011) teachings on income-generating activities increased welfare. In the Latin-American context,

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[3]In the context of school education, it is well known that educated mothers increase investments in their children. Aslam and Kingdon (2012) show that educated mothers in Pakistan are more likely to immunize their children, and observe improved anthropometric child indicators (similar results are found by Handa (1996) in Jamaica). Educated mothers can also improve the educational outcomes of their children by enrolling children in school, and making sure they attend. Educated mothers might make more effective home teachers, and allocate more time to their children's' homework (as in, Andrabi et al.(2012)), which in turn might result in improved performance in school (Paxson and Schady (2007), for instance, report an association between mothers' level of education and child test scores in Ecuador). Note that home teaching is important in developing countries, where the quality of school education is low (Glewwe and Kremer 2006).

Sandiford et al. (1995) provide evidence of the health impacts of Nicaraguan's National Literacy Crusade. They note significant effects on child mortality, and extreme malnutrition, effects they suggest might be due to a change in preferences and bargaining power of mothers.

We see our paper to be complementary to these studies. While Sandiford et al. (1995) and the studies authored by Blunch and others have focused on national adult literacy programs, and hence have benefited from large samples and a longer term view, our study, collects primary data within the context of a small randomized controlled trial. This allows one to collect detailed data on intermediate outcomes and mechanisms but imposes limitations in terms of sample size and time frame. Our study links up closely with Banerji, Berry and Shotland (2017). They, using a randomized controlled trial of an adult literacy program for mothers set in Rajasthan and Bihar (India), show only modest impacts on children's test scores one year later, even when the daily literacy classes are combined (cross randomized) with explicit weekly guidance for home teaching.

The rest of the paper is organized as follows. The next section explains the specifics of the TA+ program. Section 3 summarizes the theory of change. Section 4 details the sample, randomization and data collection. Section 5 presents the estimation methodology and results. Section 6 offers concluding comments.

2. Intervention

The intervention, Tara Akshar Plus (TA+) is implemented by an NGO Development Alternatives (DA). It is an adult literacy and numeracy program aimed at adult women in rural India. It's direct goal is to impart functional literacy in Hindi (the local language) and basic arithmetic. Indirectly, it aims to increase self-esteem, improve household decision-making and management and improve educational and health outcomes for the families involved.

The program blends a computer-based software and a face-to-face approach. The instructors have a laptop, which they use to show standardized videos. The advantage of this

approach is not only uniformity across class rooms, but also the fact that one does not need literacy experts to teach the class. In effect, DA recruits instructors locally, with the main requirement having completed high school (or 12 years of education).

The cognitive psychology approach which underlies the TA+ program is a popular approach and forms the base of much of the early years curriculum in many countries (Conway, Cohen and Stanhope (1991) and Kellogg (2003)). In this case, students are taught to recognize the sound of letters, syllables, numbers and form words and sentences using memory hook techniques, facilitated by short animated movies and exercises on the laptop. Hindi alphabets are taught explaining their link with objects that start with that particular alphabet. An illustrative English example would be to show the letter S as a snake curled in an S-shape. In this way, one gets reminded of the letter S every time one sees a snake-like shape. This principle gets further reinforced using repeated retrieval practice, in which the student applies their knowledge, repeatedly, in different contexts (on the value of repetition, see Brown, Roediger and McDaniel (2014)). The laptop displays images of letters and the objects that start with that particular letter, reads out the pronunciation and presents animated videos on the usage. Figure 1 presents an illustration of what the laptop displays during a TA+ class.

The TA+ program runs for two hour sessions, six days per week, for a total of 56 days. The program happens mid-morning, mid-day or afternoon, the timing decided together with the local women. It is conducted in TA+ centers made temporarily available for the program within each hamlet (village subdivisions), such as schools, or government buildings. The local facilities ensures that students do not have to walk more than a few minutes to attend the class. To further facilitate attendance, TA+ instructors encouraged the women to make arrangements with their families for childcare and other housework duties during the duration of the daily lessons. During the qualitative interviews we conducted after the TA+ program, many respondents mentioned that such arrangement was a requirement from their families to be able to attend. Often, they noted, they were able to simply postpone household tasks,

while asking another member of their extended family to look after their children. As a result perhaps, few children were sitting in, apart from nursing babies.

The 56 day curriculum of TA+ is divided into two components: 37 days of the literacy component named 'TARA Akshar' and 19 days of the numeracy component named 'TARA Ganit'.[4] Details on these two components are provided in the online appendix.

In addition to the classes on literacy and numeracy, discussions are held on varied topics, such as, child and family nutrition, breast-feeding, personal and family hygiene, the use of mobile phones, personal banking, woman's status, local geography, and Indian history and heritage. A detailed list of topics is provided in Appendix Table A.4. Note that fertility is not covered by the curriculum. DA also shares videos on relevant topics by sending them to the woman's mobile phones. One example of a video thus shared is on the use of water purification tablets, an object to interest for our analysis as it was used in the bargaining game. When we interviewed women after the program, several respondents mentioned that they learned (and also now applied) some tips for improved hygiene and nutrition, for instance, washing hands with soap and storing food and water in closed containers. Respondents mentioned also that the instructor re-iterated the importance of education and higher education of children.

There are more aspects of the design of the intervention that need our attention to understand its potential impact on the participants. Prior to the program, the women were mostly confined to interactions with their family members. In the setting of TA+, they are now introduced to a teacher, someone with a certain degree of education, and often an outgoing personality. This provides the participants with a role model, someone to look up to. Throughout each session, participants were invited to respond to questions and encouraged to ask questions and interact with each-other (without the supervision of elderly family members). While there were no formal student-led presentations, such an active approach

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[4]Later on, DA introduced an additional component called 'Gyan Choupali' which is a 6 month follow-up program after 56 days of TA+ where the women read materials provided by DA to further improve the functional literacy and numeracy skills. However, our study is focused on evaluating the impact of only the TA+ component.

to education might have furthered their confidence, and strengthened the social connections between the participants.

3. Theory of change

In our pursuit to explore all channels through which the intervention may have affected health and educational investments and outcomes, we outlined a theory of change after studying the design of the TA+ program and extensive formative research in the location. The TA+ program combines several features. First and foremost, the program aims to impart basic literacy and numeracy skills. Second, the program caters to women whose interactions were mostly confined at home. TA+ might have been the first opportunity to interact with role models, i.e., the teachers, mostly male, from outside of the village.[5] Third, the program provided the opportunity to spent time with other women without any inhibitions of being watched by older or male family members, and might have opened the door to a variety of social network and group effects.[6] Fourth, the curriculum of the program included health and educational topics and applications.

We acknowledge that our study was not set up to disentangle these various channels of effects; in the sense that we did not randomize any of the components. As far as DA was concerned, this would have made little sense, as they believed the components worked together in a complementary fashion, and hence looking at the individual effects would not have provided any useful information on which they could act. However, by looking at the effects on intermediate variables, we will are able to shed light on some of the mechanisms at play.

The program might have affected hygiene behavior, home-schooling and other investments in education and health through the following mechanisms. The program could have

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[5]Note that women of both control and treatment groups also interacted with our enumerators and research staff. These interaction too, had been described by the women as inspirational and motivational. However, we don't expect any differential effect by treatment status.

[6]These types of effects have been well-documented in the Indian and other contexts, see Munshi (2014)

changed the knowledge base of health and educational matters and/or the position of the woman in and outside of the household, changing her bargaining power and relations and/or increased her skill-set which could potentially increase household income and/or altered her preferences regarding education and health. Changes in behavior and investment, in their turn, change health and educational outcomes. However, not all outcomes can be expected to be altered by the program, given the time scale of the evaluation. In particular, we expect no impacts on either educational attainment or mortality as we tested for effects within one year after the TA+ intervention.

In the interest of space, we detail these mechanisms further, and situate them within the literature, in the online appendix. In the remainder of this section, we present the results of the pilot study mentioned earlier. This pilot took place two years prior to our current study in six different villages, where DA had been working for several years at the time of the evaluation. The pilot introduced an earlier version of the TA+ program, with a shorter curriculum then the curriculum described in the previous section.

In Deshpande et al. (2017) we report that this shorter TA+ program had small but positive effects on literacy and numeracy skills. Participation in TA+ increases the number of letters read in one minute by an average of 12.6 letters (compared with a control group mean of 3.4), the number of syllables by 5.7 (over a control group mean of 1.7), and the number of words read per minute by between 2.1 and 3.7 depending on the difficulty of the text selected. It is notable that while this represents a dramatic improvement over the baseline situation, this level of reading still did not represent functional literacy for the majority of the participants. The structure of Hindi implies the need for a strong visual analysis. The strings of letters are read from left to right, to form syllables, words and sentences. This requires a strong ability for syllabic and word segmentation. The bulk of the progress made by the participants is at these lower levels of literacy: letters and syllables. Skill integration implies that one needs to be familiar with almost all letters to form syllables, and with all syllables to form words. As such, a less than perfect knowledge of syllables will be an impediment

to the reading of words, and the comprehension of any paragraph. Consistent with this we note that the effects on reading comprehension are consistently larger for participants who started off at higher baseline levels. In the numeracy test, TA+ students recognized, on average, about seven out of 10 written single-digit numbers and two out of 10 double-digit numbers, compared with three and one, respectively, for the control group. While the ability to count to three was not affected (all participants could do so prior to the program), the ability to count objects and circle/write numbers down increases by about 50 percent. The ability to add and subtract improves by 30 to 35 percent, respectively.

In the appendix of Deshpande et al. (2017) we consider the effect of the current version of the TA+ program, two years later, in the set of set of 12 villages of which we included 10 in this paper. Despite the fact that the TA+ program had been lengthened, we thought the effects might be smaller. In the pilot study, we worked in villages where DA had build a presence, and the participants to the pilot study were not the first participants to the program. As will be further detailed in the next section, in this study, our sample consist of women who were not familiar with the program. We reproduce this appendix in the online appendix as Appendix C. We note that the estimated effects in the 12 villages are smaller. The differences are particularly pronounced for the more advanced literacy skills. The effects on the literacy outcomes are always positive and significantly different from zero barring two exceptions. There is an insignificant effect of TA+ on the number of words per minute read at both grades in these second set of villages. However, for the numeracy test, the progress from both sets of villages is comparable, an additional 7.5 points (out of a total possible score of 35) in the set of 12 villages, compared to 10 points (again out of a total possible score of 35) in the set of 6 villages.

4. Research design

In this section we provide an overview of the sampling process, randomization of the TA+ program, and data collected. The data instruments and data of project are available via the database FIGSHARE.[7]

4.1 Sampling, randomization and participation

TA+ is implemented by DA in eight states in the northern part of India. Our study was confined to the state of Uttar Pradesh. We worked in two of the three tehsils, namely Badohi and Gyanpur of Sant Ravidas Nagar District[8] where DA had planned to launch the TA+ program in June 2014. DA, together with the research team, selected nineteen hamlets across ten villages within these two tehsils.

The total number of hamlets in each village ranges from one to three. These hamlets and villages were chosen as they were large enough to support a treatment assignment lottery with desired numbers in both groups. The hamlets in our study are caste-specific settlements. Societal norms impose severe restrictions on inter-caste interactions in these villages. This resulted in the need for separate classes in each of the hamlets.

In each of the nineteen hamlets, DA conducted door-to-door visits to compile a list of all women between 15 and 45 years who were illiterate, had at least one child, and agreed to participate in the intervention, regardless of the time of implementation. We then conducted the baseline survey in April-May 2014 with all the women on this list. After completion of the baseline survey, the women were requested to assemble at a central location to participate in a public lottery. Every woman present was allotted a numeric identification number. These identification numbers were written in pieces of paper and put in a bowl. We then drew numbers from the bowl, one-by-one, and assigned the first set of women to the treatment group. These women were invited to attend TA+ classes in June-August 2014.

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[7]See: https://figshare.com/articles/Tara_Akshar_Research_Project/7205696

[8]Districts are administrative divisions of a state and tehsils are administrative sub-divisions within a district.

The remaining numbers picked were assigned to the control group. The control women were invited to attend TA+ classes in May-July 2015. We administered a midline survey immediately after the intervention in August-September 2014, and an endline survey seven months after the completion of the (first) TA+ classes in March-April 2015.

Table 1, Panel A, presents our sample divided between the treatment and control groups. These include 391 women from 331 households who were present during the public lottery and available during all base and endline rounds.[9] Note that the treatment sample is larger than the control sample. This is by construction. The desirable number of women for a TA+ class is ten. We required at least 20 women from each hamlet to be assigned to the treatment and control groups. DA insisted in over enrolling women in the treatment group to take care of any potential dropouts by the time TA+ classes began. At the start of time of the lottery, the randomization process yielded thirteen women in the treatment group and ten in the control group, on average, in every hamlet.

Note that within the treatment group, 133 out of 214 women participated in TA+, by which we mean, self-reported to having participated in the complete program.[10] For the purpose of the analysis we only consider this full participation. Self-reported partial participation, i.e., dropping-out, is rare in this program (less than 3 to 5 percent). During qualitative interviews the respondents indicated that the TA+ instructors visited them at their home if they did not show for classes, and urged them to return the next day. This active approach likely limited program drop-out. Self-reported full participation however does not imply that each participant attended every single class, although attendance is high. In Appendix Figure D.1 we present the distribution of the number of days participated (out of 56 days), as recorded at endline for those women who noted to fully participate. We note that, among these, 33 percent participated in all 56 days, and 70 percent participated in 80

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[9]Our baseline sample consisted of over 800 women. Upon learning more details about the program (which is time demanding) significantly fewer showed up at the public lottery. In addition, some women were not available for all three surveys. Table 1 presents the final analysis sample. We note that 7 percent of women lived in households which had both treatment/control women.

[10]This self-participation was asked at midline, and once more at endline. We used the midline variable, except for the cases where no midline data was available.

percent of days or more.

When we introduced the TA+ program in the village, the initial reaction of most women was positive. The TA+ recruiters were experienced and knew that the entire household needed to be involved in this decision. Hence, they emphasized the many potential benefits for the household, an expectation that the illiterate participant after the program might be able improve home cooking, assist children with homework, and do groceries and shopping more independently. While the participant was often the one who initially expressed interest in the program (although not always), the decision to enroll in the program was a household decision. In qualitative interviews, the participants emphasized that this enrollment was conditional on her finishing household chores and arranging for childcare (often within the family). Another important motivation to attend the program, as noted by the participants during the qualitative round was the expected increase in self-esteem, confidence and independence. An important component of this is being able to sign one's own documentation (and not having to rely on placing a ×).[11]

In addition, one should be aware of the lack of formalized social activities in these communities, and many respondents noted to welcome the activity as a "timepass" and a chance to be with and catch up with friends (see also Jeffrey (2010) on the notion of timepass). Finally, we should note that India, similar to other developing countries, has a strong and decades-old tradition of poor women mobilizing in secular community-level groups or organizations, e.g. Self-help groups (SHGs). Joining a group of other women towards a common goal has a number of attractions/advantages. The abundant literature on SHGs has highlighted the role of SHGs in enhancing social capital, increasing propensity towards collective action and strengthening woman's empowerment (Deshpande and Khanna (2019)).

In Appendix Table B.2, we present survey data collected at endline on how participants noted to use their new skills. Noting that these results cannot be interpreted in a causal manner (as we could not present a similar set of questions to the non-participants), the

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[11]Literacy is often seen as a source of power and self-esteem (Walker and Bantebya-Kyomuhendo 2014; Stromquist 1990; Ghose 2002).

similarities between the ex-ante expectations and the use after one year are of interest. About 66 percent of participants noted to be doing calculations while shopping, while 88 percent bargained. About 44 percent dialed a number on the phone, while 86 percent signed their name on official documents. Participants are optimistic when it comes to their new skills, and when asked whether they plan to use their skills in a variety of situations within the next year, ranging from reading of posters and banners to writing a shopping list, they answered affirmatively (although this might also be subject to bias, as the respondent might be reluctant to admit that the skills, received free of charge, will not be useful in the future).

4.2 Data collection

At baseline, we administered a household questionnaire to the head of household, and a woman's questionnaire to all the women in the treatment and control groups. We also conducted tests of numeracy/literacy and cognitive ability among these women.[12] At midline, we administered a woman's questionnaire and numeracy/literacy and knowledge tests to the women. The endline survey included the woman's questionnaire and a bargaining game. In addition, we administered a literacy/numeracy test among a randomly selected child within the age group of 6-10 years of every woman. In December 2016, we conducted qualitative interviews with selected treatment women.

4.2.1 Household questionnaire

The household questionnaire administered during baseline captures household structure and asset ownership, and includes questions about age, marital status, caste, education and occupation of the various household members, land ownership, whether the household had access to electricity etc. These household characteristics form part of the covariates on which the treatment and control groups were balanced, as we show later.[13]

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[12]While we have not used these data in this paper, we also conducted a village and school questionnaire in all villages obtaining information on location, facilities and composition.

[13]We expanded the usual definition of the household, and include all members who live together in one compound. This definition implies the inclusion of multiple kitchen-units (members who eat together on a

4.2.2 Woman's questionnaire

The woman's questionnaire has components related to health and educational practices, investments and outcomes, confidence, mobility, status and role in family decision making. At endline, we also included questions on the use of literacy and numeracy skills among the women who participated in TA+.

Health and education: The base, mid and endline woman's questionnaire canvassed information on the children's education. The respondent was asked about the education of the children in the household between the ages of 4 and 19 years.

These include questions as to whether the child was enrolled at school, how many days the child was absent from school the week preceding the survey, whether the woman accompanied the child to school, whether the woman inquired about the child's homework, how much time the child spent on homework the day preceding the survey, and who, if anyone, helped the child with homework.

The base, mid and endline woman's questionnaire asked the respondent, this time for all children under the age of 19 years, questions related to the child's health. These included whether the child fell ill anytime in the one month preceding the survey, whether the child received any medical treatment, whether the medical treatment received was within or outside the village, and whether the woman was present while the child was being treated.

All three rounds included a time use survey, which inquired about whether or not the respondent had engaged in any of the following activities yesterday, last week, last month, and in the last 6 months prior to the survey (if the activity was done yesterday, the questions pertaining on last week/month/6-months were skipped, etc.). If the woman had engaged in the activity the previous day, we also asked the amount of time spent, in hours and minutes, on that activity. The activities include: cooking, fetching water, collecting/generating wood/fuel, income generating activities, doing homework with children, and leisure/gossiping

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daily basis) in some households.

(which, notably, does not have the negative connotation we might associate with it). In addition, we asked about whether she had conducted the following activities yesterday, last week, last month or the last 6 months: reminding her children of homework, talking to her children's teacher at school and consulting with the health care worker at the primary health center.[14]

Before we proceed it is important to note the difference in the elicitation strategy. In the child-level questionnaire, we asked the woman to reflect on each child, whereas in the time use survey we asked about children in general. Further, in the time use survey, we asked about the activity of doing homework with children, rather than helping children. It is possible that in the latter case, the respondent would only answer in an affirmative manner if she genuinely felt her assistance was helpful to the child.

The endline woman's questionnaire also captures aspects of the respondent's health and hygiene practices. A few examples of variables on which data were collected include whether she covered vessel in which drinking water was stored, whether she treated water before drinking, whether she washed her hands after using the toilet and whether she spoke to her children about the necessity of washing hands. We also captured fertility preferences (ideal number of children), female hygiene and contraceptive behavior, and her knowledge of contraception.

Confidence, mobility, status and decision making: These sections of the questionnaire were the most innovative. While we took inspiration from existing studies, such as, the Indian Human Development Survey, the Indian Family Health Life Survey and the Young Lives Survey, we expanded the set of questions on household decision-making and mobility. Each of these questions went through careful field-testing.

In the base, mid and endline woman's questionnaire, we had questions to capture the woman's self-reported confidence in dealing with people outside their families. We identified

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[14]The time use survey questions related to education were only asked to the women who had children in school. In the case of multiple children, the women answered the question with reference to her youngest child.

nine different people which the women would potentially have to deal with namely, male and female shopkeeper, contractor, Asha worker (always female)[15], Anganwadi worker (local health care provider, always female), village head, bank employee and male and female doctor or nurse. The respondent was asked how confident she felt in dealing with each of these nine different people. Respondents had to choose between the following options, namely 'cannot even imagine dealing with the person', 'will never deal with the person', 'not confident in dealing with the person', 'somewhat confident in dealing with the person' or 'very confident in dealing with the person'. We assigned scores ranging from 0 to 4 for different levels of self-reported confidence. A score of 0 was assigned for the lowest level of confidence, when the woman expressed that she could not even imagine dealing with the person. The highest score of 4 was assigned when the woman expressed that she was very confident in dealing with the person. The confidence score for each woman was calculated as the summation of these scores across the nine different people. The maximum value which the confidence score could take was 36.

The baseline and endline woman's questionnaires included questions on a woman's status in the household, asset ownership/use and household decision-making. The latter module entailed asking the respondent whether she was involved in a particular activity, and who the three people (in order of importance) were who had most say on the activity. In addition, we inquired as whether the respondent was consulted, and if so, able to express her views, and if so, felt their views were being taken seriously, and if so, sometimes able to change the views of other. The activities included: what to cook, what to shop (at the local market and outside of the village), what needs to be done when her child falls sick, child's school enrollment decisions and whether her child should attend school on any given day. Using this information, we are able to construct several measures of involvement in decision-making: Whether the woman was involved in an activity, whether she was the main, or simply, a decision-maker, whether she was consulted, an index (out of 4) based on the degree of

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[15]ASHA is an acronym for Accredited Social Health Activist, who is an accredited social health worker, appointed by the Ministry of Health and Family Welfare, as a part of the National Rural Health Mission.

involvement.[16]

Concerning status and asset use, we asked: 'In the last two weeks, have you taken a shared auto/public transport to anywhere?', 'Do you personally own a mobile phone which you carry at all times?', 'Do you have a bank account in your name?', 'Do you get to keep your jewelry with yourself?' and also about the use of veils asked trough the question: 'Do you practice ghungat/purdah/pallu? [17]

In addition, we inquired about the respondent's mobility by asking whether they have engaged in certain activities, and, if so, whether they needed permission (and from whom, and whether they usually received permission), and (independent on whether they need permission) whether they would be allowed to go by themselves. The listed activities include leaving the house, going to a shop within the village, going to a shop outside the village, visiting a primary health care centre, visiting the natal family, making phone calls to natal family, joining community groups, and/or going for cinema or other entertainment events.

4.2.3 Tests

At both base and midline, we administered two tests of cognitive ability to the women. The first test was the Forward Digit Span (FDS) test. This test provided a measure of short-term phonological memory, which typically serves as a useful predictor of reading outcomes (Groeger, Field and Hammond 1999).[18] The second test was the Rapid Automatic Naming with Colors (RAN) test. This is a test for measuring lexical access speed and engagement-disengagement dynamics, and is known to be correlated with learning disabilities like dyslexia

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[16]This index would give one point, for each positive answer to the following questions: Are you being consulted?, Are you able to express and defend your views?, Do you feel that your views are taken seriously? and Do you sometimes change the views of others?

[17]A ghunghat/purdah/pallu is a head covering worn by married women in the Hindi speaking belt of India to cover their heads and often their faces. A married woman wears this in front of all men except her husband, her father and brothers. This practice limits a young woman's interaction with older men.

[18]In this test, we orally provided the women with random sequences of digits and asked respondents to recall them in the same order as they had received them. The length of the sequences increased gradually. The administration of this test stopped when the respondent obtained two scores of zero over two consecutive items.

(Denckla and Rudel (1976)).[19] The baseline results of the FDS and RAN tests also form part of the covariates which we later establish as balanced between the treatment and control groups.

During the midline survey, we conducted a knowledge test which had eight factual questions and four cognitive ones. The factual questions included listing the main cause of diarrhea, the recommended number of months of breast-feeding, the disease cause by iodine deficiency, the legal minimum age of marriage, and also questions on community knowledge, such as the nation's capital and the name of the Prime Minister. Two examples of the cognitive questions include the number of mangoes each child would get if twenty mangoes were to be equally divided among five children; and the name of the fourth son of Manoj's dad whose three sons are named Ram, Laxman and Shatrughana.[20]

At endline we administered literacy and numeracy tests to a randomly selected child within the age group of 6 to 10 years of each woman. These were the same tests as conducted with the respondent herself and analyzed in Deshpande et al. (2017) and summarized in the online appendix. In addition to these, we also conducted a RAN test with the selected child.

4.2.4 Bargaining game

At endline, we conducted a game to investigate the woman's bargaining power vis-a-vis her husband. Our approach is similar to De Palma, Picard and Ziegelmeyer (2011) Carlsson et al. (2013) and Braaten and Martinsson (2015) in that we determine bargaining power by examining the influence of individual preferences on a couple's joint preferences (see also Ashraf (2009) and Pitt, Khandker and Cartwright (2006)).

We set up shop at each household. Our shop sold both rice and chlorine water tablets.

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[19]In this test, the respondents were shown 6 rows of four squares colored Blue, Red, Yellow and Green. They were then asked to name the colors of each square as quickly as they could. Learners could use local names for the colors. The task involved 4 primary colors, and the color squares were randomly arranged in a matrix on the page. This test was administered twice with different random matrix arrangements in order to estimate the reliability of the measure (so a total of 24 * 2 squares). The time taken by the women to complete the test was captured as well as the number of errors they made.

[20]These are famous characters from the legend "Ramayana".

The price of one chlorine tablet was Rs.1 and rice was Rs.30 per kilogram, and each game participant was asked how they would spent 30 Rs (about 0/8 USD) on these two items. First, we asked each participant to make a decision individually (guaranteeing confidentiality). Then we brought the two spouses together, asking them to discuss and decide on a mutually agreed split.[21] A unique feature of our design is that, in addition to simply capturing preferences, we also recorded the process by which the individuals came to a joint decision. We collected information on who spoke first, what the content of this first statement was (in particular, whether this first statement dictated the valuation, sought the valuation of the other person, or suggested who should decide) and who spoke last. Once the joint decision was made, we paid out the participants in rice and water tablets as per joint decision.

It should be noted that rice performed a similar role as cash since it can be easily bought and sold in the village and is valued by both husband and wife. As DA and local government officials were not keen on us using cash in the villages, we opted for rice as a substitute for cash. Consistent with this reasoning, we priced the rice at the average village market price. Despite being included in the curriculum, water tablets were a less familiar commodity. In effect, only 8 percent of the women had heard about them versus 21 percent of men. Previous research suggested that preferences for health goods might differ by gender, and hence the combined features of unfamiliarity yet likely differential preferences made water tablets a good choice for this game (Duflo (2012); Lépine and Strobl (2013); Malapit and Quisumbing (2015); Björkman Nyqvist and Jayachandran (2017)).

We report descriptive statistics of this game in Appendix Table B.3. Assuming a Nash Bargaining process we denote the woman's bargaining power as λ. For the couples who have a λ within the acceptable range of zero to one, the majority reports $\lambda = 0$ or $\lambda = 1$ (with more than twice as many couples $\lambda = 0$ compared to $\lambda = 1$, confirming the male-centered decision-making as also found by Carlsson et al. (2013) in China). While this might suggest

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[21]For almost half of the women we were unable to conduct this experiment as the spouse was not present at the time of the interview. Whether or not the spouse was present does not correlate with the treatment status, but appears to be largely determined by the spouse's migration status and the woman's age.

extreme levels of bargaining power, we interpret this as evidence of the limitations of our game. Bargaining power is a complex concept, encompassing multiple dimensions, and our game likely just captures one of these.[22,23]

4.2.5 Qualitative interviews

In December 2016, we conducted a series of qualitative semi-structured interviews in two of the program villages. All respondents selected for this qualitative exercise had participated in the literacy program. Prior to our visit, we had made a census list of all households that had at least one literacy program participant. We randomly selected eight households, stratified by family structure (nuclear/extended families). The interviews followed a semi-structured format; a set of open questions around pre-identified themes, but allowing the respondent to talk freely and at length about each topic. We covered three topics: the decision to participate in the TA+ program, the day-to-day experience, and the perceived effects, or lack of effects, of the program.

4.3 Descriptive statistics

The process of selecting participants in the treatment group through a lottery was meant to create two groups with very similar observable and unobservable characteristics. A standard check to determine whether the randomization procedure was conducted properly involves investigating whether these two groups have similar observable characteristics at baseline. If one lottery had been held for all potential participants across all villages, then a simple

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[22]For 15 percent of the couples, λ was outside the acceptable range of $[0,1]$. If taken at face value, this would imply that the process of negotiation itself might have changed individual preferences, i.e. persuasion has taken place. More likely perhaps, the game might not have been understood by these participants. Note that for 23 percent of the couples, we recorded the same preferences, hence λ cannot be computed in these cases.

[23]We conducted a similar game with the entire extended family. In this game, we asked the members of the extended family to provide us with a willingness-to-pay for a children's book, both separately as well as jointly. However, in this case there is no straightforward manner to capture the bargaining position of any one individual. When we repeat a variation of the previous analysis, we note no statistically significant effects of TA+. In addition, the effects on the preferences of the participants, the difference in preferences, or the decision-making process are imprecise. Given the significant attrition issues in this game, we opted not to include the results of this game.

t-test would have been appropriate. However, as Duflo, Glennerster and Kremer (2007) note, one should include subgroup indicators (called strata) in this case.[24] The strata fixed effects indicate the hamlet where the respondent lived and attended class.

Table 2 reports selected baseline statistics of the women in the treatment and control groups, as well as whether the difference between the two groups is significant. Focusing on the women in the control group, the average age was 36 years, and they had, on average, three children. The average FDS test score was 5.5 out of a maximum possible score of 16. The average time taken by women for the RAN test was 82 seconds, and they made two errors on average. Each woman's household had, on average, 0.5 acres of land. There were 11 members in every household, on average, with an average number of five adult members. 17 percent of the households had access to electricity. Given that TA+ program targeted disadvantaged groups, it is no surprise that 45 percent of the households belonged to Other Backward Classes (OBCs) and 50 percent of the households belonged to Scheduled Castes (SCs).[25] Column (5) of Table 2 which reports the P-value of a regression of the variable of interest on the treatment dummy indicates that the treatment and control groups are balanced on all these characteristics. In the regression specification, we control for all the characteristics of Table 2.

Table 3 provides the summary statistics for the children of the sample women, and reports whether the difference in the children's characteristics between the two groups is significant. Focusing again on the control group, the average age was nine years. Half of the children were girls.

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[24]Whether it is necessary or simply advisable to include strata fixed effects depends on whether the same proportion of participants is chosen in each lottery. Athey and Imbens (2017) note that including strata fixed effects for different lotteries generally lowers the estimated standard errors for the estimated coefficients, and is therefore advisable. When the lottery is conducted for separate subgroups separately and the number of participants chosen for the program as a proportion of all possible participants differs by subgroup, it is necessary to include strata fixed effects to avoid biased results.

[25]There are more than 6000 caste (jati) groups in existence. The constitution of India proclaims it as a "caste-less" society, and legally, caste is recognized as a category only for the purposes of affirmative action, namely, the most disadvantaged castes, are identified for quotas in state-run educational institutions, government employment and at all levels of election. These castes are listed in a government schedule, and hence called Scheduled Castes.

They had, on average, four years of education. 92 percent were enrolled in school at the time of baseline survey and 54 percent of the enrolled children attended school on all seven working days preceding the day of the baseline survey. Only six percent were taken to school by their mother. Mothers of 69 percent of the children inquired about school homework. 63 percent spent at least one hour on homework daily and 8 percent received help from an educated member of the family, often a sibling or a cousin.

Looking at the health indicators, and considering children up to the age of 16 years, 36 percent were noted to be ill at any point of time in the past 30 days preceding the survey; conditional on being ill, almost all received treatment, in the majority of cases outside of the village with the mother present during the treatment.

Column (5) of Table 3 which reports the P-value of a regression of the variable of interest on the treatment variable indicates that the treatment and control groups are balanced on every single characteristic of the children, except for the time spent on homework, where the children from mothers in the control group, do significantly better. We control for child age, birth order, child sex and an interaction term between child sex and age.

5. Analysis and results

5.1 Regression methodology

In the previous section, we showed that the covariates are largely balanced between treatment and control groups. The goal of the impact evaluation is to establish the impact of the TA+ program on a host of outcome variables. The pre-analysis plan of this study was registered at the Registry for International Impact Evaluations in 2013, at the time of the baseline. In this paper, we, by-and-large, follow this plan.[26]

Consider the following regression, where y_{ij} denotes the variable of interest of woman i

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[26]See: https://ridie.3ieimpact.org/index.php?r=search/advancedSearchDetailView&id=60.

located in hamlet j:

$$y_{ij} = \alpha + \beta_{ITT}ITT_i + \gamma X_i + \mu_j + \epsilon_{ij} \qquad (1)$$

ITT_i is an indicator variable that takes a value of 1 if the woman was assigned to the treatment group and a value of 0 otherwise. Because not all women complied with the assignment, the variable β_{ITT} captures the intent-to-treat effect, that is, the effect of being assigned to treatment. The variable μ_j is the specific hamlet part of the error term (i.e. the strata) and ϵ_{ij} is the individual-specific part of the error term.

The control variables X_i include the woman's age, her baseline FDS/RAN test scores, the number of children under the age of 16, whether she belongs to the Other Backward Castes or Scheduled Castes, the amount of land owned by her household, the number of household members, the number of adult household members, and whether her household has access to electricity. We estimate Equation (1) with and without these control variables.

The child-level equivalent to equation (1) is, where subscript c denotes the child:

$$y_{cij} = \alpha + \beta_{ITT}ITT_i + \delta X_c + \gamma X_i + \nu_i + \mu_j + \epsilon_{cij} \qquad (2)$$

Where X_c denote the child-level control variables: age, sex, birth order and an interaction effect of age and sex. We again include strata-fixed effects (μ_j), and cluster errors at the woman's level (ν_i).

Our treatment assignment was not fully complied with: 38 percent of the women assigned to the treatment status did not participate in the program, and 4 percent of the women assigned to the control status, ended up participating in the program earlier than planned (see Table 1). Therefore, intent-to-treat will be an underestimate of the program for those who participated in the treatment. Hence, we implement an instrumental variables (IV) strategy in which participation in TA+ is instrumented by assignment to the treatment group. In the first stage, we regress participation in TA+ on assignment to the treatment

group and the other control variables. In a second stage, we use the predicted values instead of treatment assignment as the independent variable of interest.

$$y_{ij} = \alpha_{IV} + \beta_{IV} T\hat{A}_{ij} + \gamma_{IV} X_i + \mu_j + \epsilon_{ij} \tag{3}$$

Where the standard errors are adjusted to take into account the predicted first-stage regression. We apply the False Discovery Rate correction procedure of Benjamini and Hochberg (1995), following also Anderson (2008) and List, Shaikh and Xu (2019) within each group of variables in order to account for multiple testing in a group of potentially correlated outcomes. The coefficient β_{IV} now captures the local average treatment effect, which is the average effect of TA+ among the compliers. This is our preferred specification. In Table 1, panel B, we present the first stage regression results. We note that the F-statistic is above 300 in the sample of children, and above 200 in the sample of women, indicating that weak instruments are not an issue of concern (see also Stock and Yogo (2005) and Murray (2006)).

Note that unbiasedness of the estimates depends on the lack of spill-overs between the treatment and control group. Given that the randomization was conducted within each hamlet, this might not be the case. At endline, we asked the women as to whether they spoke on a regular basis with any of their class-mates prior to the start of the TA+ program: 88 percent replied positive. Then we asked those who replied positive to estimate the percentage of classmates they spoke to at least weekly, the average of this number is 50 percent. These numbers imply that we can expect within village/hamlet networks to be present. These networks may facilitate the transfer of information, but may also result in spill-over effects in empowerment and preferences (as documented by Kandpal and Baylis (2019)).[27] Based on qualitative interviews, we expect the transfer of information to possibly be important. If so, our estimates should be considered a lower bound. However, as we have no data on between-household networks, we cannot further analyze these spill-overs.

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[27]This has been documented widely in these rural contexts, see Jackson (2010) for an introduction, and Miller and Mobarak (2015) and Maertens (2017) for an application.

A second source of spillovers could be within the household. Recall that 7 percent of women lived in households with mixed treatment status, i.e. they had both control and treatment women. In Appendix Table B.4, we compare baseline variables among control women in households with mixed status versus households without mixed status, and note them to be similar except in terms of family composition. The number of both adults and children are larger in mixed households compared to non-mixed households. However, the number of children are larger in non-mixed households. In addition, the probability of the house being electrified and the household belonging to an OBC category (as opposed to SC categories) is larger for mixed households.

While the number of mixed households is small, it is notable that our estimates, as reported in the next sub-section, are not substantially altered when we dropped the mixed-status households (Appendix Tables B.5 and B.6). Finally, in Appendix Table B.7, we test the difference in child-level outcome variables between the children from pure control households, and control women in treatment households. While we note some statistically significant differences in these variables between these two groups, the direction of the effect is mixed. Overall, given the limited number of households with mixed status, the role of within-household spillovers is likely limited in this study.

5.2 Results

We start our analysis with a discussion of the impacts on children's educational investments, home schooling and test outcomes. We then cover investments in family health, and child morbidity outcomes. We conclude this section with a detailed analysis of the mechanisms identified in the theory of change. In each one of the tables we report the mean of the control group at endline.

5.2.1 Impact on children's education

We start our analysis of the effects on child education with the child-level data. To avoid issues with children leaving the home due to marriage, we only consider children between the ages of 6 and 16. This yields a sample size of 722 children. Table 4 - Panel A - presents the effect of TA+ on children's educational investments and outcomes. First, we note no statistically significant difference between treatment and control groups in terms of current enrollment. The time span of our study likely plays a role here, as one year might not be enough to see any effects on enrollment or educational attainment. In addition, the large majority, 95 percent, are enrolled in school, so this is not a relevant margin.

Conditional on enrollment, we observe some differences. First, we note a negative, marginally significant, effect on the probability that the child spends at least one hour a day on homework (the previous school day) by 11 percentage points (P-value=0.11). We are unsure about the reasons behind this, but note that the number of hours the mother reports is highly non-linear, with 60 percent of children at exactly 1 hour. This suggest that mothers are likely to give us a ballpark here. Their answer might be subject to social desirability bias, and Hawthorne effects with some members of the control group slightly over-reporting. Indeed, a detailed inspection of the histogram of the number of hours spent shows few differences by assigned treatment status (Appendix Figure D.2). In addition, recall that we noted a baseline imbalance in this variable. In particular, at baseline, this figure is 63 percent for the children of control women, and only 58 percent for the children of treatment women (a difference which is statistically significant at the 10 percent level, see Table 3).

Second, we find evidence of an increased involvement of the mother in home schooling. In Table 4, Column (4), we note that TA+ participation increased the probability of asking the child as to whether he/she had any homework, by 19 percentage points, in the past one week preceding the survey (statistically significant at the 5 percent level but no longer significant when we apply the False Discovery Rate correction). Comparing this with the results of the time use survey, in which women were asked whether they reminded any of

their children of doing homework that week, we find a similar effect, an 11 percentage point increase (Table 5, Column (4), P-value 0.13). This effect is even larger when we consider daily reminders in Table 5 - Column 3 - a 18 percentage point increase (statistically significant at the 5 percent level and remains statistically significant at the 10 percent level when we apply the False Discovery Rate correction). In this same time use survey, women also reported whether they spent any time helping any of their children with homework. While we note no statistically significant effect on this variable on a daily basis (Column (1)), but note a statistically significant (even after applying the False Discovery Rate correction), and economically meaningful effect at a weekly level (with an increase of 10 percentage points, Column 2). This lack of daily effect is confirmed in the child-level analysis (Table 4, Column (6)) - which inquired only about the previous school-day.

This change might indicate a shift of the woman's attitudes with respect to the importance of education, and, in the case of direct involvement in schoolwork might also reflect the fact that the women could directly benefit, since they can study together with their children.

Recall that the TA+ program brings the participants more or less to the level of the first grade of primary school. Hence, we would expect studying along with one's child only to be useful for the mothers of children of these very specific age groups. This interpretation is in line with the respondents in qualitative surveys. Respondents expressed that after attending TA+ classes, they realized the importance of educating their children. In addition, women with young children mentioned that they enjoyed studying along with their children after TA+ participation.

Note that we find no statistical significant effect on the probability of women walking their children at school. While we had no prior on the direction of the effect, it should be noted that walking one's child to school is quite uncommon. All but one village had a school within its boundaries, and children commonly walk together to school. As villages are small, this would take them about 5 to 10 minutes. Perhaps relatedly, TA+ participation did not impact the frequency at which the mother speaks to a school-teacher (Table 5 - Columns 5

and 6).

We explore heterogeneous impacts of the intervention on children of different age groups and present the results in Appendix Table B.8. All the above mentioned educational outcomes are tested separately for children between 6 and 12 years and also for children older than 12 but less than 16 years. The impact of TA+ participation on none of the variables are different for the two groups of children except for asking the child as to whether he/she had any homework. The positive impact we saw earlier on this variable is driven by mothers of elementary school children.

We conclude this section with the effects on the children's test scores. Recall that children's tests were only conducted with a single selected child between the ages of 6 and 10 years. Hence, the sample size here is smaller compared to the previous tables. In Appendix Table B.9 we show that TA+ participation did not have any significant impact on the literacy and numeracy test results of the woman's children. However, it should be noted that both the smaller sample, and the higher literacy and numeracy skills at baseline, might not have allowed us to pick up any effects. To illustrate this point, we reproduce the effects reported by Deshpande et al. (2017) for the same variables in the set of 12 villages. We note that the effects reported by Deshpande et al. (2017) fall within the 95 percentile confidence interval of the children's test score effects for the majority of the variables.[28]

5.2.2 Impacts on family health

We start our analysis with the child-level morbidity data. In Table 4 - Panel B - we present the results on children's health investments and outcomes. Here, we only consider children under the age of 16, which yields a sample size of 1,136 children. We note that TA+ participation did not have any impact on any of our measures related to morbidity: There was no discernible change in the probability of the child falling sick, and conditional on

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[28]We also follow Glennerster and Takavarasha (2013) to compute the power using Stata's power command. The power of these regressions ranges from 0.05 to 0.14 which is much lower than the usually acceptable 0.8 to detect a significant effect.

falling sick, in the probability of the child receiving medical treatment, the location of the treatment, or in the probability of woman being present when the child was treated. Neither do we note any difference in these null effects in children belonging to different age groups (Appendix Table B.8).

During the qualitative interviews, the respondents noted that they always took sick children to the nearest public primary health centers located within or near the village, which provides free medical services. Hence, this is likely not a relevant margin for our analysis. Any follow-up treatment, for instance, at private facilities or paid public treatment is uncommon and only considered in the most persistent and severe conditions. Hence, in the survey, we did not attempt testing for the impact on health expenditures and the like.

In Table 5 - Panel B - we present the effect of TA+ on the woman's health and hygiene practices. Recall that TA+ classes include discussions on woman's health, nutrition, antenatal and postnatal care, breast-feeding, baby health and nutrition, malnutrition, prevention and treatment of common diseases, importance of cleanliness, sanitation, and safe drinking water.

This is likely an important dimension of possible change, as these refer to habits, most of which do not require any additional time or financial investment, but rather a certain amount of cognitive effort. TA+ participation increased the probability of women covering vessels in which drinking water is stored by 18 percentage points (significant at the 1 percent level of significance and remains statistically significant at the 5 percent level when we apply the False Discovery Rate correction). TA+ participation also increased the probability of women washing their hands with soap after using the toilet facilities, by 14 percentage points (significant at the 5 percent level of significance and remains statistically significant at the 10 percent level when we apply the False Discovery Rate correction).

While we did not note any effects on telling children to wash hands after using the toilet facilities, we note that this behavior is already very common in the control group. Neither did we find any effect on water treatment, which is fairly uncommon. This might be due to

the specific definition of water treatment we employed.[29]

Finally, TA+ participation increased the probability that one has spoken to the health care worker, or doctor, or nurse the week preceding the survey by 14 percentage points (significant at the 10 percent level although it becomes marginally insignificant when we apply the False Discovery Rate correction). Looking at the means of this variable, one notes that speaking to a health care working on daily basis is not very common, but the prevalence increased to 78 percent when one extends the time under consideration to 6 months preceding the survey. Again, this was an anticipated effect since the TA+ discussions focused on the need to monitor one's own health and the role of health care workers.

While not reported in Table 5, we noted no impacts on fertility preferences, fertility knowledge or contraceptive use. An impact on any of these dimensions was not expected. Fertility and child-bearing were not topics of discussion during the formal classes, which one might recall, often had male instructors. These topics are considered to be of sensitive nature, and while an indirect effect might have been possible, through the social network channel, for instance, any effect on fertility behavior in particular would be limited by the time scale under consideration.

5.2.3 Impacts on mechanisms

An important component of the qualitative interviews was to inquire about possible mechanisms to explain the effects, or reasons to explain some of the lack of effects. Respondents mentioned how TA+ participation improved their self-esteem, and relatedly, increased their status in the household. Women noted that their voice matters more with some mentioning that they were no longer casted off as the illiterate in the household. Many women mentioned that the ability to count better, together with their increased confidence, resulted in a situation where they can now do much more of the daily household shopping. In this

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[29]We asked 'During a normal week, how often do you treat or purify your drinking water by boiling the water, or filtering the water with a purchased filter or using an Aquaguard OR adding chemicals (do not count a cloth or strainer)?' (we only counted the response never as a no).

section, we follow the theory of change, and document the changes along two dimensions in particular. The first dimension is increased knowledge. The second dimension is an increase in bargaining power. We have little data on the remaining two mechanisms: increased earnings or a change of preferences.

This is not because we did not believe these mechanisms to be important, but rather because the time scale and sample size of our study would not have allowed us to capture any effects along these two dimensions. The only variable to explore increased household income is the amount of land the household owns[30].

Knowledge Columns (1), (2) and (3) of Table 6 presents the impact of TA+ participation on knowledge test scores. Recall that this test was conducted at midline, which accounts for the slightly lower sample size - 356 women. TA+ participation increased the test score by 2.8 points which corresponds to a 23 percent increase (significant at the 1 percent level). This overall increase can be decomposed into two components: an increase in the factual knowledge component by 2.3 points which corresponds to a 29 percent increase, and an increase in the cognitive component by 0.5 points which corresponds to a 13 percent increase. The larger impact on factual questions, highlights the effectiveness of the TA+ discussions on varied factual topics. The factual questions thus seemed to be a direct application of what the women were exposed to in their classes.

Note that the cognitive questions in this knowledge test are a combination of mathematics questions and logic questions. To compare, recall that in Deshpande et al. (2017) we noted that TA+ participants dramatically improved in terms of number recognition, counting and writing of numbers, and addition and subtraction. In total, we noted an increase of 7.5 points (out of a total possible score of 35 points). This is an effect size of about 60 percent.

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[30]The only variable to explore the change of preferences is the responses to what women think is the ideal number of children one should have. Our power calculations on these two variables indicate that our sample size is not large enough to capture minimum detectable effects (MDE) along these two dimensions. The MDE corresponding to a statistical power of 0.8 for the former variable is 0.40 compared to an estimated effect of 0.10. Similarly, for the latter variable the MDE corresponding to a statistical power of 0.8 is 0.27 compared to an estimated effect of 0.07.

Decision-making We start with our analysis with the most direct survey measures of bargaining power, the self-expressed degree of involvement in a range of decisions. In the top panel of Table 6 we present the results. As note before, the information we collected on household decision-making can be aggregated in many different ways. For instance, one can look at whether the woman is involved in a certain activity, or whether she has self-expressed any say or the most say in any decision. On can also create an index of the degree of her involvement using the sequence of questions as to whether the woman was consulted, and if so, able to express her views, and if so, felt their views were being taken seriously, and if so, sometimes able to change the views of other. Or one can simply look at to whether she was consulted.

In Table 6, we opted for the variable 'whether the woman is the main decision-maker', but we have conducted alternative analysis as well. We note that TA+ participation did not have any impact on any decisions under consideration. Nor did TA+ participation affect the sum of these indicators (Column (4)). Note that the means of the control group varies by activity: 55 percent are the primary decision-maker on what to cook on daily basis, 48 percent are the primary decision-maker on what and how much to purchase from the local market, 44 percent are the primary decision-maker on what and how much to purchase from the market outside the village, 46 percent are the primary decision-maker as to what had to be done when their children fell ill, 36 percent are the primary decision-maker on their children's school enrolment decisions and 43 percent are the primary decision-maker as to whether their children should take leave from school on a given day.

We note similar insignificant results when using the somewhat weaker 'whether the woman is any of three decision-makers' or 'whether or not the woman was consulted', an index (out of four) of the woman's degree of involvement, or whether or not the woman was involved in a particular activity. The only statistical significant effect we noted was an increase in involvement in 'what and how much to purchase at the local market' - with the effect size estimated at 11 percentage points (statistically significant at the 10 percent

level). We note that for these less stringent measure of power, the percentage of women involved or participating in the decision-making process are significantly higher. For instance, if we consider the 'consulted' definition, the average rates range between 80 and 90 percent. Similarly, the average index (out of four) is well over 3.5 for all decision-making dimensions.

Overall, this suggest that the TA+ program did not alter the balance of power within the household substantially, at least not within the short period we conducted our evaluation. This is also suggested by commonly used measures of status (in the Indian context). In the bottom panel of Table 6, we note that TA+ participation did not have any impact on whether the woman wears a veil, whether she could keep her jewelry with herself, whether she has a personal mobile phone, whether she used a vehicle, or whether she has a personal bank account. Note again, looking at the means of the control group, relatively high levels of assets across the board, and a uniform use of veils. There are no statistical significant differences between the two groups of women, not any effects on the overall status index which adds these five binary variables.

However, the qualitative interviews, as well as previous studies using other approaches do note the importance of female literacy in the balance of power within the household (Anderson and Eswaran (2009); Ramachandran and Jandhyala (2019)). Perhaps these fairly traditional measures fail to measure these perhaps smaller, more nuanced, changes that are taking place.

As a response to these concerns, Table 7 presents the results of the bargaining game. Recall that as the game required the spouse to be present, the sample is smaller. We present the results among all aspects of the game, from knowledge of water tablets, over individual and joint preferences, to the process by which a decision was reached. We note while that the TA+ program did not impact the preferences of the woman and her husband (in Columns (1) and (2), respectively), the discrepancy between their preferences might have decreased, as measured in Column (3). We use the difference between the individual preferences and the joint preference to estimate the woman's bargaining power in the game. We restrict the

sample to the couples with λ within the acceptable range of 0-1 for Columns (4) and (5). In Column (4) we note an almost statistical significant effect on λ (P-value 0.13). The P-value of the discrete counterpart is 0.14 in Column (5). If interpreted as (almost) significant, this suggests that the TA+ program increased the woman's bargaining power in the game. We also observe a change in the decision-making process. While, in most cases, the spouse speaks both first and last, and this is not something which appears to have been altered by the TA+ program, the first speaker is now 22 percentage points more likely to seek the other person's valuation rather than to dictate a valuation (although this difference is no longer significant after the False Discovery Rate correction). Note that TA+ did not affect the probability that the woman or her spouse had heard about water tablets.

Confidence and mobility In Table 8, we present our final measures of the woman's position in the household. These measures follow what we had observed in the qualitative interviews, and recognize that one of the first signs of a change in power in this context might come from a change in mobility. During our qualitative survey, respondents reported that before TA+ participation, they used to seek the help of their older children or other family members to accompany them when visiting, for instance, a health center, store or bank. TA+ instructors reportedly, encouraged the women to be confident, and to leave home by themselves.

Column (1) of Table 8 presents the impact of TA+ participation on the woman's confidence in dealing with people outside their families. TA+ participation increased the confidence score by 2.2 points, which corresponds to a 6 percent increase (statistically significant at the 1 percent level). Decomposing this measure per type of person (not reported in this table), we note statistically significant effects across the board, from male shopkeeper, to contractor, school teacher, bank clerk and female and male doctor.

The remainder of the columns in Table 8 presents the results on mobility. We note no significant impact of TA+ participation on whether women performs a range of activities,

apart from 'going to a local store', where we note an increase of 14 percentage points (statistically significant at the 10 percent level, although no longer significant after applying the False Discovery Rate correction). As a whole, the index of mobility did not increase (Column 2). Conditional on engaging on these activities, columns (1) through (8) of Appendix Table B.10 presents the impact of TA+ participation on whether the woman is exempted from seeking permission. TA+ participation increased the probability of woman not having to seek permission to make phone calls to the natal family by 21 percentage points (significant at the 1 percent level which remains significant after applying the False Discovery Rate correction). TA+ participation increased the probability of not having to seek permission to go to the local shop by 18 percentage points (significant at the 10 percent level, but no longer significant after applying the False Discovery Rate correction). Similarly, but not reported in these tables, TA+ participation increased the probability of being allowed to go alone to a local shop by 11 percentage points (significant at the 10 percent level) and attending a social event by 18 percentage points (significant at the 10 percent level).

Looking at the means of the control group in Table 8, note again that the level of mobility depends on the activity: 80 percent has been outside their home/dwelling, 58 percent has visited a local market (within the village), 50 percent has frequented a market outside the village, 92 percent has been to a primary health care center within the village, 98 percent has visited their natal family, 94 percent has made phone calls to their natal family, 9 percent has joined a community group, and 65 percent has gone for a social event. Whether permission was needed also depends on the activity in question. The woman generally does not need permission for calling her natal family by phone, or doing household shopping in the village; but tends to need permission for all other activities.

It should be noted that these results are less affected by possible lack of power. Recall that minimum detectable effects (MDEs) are the differences we can pick up with the existing sample size between the treatment group with the control group. Using baseline data, we computed that we can detect a MDE of 0.70 in the decision-making index. This is

comparable to the effect of 0.05 standard deviations noted by Banerji et al. (2013) in a comparable program implemented in North India. The MDE for the status and mobility index are, respectively, 0.29 and 0.44. The MDE for the knowledge and confidence score are, respectively, 0.79 and 1.45.[31]

6. Conclusion

Following the Second World War, UNESCO began to emphasize adult literacy as an important educational goal. However, adult literacy programs are often characterized by low enrollment, high dropout rates, and rapid skills depreciation (Romain and Armstrong (1987); Abadzi (1994, 2003b); Oxenham et al. (2002); Ortega and Rodríguez (2008)). These disappointing outcomes were due to several factors including unavailability of teaching material in the local language, poorly trained teachers, poor teaching program implementation, no planned practice of new acquired reading skills and no incentive to use these skills outside the immediate teaching environment. In the 1990s these observations led international donors such as the World Bank to largely abandon support for adult literacy programs. In the past decade, however, these programs have regained support, among others as a means to achieving the Millennium Development Goals. But what is the evidence on the degree to which these programs support these goals?

Although evaluations of adult literacy programs do exist, the body of rigorous evidence is small. Our paper directly contributes to this literature by evaluating the impact of an innovative computer based adult literacy program named Tara Akshar+ (TA+) over a wide range of outcomes and the mechanisms which underlie the theory of change. Given that 37 percent of illiterate adults are in India (UNESCO (2014)), the evidence from India is critical in terms of our understanding of the broader, inter-generational impacts of adult female

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[31]It should also be noted that at baseline, the control group differs from the treatment group along some of these dimensions, in particular in the areas of going to markets outside of the village, visiting the natal family, and going for a social event. Women in the control group enjoy more mobility along these dimensions at baseline. Hence, it is possible that these estimates represent a lower bound.

literacy.

It is useful to remind ourselves that while India has been successful in raising the primary enrollment rates of boys and girls through programs such as Sarva Shiksha Abhiyan and mid-day meal, adult education programs, such as the well known National Literacy Mission, aiming at increasing adult literacy, have been met with limited success (Kapur and Murthi (2009)), consistent with international experience. TA+, implemented by the NGO Development Alternatives (DA), has a 56 day curriculum focusing on imparting basic literacy and numeracy skills to its participants. The logistics of the program implies that the participants leave their home to assemble at a central location to attend the classes and to interact for substantial time period with people from outside their family. In addition to imparting skills, TA+ entails complementary discussions on a wide variety of topics.

With such a short program, it would be hard to imagine that the participants would have gained anything beyond basic literacy and numeracy skills. But our results show that TA+ does have impacts beyond these basic skills. We document an improvement in women's hygiene practices and an increased involvement in their children's education. We find little effects, however, on other morbidity, and more traditional measures of educational investment, such as school enrollment and attendance.

In addition to a longer-term analysis, a more complete analysis would also need to consider spillovers, and in particular within household spillovers in extended families (as literacy might be advantageous to those living in the same household, see Basu, Narayan and Ravallion (2001)). While we are limited by data constraints; only 7 percent of women live in households with both control and treatment women, our evidence suggests that spillovers within households are limited within this short time frame.

An important component of our data collection was the collection of information on mechanisms. As Blunch (2013) notes, it is often unclear which aspects of a program work and which ones do not. For instance, in the Ghana National Functional Literacy Program, we do not see any drastic impacts on the literacy and numeracy skill set of the participants,

but do observe significant impacts on the women's lives. In our study too, the overall impacts appear to exceed and outweigh the initial impacts on literacy as reported in our pilot study (Deshpande et al. (2017)). To understand this discrepancy, we collected and analyzed data on mechanisms.

We find that TA+ participation does result in significant impacts on the mechanisms which underlie the theory of change. Women have increased general knowledge of health and educational matters and increased confidence in dealing with people outside their families. Within their households, women were more likely to be exempted from seeking permission to leave the house. While making decisions with their spouse, there was an increased probability that the women would be consulted, and not dictated.

Not all our measures of the woman's status and power in the household showed positive impacts. This can likely be attributed to a combination of two factors: First: measuring these changes is not straightforward, and the specificity of the questions, respondents and context can dominate the range of answers one can expect (Quisumbing and De La Brière (2000); Almås et al. (2018)). Second: an increase in status might not result in an increase in power across all dimensions; instead, women might opt to exert their power in selected domains only (as suggested by Heath and Tan (2020)), or among selected family members only (for further discussions on India's extended family structure see, among others, Anukriti et al. (2020), Debnath (2015), Gupta et al. (2021)), or the household might move towards joint decision-making (as in Kafle, Michelson and Winter-Nelson (2019)). Or, perhaps, we have to reconsider the fundamental tenants of our intra-household models and take dynamic, flexible approach to preferences, bargaining power and relations (see Ligon (2012), Munro (2015) and Doss and Quisumbing (2020) for insights). Keeping in mind the short duration of the evaluation (about one year), the fact that we found strong, significant impacts on knowledge formation, confidence and women's mobility are encouraging results.

References

Abadzi, Helen. 1994. "What we know about acquisition of adult literacy: is there hope?." Discussion papers,ix,93 p.,World Bank, Washington, DC.

Abadzi, Helen. 2003a. "Adult literacy: A review of implementation experience." Operations Evaluation Department Working Paper 29387, World Bank, Washington, DC.

Abadzi, Helen. 2003b. *Improving adult literacy outcomes: Lessons from cognitive research for developing countries.* World Bank, Washington, DC.

Abadzi, Helen. 2013. "Literacy for All in 100 Days? A research-based strategy for fast progress in low-income countries." Global Partnership for Education (GPE) working paper series on Learning no. 7, World Bank, Washington, DC.

Aker, Jenny C., Christopher Ksoll, and Travis J. Lybbert. 2012. "Can mobile phones improve learning? Evidence from a field experiment in Niger." *American Economic Journal: Applied Economics* 4, no. 4: 94-120.

Alderman, Harold, and Derek D. Headey. 2017. "How important is parental education for child nutrition?." *World Development* 94: 448-464.

Almås, Ingvild, Alex Armand, Orazio Attanasio, and Pedro Carneiro. 2018. "Measuring and changing control: Women's empowerment and targeted transfers." *The Economic Journal* 128, no. 612: F609-F639.

Anderson, Michael L. 2008. "Multiple inference and gender differences in the effects of early intervention: A reevaluation of the Abecedarian, Perry Preschool, and Early Training

Projects." *Journal of the American statistical Association* 103, no. 484: 1481-1495.

Anderson, Siwan, and Mukesh Eswaran. 2009. "What determines female autonomy? Evidence from Bangladesh." *Journal of Development Economics* 90, no. 2: 179-191.

Andrabi, Tahir, Jishnu Das, and Asim Ijaz Khwaja. 2012. "What did you do all day? Maternal education and child outcomes." *Journal of Human Resources* 47, no. 4: 873-912.

Anukriti, S, Catalina Herrera-Almanza, Mahesh Karra and Praveen Kumar Pathak. 2020. "Curse of the Mummy-ji: The Influence of Mothers-in-Law on Women in India." *American Journal of Agricultural Economics.* Forthcoming.

Aoki, Aya. 2005. "Assessing learning achievements and development impact: Ghana's national functional literacy program." *Australian Journal of Adult Learning* 45, no. 1: 63.

Aslam, Monazza, and Geeta Gandhi Kingdon. 2012. "Parental education and child health—understanding the pathways of impact in Pakistan." *World Development* 40, no. 10: 2014-2032.

Athey, Susan, and Guido W. Imbens. 2017. "The econometrics of randomized experiments." In *Handbook of economic field experiments*, vol. 1, pp. 73-140. North-Holland.

Banerji, Rukmini, James Berry, and Marc Shotland. 2017. "The impact of maternal literacy and participation programs: Evidence from a randomized evaluation in India." *American Economic Journal: Applied Economics* 9, no. 4: 303-37.

Basu, Kaushik, Ambar Narayan, and Martin Ravallion. 2001. "Is literacy shared within

households? Theory and evidence for Bangladesh." *Labour Economics* 8, no. 6: 649-665.

Behrman, Jere R., Andrew D. Foster, Mark R. Rosenweig, and Prem Vashishtha. 1999. "Women's schooling, home teaching, and economic growth." *Journal of political Economy* 107, no. 4: 682-714.

Benjamini, Yoav, and Yosef Hochberg. 1995. "Controlling the false discovery rate: a practical and powerful approach to multiple testing." *Journal of the Royal statistical society: series B (Methodological)* 57, no. 1: 289-300.

Björkman Nyqvist, Martina, and Seema Jayachandran. 2017. "Mothers care more, but fathers decide: Educating parents about child health in Uganda." *American Economic Review* 107, no. 5: 496-500.

Blunch, Niels-Hugo. 2006. "Skills, schooling and household well-being in Ghana." PhD diss., The George Washington University, Washington, DC.

Blunch, Niels-Hugo. 2009. "18 Multidimensional human capital, wages, and endogenous employment status in Ghana." *Labor Markets and Economic Development* 367.

Blunch, Niels-Hugo. 2013. "Staying alive: Adult literacy programs and child mortality in rural Ghana." *World Development* 42: 114-126.

Blunch, Niels-Hugo. 2017. "Adult literacy programs in developing countries." *IZA World of Labor*, 374.

Blunch, Niels-Hugo, and Claus C. Pörtner. 2011. "Literacy, skills, and welfare: Effects

of participation in adult literacy programs." *Economic Development and Cultural Change* 60, no. 1: 17-66.

Braaten, Ragnhild Haugli, and Peter Martinsson. 2015. "Experimental measures of household decision power." Technical Report 02/2015, CREE.

Brown, Peter C., Henry L. Roediger III, and Mark A. McDaniel. 2014. *Make it stick.* Harvard University Press.

Carlsson, Fredrik, Peter Martinsson, Ping Qin, and Matthias Sutter. 2013. "The influence of spouses on household decision making under risk: an experiment in rural China." *Experimental Economics* 16, no. 3: 383-401.

Conway, Martin A., Gillian Cohen, and Nicola Stanhope. 1991. "On the very long-term retention of knowledge acquired through formal education: Twelve years of cognitive psychology." *Journal of Experimental Psychology: General* 120, no. 4: 395.

Debnath, Sisir. 2015. "The impact of household structure on female autonomy in developing countries." *The Journal of Development Studies* 51, no. 5: 485-502.

Denckla, Martha Bridge, and Rita G. Rudel. 1976. "Rapid 'automatized'naming (RAN): Dyslexia differentiated from other learning disabilities." *Neuropsychologia* 14, no. 4: 471-479.

De Palma, Andre, Nathalie Picard, and Anthony Ziegelmeyer. 2011. "Individual and couple decision behavior under risk: evidence on the dynamics of power balance." *Theory and decision* 70, no. 1: 45-64.

Deshpande, Ashwini, Alain Desrochers, Christopher Ksoll, and Abu S. Shonchoy. 2017. "The impact of a computer-based adult literacy program on literacy and numeracy: Evidence from India." *World Development* 96: 451-473.

Deshpande, Ashwini and Shantanu Khanna. 2019. "Can Weak Ties Create Social Capital? Evidence from Self-Help Groups in Rural India." Working Paper 23, Ashoka University, Department of Economics.

Doss, Cheryl R., and Agnes R. Quisumbing. 2020. "Understanding rural household behavior: Beyond Boserup and Becker." *Agricultural Economics* 51, no. 1: 47-58.

Duflo, Esther. 2012. "Women empowerment and economic development." *Journal of Economic literature* 50, no. 4: 1051-79.

Duflo, Esther, Rachel Glennerster, and Michael Kremer. 2007. "Using randomization in development economics research: A toolkit." *Handbook of development economics* 4: 3895-3962.

Foster, Andrew D., and Mark R. Rosenzweig. 1996. "Technical change and human-capital returns and investments: evidence from the green revolution." *The American economic review*: 931-953.

Glennerster, Rachel, and Kudzai Takavarasha. 2013. *Running randomized evaluations: A practical guide.* Princeton University Press.

Glewwe, Paul. 2002. "Schools and skills in developing countries: Education policies and socioeconomic outcomes." *Journal of economic literature* 40, no. 2: 436-482.

Glewwe, Paul, and Michael Kremer. 2006. "Schools, teachers, and education outcomes in developing countries." *Handbook of the Economics of Education* 2: 945-1017.

Good III, Roland H., Ruth A. Kaminski, Deborah Simmons, and Edward J. Kame'enui. 2001. "Using Dynamic Indicators of Basic Early Literacy Skills (DIBELS) in an outcomes-driven model: Steps to reading outcomes." Unpublished manuscript, University of Oregon at Eugene.

Groeger, John A., David Field, and Sean M. Hammond. 1999. "Measuring memory span." *International Journal of Psychology* 34, no. 5-6: 359-363.

Gupta, Sweta, Christopher Ksoll and Annemie Maertens. 2021."'Intra-household efficiency in extended family households: evidence from Rural India."' Journal of Development Studies.

Gupta, Geeta Rao, N. Oomman, C. Grown, K. Conn, S. Hawkes, Y.R. Shawar, J. Shiffman, K. Buse, R. Mehra, C.A. Bah, L. Heise, M.E. Greene, A.M. Weber, J. Heymann, K. Hay, A. Raj, S. Henry, J. Klugman and G.L. Darmstadt. 2019. "Gender equality and gender norms: framing the opportunities for health." *The Lancet* 393, no. 10190: 2550-2562.

Handa, Sudhanshu. 1996. "Maternal education and child attainment in Jamaica: Testing the bargaining power hypothesis." *Oxford Bulletin of Economics and Statistics* 58, no. 1: 119-137.

Heath, Rachel, and Xu Tan. 2020. "Intrahousehold bargaining, female autonomy, and labor supply: Theory and evidence from India." *Journal of the European Economic Association* 18, no. 4: 1928-1968.

Jackson, Matthew O. 2010. *Social and economic networks.* Princeton university press.

Jeffrey, Craig. 2010. "Timepass: Youth, class, and time among unemployed young men in India." *American Ethnologist* 37, no. 3: 465-481.

Kafle, Kashi, Hope Michelson, and Alex Winter-Nelson. 2019. "His, Hers, or Ours: Impacts of a Training and Asset Transfer Programme on Intra-Household Decision-Making in Zambia." *The Journal of Development Studies* 55, no. 9: 2046-2064.

Kandpal, Eeshani, and Kathy Baylis. 2019. "The social lives of married women: Peer effects in female autonomy and investments in children." *Journal of Development Economics, Elsevier* 140: 26-43.

Kapur, Sandeep, and Mamta Murthi. 2009. "Literacy in India." In *The Oxford Companion to Economics in India.* 2nd ed., Oxford University Press, Oxford, England.

Kellogg, Ronald T. 2003. *Cognitive psychology.* Vol. 2. Sage.

Lépine, Aurélia, and Eric Strobl. 2013. "The effect of women's bargaining power on child nutrition in rural Senegal." *World Development* 45: 17-30.

Ligon, Ethan. 2012. "Cooperation, reciprocity and altruism in developing countries: Discussion." *American Journal of Agricultural Economics* 94.2: 419-421.

List, John A., Azeem M. Shaikh, and Yang Xu. 2019. "Multiple hypothesis testing in experimental economics." *Experimental Economics* 22, no. 4: 773-793.

Maertens, Annemie. 2017. "Who cares what others think (or do)? Social learning and social pressures in cotton farming in India." *American Journal of Agricultural Economics* 99, no. 4: 988-1007.

Malapit, Hazel Jean L., and Agnes R. Quisumbing. 2015. "What dimensions of women's empowerment in agriculture matter for nutrition in Ghana?." *Food Policy* 52: 54-63.

Miller, Grant, and A. Mushfiq Mobarak. 2015. "Learning about new technologies through social networks: experimental evidence on nontraditional stoves in Bangladesh." *Marketing Science* 34, no. 4: 480-499.

Munro, Alistair. 2015. "Intra-household Experiments: a survey and some methodological observations." Discussion Paper 15, National Graduate Institute for Policy Studies, Tokyo.

Munshi, Kaivan. 2014. "Community networks and the process of development." *Journal of Economic Perspectives* 28, no. 4: 49-76.

Murray, Michael P. 2006. "Avoiding invalid instruments and coping with weak instruments." *Journal of economic Perspectives* 20, no. 4: 111-132.

Ortega, Daniel, and Francisco Rodríguez. 2008. "Freed from illiteracy? A closer look at Venezuela's Misión Robinson literacy campaign." *Economic Development and Cultural Change* 57, no. 1: 1-30.

Oxenham, John, Abdoul Hamid Diallo, Anne Ruhweza Katahoire, Anna Petkova-Mwangi and Oumar Sall. 2002. "Strengthening Livelihoods with Literacy. Report of a study of pro-

grammes of adult education and training that have attempted to incorporate either training for livelihood skills into mainly literacy instruction, or literacy instruction into mainly training for livelihood skills." Working paper, World Bank Human Development, Washington, DC.

Paxson, Christina, and Norbert Schady. 2007. "Cognitive development among young children in Ecuador the roles of wealth, health, and parenting." *Journal of Human resources* 42, no. 1: 49-84.

Pitt, Mark M., Shahidur R. Khandker, and Jennifer Cartwright. 2006. "Empowering women with micro finance: Evidence from Bangladesh." *Economic Development and Cultural Change* 54, no. 4: 791-831.

Quisumbing, Agnes R., and Bénédicte De La Brière. 2000. "Women's assets and intrahousehold allocation in rural Bangladesh: Testing measures of bargaining power." Discussion paper no.86, IFPRI, Washington, DC.

Ramachandran, V. and K. Jandhyala. 2019. *Gender and Education: Essays from Economic and Political Weekly.* Orient Black Swan.

Robinson-Pant, Anna. 2005. *Cross cultural perspectives on educational research.* McGraw-Hill Education, UK.

Romain, R., and L. Armstrong. 1987. *Review of World Bank Operations in Nonformal Education and Training.* world Bank, Washington, DC.

Rosenzweig, Mark, and Anjini Kochar. 2004. "New research on education in developing economies." *Journal of Development Economics, Elsevier* 74, no. 1: 1-2.

Rosenzweig, M.R. 1995. "Why are there returns to schooling?." *The American Economic Review*, 85(2:153-158).

Sandiford, Peter, J. Cassel, M. Montenegro, and G. Sanchez. 1995. "The impact of women's literacy on child health and its interaction with access to health services." *Population studies* 49, no. 1: 5-17.

Schultz, T.P. 1988. "Education investments and returns." *Handbook of development economics*, 1:543-630.

Singh, Chandra Lekha. 2018. "Making "ideal" Indian women: Annie Besant's engagement with the issue of female education in early twentieth-century India." *Paedagogica Historica* 54, no. 5: 606-625.

Stock, James H., and Motohiro Yogo. 2005. "Testing for Weak Instruments in Linear IV Regression." In *Identification and Inference for Econometric Models.* Cambridge: Cambridge University Press.

Stromquist, Nelly P. "Women and illiteracy: The interplay of gender subordination and poverty." *Comparative Education Review* 34, no. 1: 95-111.

The World Bank. "World Development Indicators 2020."
https://datatopics.worldbank.org/world-development-indicators/.

Thomas, Duncan, John Strauss, and Maria-Helena Henriques. 1991. "How does mother's education affect child height?." *Journal of human resources*: 183-211.

Walker, Robert, and Grace Bantebya-Kyomuhendo. 2014. *The shame of poverty.* Oxford University Press, USA.

Tables

Table 1: Treatment assignment and participation status

Panel A: Overview treatment

	Participated in TA		
	No	Yes	Total
Treatment status			
Control	170	7	177
Treatment	81	133	214
Total	251	140	391

Panel B: First stage estimation with dependent variable:

	Participated in TA			
	Child		Woman	
	Coeff	St. Error.	Coeff.	St. Error
ITT	0.64***	0.04	0.62**	0.04
Age child	0.01	0.01		
Sex child	-0.03	0.04		
Sex * Age child	0.01	0.00		
Birthorder	0.03**	0.01		
Age of woman (years)	0.00	0.00	0.00	0.00
FDS total	-0.02	0.01	-0.02	0.01
RAN time	0.00	0.00	0.00**	0.00
RAN error	0.00	0.00	0.00	0.00
Number of children	-0.02	0.02	0.01	0.02
Acreage land owned	0.06**	0.02	0.03	0.03
Members in the household	0.01	0.01	0.00	0.01
Adult members in the household	-0.02	0.02	0.01	0.02
Whether the house has electricity	-0.11	0.08	-0.10	0.07
Belong to OBC dummy	0.17	0.13	0.23*	0.13
Belong to SC dummy	0.33**	0.14	0.29**	0.14
R-square	0.48		0.43	
F-stat	310		272	

Notes: Panel A of the table presents the number of women who were assigned the treatment and control status as well as the number of women who participated in the program. Panel B presents the results of the first stage equation with treatment assignment to the program being used as an instrument for participation in the program for the child-level regressions and the women-level regressions. These regressions includes hamlet (strata) fixed effects and clustered (child) and robust (woman) standard errors.

Table 2: Balance test - women

Variable	Control Mean	Control St. Dev.	Treatment Mean	Treatment St. Dev.	P-value
	(1)	(2)	(3)	(4)	(5)
Age of woman (years)	36.04	9.38	34.66	10.41	0.11
FDS total	5.54	1.58	5.79	1.58	0.16
RAN time	82.20	30.40	81.28	27.44	0.98
RAN error	2.30	4.61	1.98	4.42	0.92
Number of children	3.06	1.44	2.68	1.37	0.24
Acreage land owned	0.45	0.72	0.57	1.16	0.56
Members in the household	10.94	7.36	10.61	7.07	0.36
Adult members in the household	5.34	4.18	5.28	3.91	0.51
Whether the house has electricity	0.17	0.38	0.13	0.33	0.31
Belong to OBC dummy	0.45	0.49	0.53	0.50	0.18
Belong to SC dummy	0.51	0.50	0.43	0.49	0.26

Notes: This table presents the descriptive statistics and the results of a balance test. Columns (1) and (2), respectively, present the mean and standard deviation for the control sample. Columns (4) and (4), respectively, present the mean and standard deviation for the treatment sample. Column (5) presents the P-value of a regression on the treatment variable. This regression includes hamlet (strata) fixed effects and robust standard errors.

Table 3: Balance test - children

Variable	Control Mean	St. Dev.	Treatment Mean	St. Dev.	P-value
	(1)	(2)	(3)	(4)	(5)
Child age (years)	8.91	4.67	8.65	4.56	0.24
Sex (1=female; 0=male)	0.50	0.50	0.50	0.50	0.63
Birthorder (order of birth)	2.38	1.38	2.26	1.25	0.15
Educational investments and outcomes					
Education (in years)	4.60	3.06	4.55	2.99	0.61
Currently enrolled in school (1=yes; 0=no)	0.92	0.27	0.94	0.23	0.38
No absence from school in last 7 days (1=yes; 0=no)	0.54	0.50	0.53	0.50	0.30
Mother drops of child at school (1=yes; 0=no)	0.06	0.23	0.03	0.17	0.24
Mother asks child about homework (1=yes; 0=no)	0.69	0.47	0.73	0.44	0.41
Child spends at least 1 hour on homework daily (1=yes; 0=no)	0.63	0.48	0.58	0.49	0.07
Mother helps with homework (1=yes; 0=no)	0.00	0.00	0.01	0.07	0.17
Child receives any help with homework (1=yes; 0=no)	0.07	0.25	0.07	0.26	0.74
Health investments and outcomes					
Not sick in the last 30 days (1=yes; 0=no)	0.74	0.43	0.73	0.44	0.62
Received treatment when sick (1=yes; 0=no)	0.98	0.30	0.94	0.22	0.13
Received treatment outside of the village (1=yes; 0=no)	0.58	0.49	0.66	0.47	0.55
Mother attended treatment (1=yes; 0=no)	0.65	0.47	0.57	0.49	0.30

Notes: This table presents the descriptive statistics and the results of a balance test. Columns (1) and (2), respectively, present the mean and standard deviation for the control sample. Columns (3) and (4), respectively, present the mean and standard deviation for the treatment sample. Column (5) presents the P-value of a regression of the variable on the treatment variable. This regression includes hamlet (strata) fixed effects and robust standard errors. For the educational variables only children between the ages of 5 and 16 are included. For the health variables only children up to the age of 16 years are included. Rows after 'currently enrolled' are conditional on the child currently enrolled in school; and the rows after 'not sick in the last 30 days' are conditional on being sick.

Table 4: The Effect of the TA+ on Child Investments and Outcomes

Panel A: Education

	Currently enrolled in school	No absence from school in last 7 days	Mother drops of child at school	Mother asks child about homework	Child spends at least 1 hour on homework daily	Mother helps with homework	Child receives any help with homework
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Participated (1=yes;0=no)	0.007	-0.063	-0.031	0.189**	-0.106	0.007	-0.005
	(0.032)	(0.067)	(0.025)	(0.081)	(0.067)	(0.011)	(0.033)
FDR-Q value		0.519	0.424	0.12	0.336	0.618	0.882
Mean of control group	0.94	0.73	0.04	0.60	0.75	0.00	0.10
Observations	722	674	674	674	674	674	674
R-squared	0.115	0.186	0.073	0.246	0.219	0.081	0.170

Panel B: Health

	Not sick in the last 30 days	Received treatment when sick	Received treatment outside of the village	Mother attended treatment
	(8)	(9)	(10)	(11)
Participated (1=yes;0=no)	0.043	0.034	-0.036	0.006
	(0.045)	(0.024)	(0.102)	(0.106)
FDR-Q value	0.69	0.62	0.952	0.952
Mean of control group	0.70	0.97	0.66	0.67
Observations	1,138	336	330	330
R-squared	0.093	0.119	0.209	0.161

Notes: This table shows the results of a linear regression of the various child-level education and health investment and outcome variables using the invitation to participate in the Tara Akshar Literacy and Numeracy Program as the instrument for participation status. Columns (2) to (7) are conditional on the child being currently enrolled in school as per Column (1). Only children between the ages of 6 and 16 are included in Panel A. Column (9) is conditional on the child reported to be sick in Column (8) and Columns (10) and (11) are conditional on the child receiving treatment in Column (9). Only children up to the age of 16 are included in Panel 3 Additional baseline controls included are: age, sex, interaction age and sex, birthorder, number of children up to the age of 16 years, results of cognitive ability tests (FDS and RAN), land acreage owned by the household, number of household members, number of adult household members, and whether or not the house has electricity. Includes caste-fixed effects and strata-fixed effects. Errors clustered at the woman's level are reported under the coefficient estimates. The FDR Q-values are computed following Benjamini and Hochberg (1995) within each category. *** p<0.01; ** p<0.5; * p<0.1.

Table 5: The Effect of TA+ on Home Schooling and Health Practices

Panel A: Education

	Do homework with children - daily	Do homework with children - weekly	Remind children of homework - daily	Remind children of homework -weekly	Talk to teacher at school - daily	Talk to teacher at school - weekly
	(1)	(2)	(3)	(4)	(5)	(6)
Participated (1=yes;0=no)	0.021	0.107**	0.189**	0.118	0.085	0.039
	(0.038)	(0.046)	(0.082)	(0.079)	(0.069)	(0.076)
FDR Q-value	0.608	0.06	0.06	0.266	0.329	0.608
Mean of control group	0.06	0.06	0.35	0.58	0.18	0.25
Observations	344	344	343	343	343	343
R-squared	0.177	0.183	0.206	0.193	0.16	0.112

Panel B: Health

	Cover water vessel	Treat drinking water	Wash hands with soap after using toilet	Talk to children about handwashing	Consult with the nurse at health care centre - daily	Consult with the nurse at health care centre - weekly	Consult with the nurse at health care centre - monthly	Consult with the nurse at health care centre - 6 monthly
	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Participated (1=yes;0=no)	0.181***	0.011	0.136**	0.008	0.084	0.142*	0.191**	0.114*
	(0.068)	(0.047)	(0.064)	(0.035)	(0.067)	(0.081)	(0.075)	(0.061)
FDR Q-value	0.04	0.824	0.088	0.824	0.276	0.128	0.04	0.126
Mean of control group	0.69	0.09	0.72	0.94	0.19	0.36	0.63	0.78
Observations	385	385	385	385	385	385	385	385
R-squared	0.137	0.136	0.213	0.115	0.142	0.066	0.118	0.112

Notes: This table shows the results of a linear regression of the various woman-level education/health investment variables using the invitation to participate in the Tara Akshar Literacy and Numeracy Program as the instrument for participation status. Note that the education questions were only asked if the woman had children currently enrolled in school. Additional baseline controls included are: age, number of children up to the age of 16 years, results of cognitive ability tests (FDS and RAN), land acreage owned by the household, number of household members, number of adult household members, and whether or not the house has electricity. Includes caste-fixed effects and strata-fixed effects. Robust standard errors are reported under the coefficient estimates. The FDR Q-values are computed following Benjamini and Hochberg (1995) within each category. *** p<0.01; ** p<0.5; * p<0.1.

Table 6: The Effect of TA+ on Mechanisms

Is the woman the main decision-maker with regard to

	Knowledge score (out of 12)	Knowledge score (factual) (out of 8)	Knowledge score (cognitive) (out of 4)	Decision-maker index (out of 6)	What to cook on a daily basis?	What and how much to purchase at the local shop/market?	What and how much to purchase at the market outside the village?	What to do when your child falls ill?	Whether your child is enrolled in school a particular year?	Whether your child attends school a particular day?
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Participated (1=yes;0=no)	2.829***	2.317***	0.512***	0.034	-0.029	0.016	-0.063	-0.005	0.000	0.114
	(0.394)	(0.307)	(0.150)	(0.389)	(0.081)	(0.080)	(0.078)	(0.080)	(0.079)	(0.081)
FDR - Q-Value					0.999	0.999	0.999	0.999	0.999	0.954
Mean of control group	4.25	3.24	1.01	2.71	0.55	0.48	0.44	0.46	0.36	0.43
Observations	356	356	356	385	385	385	385	385	385	385
R-squared	0.36	0.368	0.204	0.136	0.145	0.170	0.163	0.113	0.086	0.102

	Status index (out of 5)	Use vehicle	Personal mobile	Personal bank account	Keep jewellery with yourself	Use veil
	(11)	(12)	(13)	(14)	(15)	(16)
Participated (1=yes;0=no)	0.089	0.072	-0.030	0.062	0.006	-0.021
	(0.168)	(0.076)	(0.081)	(0.076)	(0.05)	(0.028)
FDR - Q-Value		0.747	0.892	0.747	0.903	0.747
Mean of control group	3.30	0.35	0.47	0.62	0.89	0.97
Observations	385	385	385	385	385	385
R-squared	0.128	0.155	0.117	0.172	0.140	0.145

Notes: This table shows the results of a linear regression of the knowledge score, main main decision-maker, and women's status variables using the invitation to participate in the Tara Akshar Literacy and Numeracy Program as the instrument for participation status. Additional baseline controls included are: age, number of children up to the age of 16 years, results of cognitive ability tests (FDS and RAN), land acreage owned by the household, number of household members, number of adult household members, and whether or not the house has electricity. Includes caste-fixed effects and strata-fixed effects. Robust standard errors are reported under the coefficient estimates. The FDR Q-values are computed following Benjamini and Hochberg (1995) within each category. The knowledge score in column(1) is the aggregate score obtained on a twelve question test which had eight factual questions and four cognitive ones. An example of factual question is listing the main cause of diarrhea. An example of a cognitive question is the number of mangoes each child would get if twenty mangoes were to be equally divided among five children. Columns(2) and (3) reports the scores in each of those two types of questions separately. The decision maker index in column (4) is the aggregate of the six binary variables reported in columns (5)-(10). The status index in column (11) is the aggregate of the five binary variables reported in columns (12)-(16). *** p<0.01; ** p<0.5; * p<0.1.

Table 7: The Effect of TA+ on the Bargaining Game Results

	Rs spend on water tablets by woman	Rs spend on water tables by husband	Absolute difference between (1) and (2)	λ	Dummy variable if $\lambda=1$	Woman speaks first in negotiation	Woman speaks last in negotiation	First speaker suggest decider	First speaker inquires about preferences of other	First speaker dictates division	Woman has heard about water tablets	Husband has heard about water tablets
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Participated (1=yes;0=no)	-1.242	-1.338	-1.826	0.083	0.08	-0.011	0.109	-0.004	0.224*	-0.220*	0.023	0.163
	(1.591)	(1.405)	(1.235)	(0.128)	(0.134)	(0.13)	(0.135)	(0.076)	(0.123)	(0.128)	(0.071)	(0.116)
FDR Q-value	0.435	0.435	0.417			0.958	0.695	0.958	0.213	0.213	0.749	0.32
Mean of control group	6.90	6.23	4.56	0.28	0.27	0.39	0.28	0.10	0.24	0.66	0.06	0.16
Observations	181	181	181	113	113	181	181	181	181	181	181	181
R-squared	0.193	0.272	0.161	0.328	0.321	0.198	0.127	0.077	0.192	0.196	0.242	0.178

Notes: This table shows the results of a linear regression of the various bargaining variables using the invitation to participate as an instrument for the participation status. Additional baseline controls included are: age, number of children up to the age of 16 years, results of cognitive ability tests (FDS and RAN), land acreage owned by the household, number of household members, number of adult household members, and whether or not the house has electricity. Includes caste-fixed effects and strata-fixed effects. Robust errors are reported under the coefficient estimates. The FDR Q-values are computed following Benjamini and Hochberg (1995) within each category (columns 1-3, columns 6-10, columns 11-12). *** p<0.01; ** p<0.5; * p<0.1.

Table 8: The Effect of TA+ on Confidence and Mobility

Has the woman ever done activity X?

	Confidence score (out of 36)	Index of mobility (out of 8)	Leaving the house	Going to a local shop/market (kirana)	Going to a market/shop outside of the village	Visiting a primary health care centre	Visiting natal family	Making calls to the natal family	Joining any community groups (e.g. a Self Help group)	Going for mela/personal shopping/cinema (entertainment)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Participated (1=yes;0=no)	2.173***	0.315	0.049	0.135*	0.077	-0.021	-0.018	-0.028	0.032	0.089
	(0.763)	(0.247)	(0.066)	(0.078)	(0.080)	-0.047	(0.025)	(0.041)	(0.045)	(0.076)
FDR Q-value			0.563	0.52	0.563	0.581	0.563	0.563	0.563	0.563
Mean of control group	26.19	5.4	0.80	0.58	0.50	0.92	0.98	0.94	0.09	0.65
Observations	383	385	385	385	385	385	385	385	385	385
R-squared	0.210	0.196	0.130	0.193	0.166	0.131	0.092	0.109	0.177	0.110

Notes: This table shows the results of a linear regression of the woman's confidence and mobility using the invitation to participate in the Tara Akshar Literacy and Numeracy Program as the instrument for participation status. Additional baseline controls included are: age, number of children up to the age of 16 years, results of cognitive ability tests (FDS and RAN), land acreage owned by the household, number of household members, number of adult household members, and whether or not the house has electricity. Includes caste-fixed effects and strata-fixed effects. Robust standard errors are reported under the coefficient estimates. The FDR Q-values are computed following Benjamini and Hochberg (1995). Confidence score in column (1) is the aggregate of the self-reported confidence ranging from 0-4 which the woman has expressed while having to deal with nine different people outside her family namely male and female shopkeeper, contractor, Asha worker, Anganwadi worker, village head, bank employee, male and female doctor or nurse. Index of mobility in column(2) is the aggregate of the binary variables reported from columns(3)-(10).*** p<0.01; ** p<0.5; * p<0.1.

Figure legend

Figure 1: Laptop display during TA+ class - displaying a Hindi alphabet which is the first letter of the object, carrot in Hindi