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Does microcredit increase hope, aspirations and well-being? Evidence from Sierra Leone

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Does microcredit increase hope, aspirations and well-being?

Evidence from Sierra Leone

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Abstract

Microcredit has received substantial attention because of its promising potential to help achieve the United Nations Sustainable Development Goals (SDGs), in particular poverty alleviation, woman empowerment and decent work opportunities (self-employment). However, its effectiveness has been exclusively evaluated in terms of relieving external constraints of the poor, such as a lack of financial capital for business development. Our study is the first that examines whether and to what extent microcredit can reduce internal psychological constraints. We use a self-collected cross-sectional dataset of 1295 women in Sierra Leone, of whom 845 are borrowers of BRAC. BRAC's eligibility rules enable to conduct unbiased estimates of the impacts of microcredit on hope, aspirations, subjective well-being and economic welfare. Our results reveal statistically significant and economically meaningful positive impacts of microcredit on hope about economic welfare, life aspirations, life satisfaction, and household durable assets index. Overall, this study suggests that microcredit plays an important role in reducing internal psychological constraints. In light of the somewhat disappointing outcomes suggested by several recent randomized controlled trials which mainly focus on the microcredit impacts on external constraints, this research also provides a more positive picture of the potential contribution of microcredit in realizing the SDGs.

Keywords: Microcredit; Impact evaluation; Hope; Aspirations; Well-being

JEL Codes: C83, G21, I31, O12, Z13

Microcredit has received substantial attention because of its promising potential to help achieve the United Nations Sustainable Development Goals (SDGs), in particular poverty alleviation, woman empowerment and decent work opportunities (self-employment). Microcredit programs provide small loans to poor entrepreneurs, to help them start or expand their own businesses. Since its origin in Bangladesh in the 1970s, microcredit has rapidly expanded to other developing countries across five continents. In 2013, microfinance institutions (MFIs) provided funding to 211 million borrowers around the world, 114 million of whom were living under the poverty line (Microcredit Summit Campaign, 2015). But even as microcredit has grown, debates about its effectiveness continue among policy makers, nongovernmental organizations, and academics (Morduch, 2000). These debates question whether microcredit actually serves as a development tool. Proponents emphasize how microcredit helps poor people invest in productive activities, which eventually lead to increased income, smoothed consumption, and improvements in health, education, and women's empowerment (Hermes & Lensink, 2011). Yet critics question whether microcredit substantially increases people's living standards.

In their efforts to resolve these debates, empirical studies seek to evaluate the impacts of microcredit; research over more than two decades offers mixed evidence (Banerjee, 2013; Hermes & Lensink, 2011). Several recent, randomized, controlled trials consistently indicate that access to microcredit has a positive, small, and non-transformative impact on the poor (Angelucci, Karlan, & Zinman, 2015; Attanasio, Augsburg, De Haas, Fitzsimons, & Harmgart, 2015; Augsburg, De Haas, Harmgart, & Meghir, 2015; Banerjee, Duflo, Glennerster, & Kinnan, 2015; Crépon, Devoto, Duflo, & Parienté, 2015; Tarozzi, Desai, & Johnson, 2015). In general, access to microfinance appears to increase business activity but fail to raise income or consumption substantially. Moreover, there is little evidence that access to microcredit improves

children's education or women's empowerment. Thus, definitive conclusions still demand more evidence.

To contribute to this discussion, we present an impact evaluation of the BRAC microcredit program in Sierra Leone, which operates according to a group lending with joint liability scheme. As its main innovation, this study examines the impact of microcredit on life aspirations and subjective well-being; most prior impact studies instead concentrate on how microcredit mitigates external constraints, such as a lack of credit. A growing research trend instead seeks to understand how people move out of poverty, according to internal factors and motivations, including hope and aspirations (Beaman, Duflo, Pande, & Topalova, 2012; Bernard, Dercon, Orkin, & Taffesse, 2014; Glewwe, Ross, & Wydick, 2014; Lybbert & Wydick, 2017a; Macours & Vakis, 2014, 2016). Duflo (2012) argues that hope is fundamental, whereas low aspirations and hopelessness lead to reduced investments and outcomes that ultimately reduce long-run welfare. Microfinance interventions may influence aspirations directly, such as when group lending systems encourage members to pool and share information or coordinate their efforts. Access to credit also might increase borrowers' capabilities, which moves people along the path to success and might enhance their hope and aspirations. In contrast, access to microcredit could reduce aspirations, if it creates a high debt burden. Despite the essential functions of aspirations and hope in development processes, and the seemingly clear link to microfinance interventions, we know of no research that examines the impact of microcredit interventions on aspirations. Only a few studies test the impacts on subjective well-being more generally (Angelucci et al., 2015; Fernald, Hamad, Karlan, Ozer, & Zinman, 2008; Karlan & Zinman, 2010, 2011). Thus, we attempt to add to the limited evidence regarding the impacts of microcredit on subjective well-being by considering its effects on indexes reflecting locus of control perceptions, health status,

and life satisfaction. In line with standard microfinance impact studies, we also note its impacts on income, consumption, and material standards of living.

For this empirical analysis, we use a unique, self-collected, cross-sectional data set involving 1295 women in Sierra Leone, 854 of whom are borrowers of BRAC Sierra Leone. This MFI uses clear eligibility rules, so we could develop an appropriate identification strategy to reduce potential selection biases. In particular, an important eligibility rule refers to the distance between a woman's house and the MFI branch office: Only women living within a radius of four kilometers (km) from the branch office may borrow. We thus sample eligible participants and nonparticipants within this radius, as well as nonparticipants outside the radius who satisfy all other eligibility criteria.

Using inverse probability of treatment weighting, which controls for selection biases pertaining to observable elements, we estimate the impacts of microcredit access and participation. As an alternative approach, we also consider the cross-sectional double-difference (DD) to control for selection biases on observable and unobservable factors to estimate the impacts of microcredit. By focusing on microcredit participation, our results reveal significantly positive impacts on hope about economic welfare, life aspirations and life satisfaction, across both methodological approaches. The preferred cross-sectional DD method also provides a positive picture of the likely impacts on monthly income and household durable assets.

In the next section, we present our theoretical framework, including the channels by which microfinance interventions may affect aspirations. After we provide a study background, we describe our sampling strategy and the data, followed by the measures and identification strategies. The discussion of the main results then leads in to our introduction of some mechanisms that might explain the impacts of microcredit on aspiration, before we conclude.

Theoretical framework

Microcredit, hope and aspirations

Hope is a broad concept with different shades of definitions. Lybbert & Wydick (2017b) make a distinction of its meaning based on the dimensions of optimism and agency: victimization, grit, wishful hope and aspirational hope. Both victimization and wishful hope are characterized by individuals' low agency or fatalism; but victimization is also distinguished by a pessimistic view about the future and wishful hope by an optimistic view. Grit and aspirational hope are similar. Individuals in these states have high agency or self-determination. However, while those in the state of grit have neutral or slightly negative future perceptions, those in the state of aspirational hope have neutral or slightly positive perceptions. The emerging literature in development economics studying poverty dynamics and hope focuses on the concept of aspirational hope.

Aspirational hope comprises three elements: aspirations, pathways and agency (Snyder, 1994). “An individual must have a goal, see a pathway to reaching that goal, and believe that she is able to achieve the goal by progressing along the pathway..., yet the causal relationship between the three components of hope is less than straightforward. A greater sense of personal agency and the ability to conceptualize pathways in pursuit of a goal create the basis for the formation of aspirations, but aspirations may also motivate the conceptualization of pathways and a desire to increase agency in a particular domain.” (Lybbert & Wydick, 2017a, p. 4).

We argue that microcredit programs can potentially affect the elements of aspirational hope. First, microcredit potentially improves agency and open pathways. It might shorten the steps to success, such as by providing financial capital to start a new business, which implies that goals are within reach. As Duflo (2012) suggests, too many or very high steps may lead to

discouragement, such that people stop trying to reach their goals. If they never try, they never can uncover their own capabilities, which likely creates or worsens poverty traps.

Second, microcredit with a group lending approach potentially improves aspirations through members' social interactions. We base our argument on the theoretical framework by Ray (2006). Appadurai (2004) proposes the notion of a "capacity to aspire", with an anthropological perspective. He argues that individual aspirations originate from the sense that each person is part of a larger ethos within a particular reference community. Ray (2006) builds on this notion by integrating an economic perspective, such that he defines aspirations as "social grounding of individual desires" and further asserts that individual desires and standards of behavior generally are defined by the experience and observations of others. That is, people use the experiences of their peers and their own past experiences as benchmarks for setting their goals, which they subsequently use to evaluate their actual experiences. In addressing the effect of aspirations on individual behavior, Ray introduces three aspiration concepts: the aspirations window, aspirations gap, and aspirations failure. Then the details three channels by which collective action may influence the capacity to aspire.

An aspiration window forms through observations of similar others; each person draws aspiration from the lives, achievements, or ideas of those who exist within her aspiration window. The aspiration gap instead refers to the difference between the life to which the person aspires (i.e., aspiration window) and her current life. This gap affects future-oriented behavior, in that to narrow it, the person must make some investment that she expects to enhance her future standards of living. This investment is costly though, so the person seeks the effort that will maximize the resulting benefits. Accordingly, someone whose aspirations are very close or very far from their current life situation may experience less motivation to make the costly

investments required to improve. Accordingly, for people to improve their lives, the aspiration window must be opened, but not too wide or too narrowly to avoid discouraging forward-looking behavior. When the aspiration gap is too wide or narrow, it becomes an aspiration failure. Ray (2006) argues for a mutual link between poverty and aspiration failure, leading to a closed trap, because poverty limits dreams and the process of fulfilling them, which induces greater poverty. However, poverty is not the only source of aspiration failure; it is the combination of poverty and a lack of connectedness—that is, a lack of proximal others who are better off than the focal person, but not so much better off that they seem unreachable.

Ray (2006) further suggests that the capacity to aspire and forward-looking behavior both depend on collective action. First, groups have information and experiences that can be communicated credibly to the members. Second, group actions convey information to external parties more credibly than do individual actions. Third, groups function as coordination devices. Thus group effectiveness can be explained in terms of a multiple equilibrium: “A state x persists in society, which leads individuals in the society to take actions a . The actions a aggregate back to x , and the cycle is complete” (Ray, 2006, p. 9).

Although no microfinance impact studies focus on aspirations, some recent research evaluates the impacts of different interventions on aspirations and forward-looking behavior in developing countries. With a natural experiment in India, Beaman et al. (2012) show that a policy to increase female leadership, by reserving council positions for women, improves girls' schooling and their vocational aspirations. Glewwe et al. (2014) also find that sponsorship of Kenyan children significantly improves their educational and vocational aspirations. In rural Ethiopia, Bernard et al. (2014) reveal that showing a documentary about successful people from

similar communities improves people's aspirations and future-oriented behavior, including their demand for microfinance.

Lybbert and Wydick (2017a) conduct a field experiment in Oaxaca, Mexico, explicitly aimed at enhancing three aspects of hope: aspirations, agency, and pathways. Their intervention among female members of community banks consists of three elements: (1) watch a documentary about women successfully using microcredit to expand their businesses, (2) receive a refrigerator magnet on which they write three personal goals, and (3) participate in a workshop designed to help them lift aspirations, set goals, improve agency, and visualize pathways. After one month, the researchers could identify positive impacts on aspirations and modest impacts on agency and business outcomes among women who received the three-component intervention.

In Nicaragua, Macours and Vakis's (2014) randomized evaluation focuses on cash transfer programs that aim to improve human capital and productive investments. In particular, they study how leaders who enhance information flows and promote program compliance might influence attitudes and behavioral changes. Their evidence indicates that social interactions with leaders improve agency and aspirations through role-modeling, inspiration, and learning effects, which prompt greater investments in children's nutrition and education. The closer the participants live to the leaders, the stronger these effects. Even two years after the interventions, the results hold for cash transfer beneficiaries living near leaders (Macours & Vakis, 2016).

Microcredit and subjective well-being

A few recent studies analyze the potential role of microcredit for enhancing subjective well-being indicators, such as happiness, life satisfaction, and locus of control. Subjective well-being is a self-assessment of different aspects of the person's life, based on her own experience (Diener, 1984). Microcredit may improve subjective well-being, because it represents additional

opportunities, which may make recipients feel more optimistic and capable (Karlan & Zinman, 2011). It also may alleviate stress related to poverty (Fernald et al., 2008). However, microcredit could have negative effects on subjective well-being, if the loan and repayment burden increase symptoms of stress or depression (Fernald et al., 2008).

Fernald et al. (2008) conduct a field experiment among marginally rejected loan applicants in South Africa and find that access to microcredit has mixed effects on subjective well-being: It increases symptoms of stress but decreases depression among the male applicants. From a similar intervention in South Africa, Karlan and Zinman (2010) find that microcredit access positively affects indexes of intra-household bargaining, community status, and general optimism, but it negatively affects stress and depression among female, high income, and low credit score applicants. They suggest two possible mechanisms: The increased bargaining power of women might create conflicts between couples, and access to credit might allow spending that applicants regret later. Then moving to the Philippines, Karlan and Zinman (2011) use randomized credit scoring to assign microloans. They find that access to credit leads to lower subjective well-being, such that a summary index of life satisfaction, job stress, optimism, calmness, worry, job satisfaction, decision power, and socioeconomic status reveals negative impacts on both men and women. Finally, in Mexico, Angelucci et al. (2015) determine that access to microcredit has positive, significant effects on happiness, as well as positive but not significant effects on life satisfaction, job stress, locus of control, and good health status.

Microcredit and economic welfare

By mitigating financial capital constraints, microcredit may increase business activities and thereby improve business outcomes, such as revenues and profits. If profits are higher than microcredit costs, household income would increase, granting those households additional

resources to spend on food, education, health care, housing, and so forth. As a result, social outcomes, such as children's schooling and health status, should increase. Although literature pertaining to the impacts of microcredit on economic welfare is too vast to summarize here, we refer interested readers to Hermes and Lensink (2011) and Banerjee (2013). Relevant for our current study, we note that Banerjee et al. (2015) combine results from six randomized evaluations of microcredit programs in Bosnia, Ethiopia, India, Mexico, Morocco, and Mongolia. All these programs increase access to credit, but the uptake of loans is very low (17%–31%). Overall the studies indicate positive impacts on business outcomes, mainly business investments, size, and profits. Yet none of the studies reveal significant increases in household income or consumption, which likely are essential for poverty alleviation. The results about consumption choices are promising though they are not transformative: Five studies find reduced discretionary consumption on temptation goods or celebrations. Regarding social indicators, five studies offer null or negative effects on children's schooling, and three of the four studies that measure female empowerment identify no such effects.

Microcredit program and study setting

Study setting and microcredit program

Sierra Leone, still recovering from a 11-year civil war that ended in 2002, is a low income country; 52.3% of the total population lived on less than US\$1.90 per day in 2011. The financial sector in the country is extremely underdeveloped, such that among the economically active population, only 13% have access to financial services (The World Bank Group, 2017b). For the women in our sample, the main sources of credit, beyond BRAC, are relatives, friends, neighbors, and *osusus*—similar to rotating savings and credit associations.

BRAC, one of the largest MFIs in the world, aims to alleviate poverty by empowering the poor. It functions in 11 countries in Asia and Africa, including Sierra Leone since 2008. Its program in Sierra Leone provides loans to women who are not served by other financial institutions, giving them the opportunity to expand their own, mainly small-scale trading businesses. In 2014, BRAC Sierra Leone disbursed US\$2.8 million in loans; the average loan was US\$145. It served 21,738 women through 29 branch offices, according to a group lending methodology with joint liability (BRAC, 2014). Each woman received an individual loan, but she was accountable for repayment by her group members too.

Group lending methodology

When BRAC opens a new branch office, loan officers conduct door-to-door visits in a 4 km radius to find potential borrowers and introduce them the microcredit program. Eligible potential borrowers meet the following criteria: female, aged 18–50 years, who is the only one from her household participating in the program, owns a business, does not have outstanding loans with other MFIs, has lived in the area for at least three years, and lives within the 4 km radius of the branch office. The loan officer returns for a second visit to ask eligible women if they are interested in joining the program. Those who are interested form small groups of four to five women and apply for individual loans with a joint liability scheme. Finally, the loan officer decides whether the groups may enter the program.

The accepted small groups then meet every week, clustered in bigger groups. Each small group has a president; each big group includes a leadership committee of five women: president, secretary, treasurer, and two executive members. Every two weeks, two group members receive a loan, the size of which varies among members. The interest rate is 13% if the loan is for 20 weeks and 25% if the loan is for 40 weeks. The loan gets repaid weekly, during group meetings.

The president of each small group collects repayments and transfers them to the treasurer of the big group, who then gives them to the loan officer. If someone is not able to make a payment, the group members pay for her. However, if this failure occurs repeatedly, the member may be expelled, and another eligible woman will be invited to join the group.

Sampling strategy and data

We conducted a survey in Sierra Leone in 2014, after the BRAC microcredit program had already started. It took place in 7 villages, randomly selected from among 29 villages in which BRAC's branch offices were located throughout Sierra Leone. The sample consists of 1295 women who were selected according to BRAC's eligibility rules, including the 4 km distance from the branch office. We surveyed all women in each village who met the eligibility criteria and had access to the microcredit program, whether they decided to participate and became borrowers or not. In addition, we surveyed women living outside the 4 km radius who met all other requirements. These women were not eligible for the microcredit program, but if they lived just a little closer to the branch office, they would have been.

By leveraging these eligibility rules, we established a clear sampling strategy and could survey women with similar characteristics. However, the rules also restricted our sample, such that the group outside the radius was smaller than the group within it. Table 1 summarizes the sample frame: 1068 women eligible for the program, 854 of whom participated and 214 who did not, along with 227 women who were not eligible for the program.

Table 1 – Sample Frame

	Access area (Inside 4 km radius)	Nonaccess area (Outside 4 km radius)	Total
Eligible participants	854		854
Eligible nonparticipants	214		214
Not eligible		227	227
Total	1086	227	1295

We also collected data about the socio-economic profiles of the women and their households, using economic and subjective welfare indicators. Table 2 summarizes the descriptive statistics. On average, the women are 34 years of age. In addition, 77% are Muslim, and 60% belong to the Temne tribe, the largest ethnic group in Sierra Leone. Their households consist of an average of seven members, three adults and four children. We also find significant differences based on location: on average, in the 4 km radius, women are 2 years older, their households contain one more member, and more of them practice Islam (16% more) and belong to the Temne tribe (21% more).

Table 2 – Summary Statistics

Variables	Total sample			Access area			Nonaccess area			Access – Nonaccess
	N	Mean	SD	N	Mean	SD	N	Mean	SD	
<i>Exogenous variables</i>										
Age	1,279	33.80	8.634	1,052	34.13	8.725	227	32.27	8.040	1.861***
Temne (tribe)	1,271	0.601	0.490	1,049	0.638	0.481	222	0.428	0.496	0.210***
Muslim (religion)	1,268	0.771	0.420	1,048	0.799	0.401	220	0.641	0.481	0.158***
Number of adults in household	1,276	3.512	1.889	1,050	3.563	1.909	226	3.274	1.775	0.289**
Number of children in household	1,271	3.873	2.401	1,046	3.987	2.450	225	3.347	2.082	0.640***
<i>Outcome variables</i>										
Hope scale	1,215	0.00	1.893	1,005	-0.05	1.869	210	0.23	1.994	-0.276*
Monthly income in good year (US\$)	1,170	304.0	267.3	957	307.9	276.4	213	286.6	221.6	21.38
Monthly income in bad year (US\$)	1,169	128.5	119.0	956	131.9	122.6	213	113.4	99.95	18.45**
Life aspirations	1,219	9.336	1.519	1,008	9.368	1.476	211	9.185	1.704	0.183
Aspiration gap	1,219	4.272	1.876	1,008	4.276	1.930	211	4.251	1.600	0.0246
Life satisfaction	1,219	5.065	1.741	1,008	5.092	1.764	211	4.934	1.629	0.159
Locus of control index	1,212	1.726	0.540	1,002	1.736	0.526	210	1.681	0.602	0.0546
Income current month (US\$)	1,157	220.0	203.1	953	224.9	209.0	204	197.3	171.5	27.65**
Housing condition index	1,209	4.829	1.156	990	4.824	1.144	219	4.849	1.212	-0.0251
Household durable assets index	1,200	9.047	2.577	983	9.048	2.648	217	9.041	2.230	0.0063

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Notes: Exchange rate: 1 US\$ = 1976 Sierra Leone PPP 2014 (The World Bank Group, 2017a)

Methodology

Measures

We evaluate the impact of the BRAC microcredit program using three groups of measures: hope, aspirations, subjective well-being, and economic welfare.

Hope. We created a hope index using six statement of the trait hope scale by Snyder et al. (1991), four of which measured agency and two measured pathways. We presented the six statements to women and asked them to indicate if they strongly agree = 1, agree = 2, disagree = 3 and strongly disagree = 4 with each statement. We inverted the scale of the answers such that the highest value indicated strongly agreement with the statement. Before creating the index, we calculated the Cronbach's alpha which measures reliability of scale, that is, the correlations among the six variables. The alpha coefficient was 0.8646 which means that the reliability is good, according to the rule of thumb. Then, we proceeded to create the index using principal component analysis (PCA) and carried out the Kaiser-Meyer-Olkin (KMO) test of sampling adequacy. The individual KMO values ranged between 0.8572 and the overall value was 0.8725, which are classified as meritorious based on the rule of thumb. In other words, these values indicate that the six variables are adequate for PCA.

In addition, we used two measures that reflect hope about economic welfare. We asked women two questions: “what would your income per month be in the coming year if it were a good year?” and “what would your income per month be in the coming year if it were a bad year?”. We argue that they reflect aspirational hope because its three elements are implicitly involved: visualizing higher monthly income in the next year might imply that a woman has the aspiration of a better economic situation, has the self-determination to achieve the goal (e.g. by expanding a business), and sees a pathway to achieve it (e.g. the microcredit program). On

average, women consider that their monthly income if the coming year were a good year would be US\$304 and US\$129 if it were a bad year, equivalent to US\$1.45 and US\$0.61 per day per household member, respectively.

Aspirations. To measure life aspirations, we presented the women with an image of a cotton tree, the historic symbol of Sierra Leone, divided into ten levels, such that the tenth level is the best possible life and the first level is the worst. We asked them to indicate the level they wanted; on average, they aspired to reach the ninth level. We also measured the aspiration gap, as the difference between their life aspiration and life satisfaction. The average aspiration gap is 4.72; that is, women want their lives to be almost 5 levels higher than they actually perceive them to be.

Subjective well-being. We used two measures of subjective well-being (Angelucci et al., 2015). First, to assess life satisfaction, we again relied on the cotton tree and asked the women to report their life level. On average, women chose the fifth level. Second, a locus of control index reflects the women's beliefs that they can control aspects that determine their lives. We are interested in locus of control because it is a concept closely related to agency (Lybbert & Wydick, 2017b). For this measure, we used two items, and participants had to indicate whether they agreed with statement A or B. For each item, statement A takes a value of 1, because it indicates higher locus of control, and statement B takes a value of 0. The index reflects the sum of the values, such that it ranges from 0 to 2 (closer to 2 indicates a higher locus of control). The statements were as follows: (A) "Everyone is responsible for her success or failure in life" or (B) "Success or failure in life is for each person a question" and (A) "To be successful, above all, you should work very hard" or (B) "To be successful, above all, you must have luck." The mean of the locus of control index was 1.7 points.

Economic welfare. As a first measure of economic welfare, we used household income, in terms of the women's income for the current month. We winsorized the income proxy at 5% and 95% and used logarithmic transformations. On average, current monthly income is US\$220; expressed as daily income per household member, that amount equals US\$1.05, just below the poverty line.

As a second measure of economic welfare, we created two indexes of material standards of living: for housing conditions and for household durable assets. The first index summed five dummy variables that represent housing conditions, namely, pan roof, cement walls, concrete floor, private toilet, and electricity. The second index summed 19 dummy variables that indicate whether the household owned durable assets, such as a bed, motorbike, television, phone, refrigerator, and sewing machine. The average values of the first and second indexes were 5 and 9, respectively.

Selection bias

One of the main challenges associated with measuring the impacts of microfinance is controlling for selection bias, which stems from two sources: self-selection bias and program placement bias. Self-selection may bias the results if people self-select to participate in a program due to unobserved characteristics; for example, the most innovative or entrepreneurial women might be the ones who decide to take up microcredit. Program placement biases may result from institutional decisions regarding strategic locations; BRAC often seeks to open branch offices in the most underdeveloped regions, to reach the poorest of the poor. These biases can be addressed using randomization, such that we would randomly assign the program to individual participants and randomly assign locations for branches. However, random assignment is not always

possible; in our case, the BRAC microcredit program had started before we began to evaluate it. Instead, we used non-experimental methods to control for selection bias.

Identification strategies

Measuring the impacts of microcredit access. The most straightforward method to control for self-selection bias is an intention to treat (ITT) analysis. It estimates the impacts of having access to microcredit by comparing access and nonaccess areas, which we can define clearly using the distance to the branch office as an eligibility rule. Although ITT provides unbiased estimates if both areas are similar—that is, if there is no program placement bias—this assumption may not hold for our study, because BRAC offices likely were strategically located. According to the ITT analysis we conduct, the access and nonaccess areas differ in terms of the women's exogenous characteristics (Table 2), so the ITT estimates appear to suffer from program placement bias.

To address it, we control for differences in observed characteristics. We implement inverse probability of treatment weighting (IPTW), for which the treatment is access to microcredit (A). This propensity score method uses scores to create weights and generate a pseudo-population in which the treatment assignment is independent of observable variables, as in randomization processes (Rosenbaum & Rubin, 1983). First, we estimate the probability (P) of having access to microcredit (A) over the total sample, conditional on the observed characteristics (X), that is, $P(A = 1|X)$. We estimate the following equation and assume a logistic distribution:

$$A_i = \beta_0 + \beta_1 X_i + \varepsilon_i. \quad (1)$$

Table 3 shows that the probability of having access to microcredit mainly depends on age, tribe, religion, and geographic location (district) of women.

Table 3 – Propensity Score Models

Variables	Access (IPTW)	Participation (IPTW)	Participation (DD)
Adults	-0.0115 (0.0479)	0.0133 (0.0405)	0.0397 (0.0510)
Children	0.0458 (0.122)	0.206*** (0.0718)	0.305*** (0.0894)
Children squared	-0.00193 (0.0121)	-0.0125** (0.00557)	-0.0195*** (0.00620)
Age	0.0213** (0.00932)	0.0261*** (0.00805)	0.0255** (0.0107)
Temne (tribe)	0.541*** (0.172)	0.226 (0.158)	-0.0559 (0.207)
Muslim (religion)	0.560*** (0.177)	0.481*** (0.166)	0.255 (0.220)
District 2	1.193*** (0.274)	2.491*** (0.245)	3.778*** (0.469)
District 3	0.547** (0.262)	0.823*** (0.224)	0.773*** (0.267)
District 4	-0.215 (0.228)	0.190 (0.192)	0.430* (0.225)
Constant	-0.280 (0.436)	-2.140*** (0.376)	-1.564*** (0.483)
Observations	1,228	1,228	1,012
Area under ROC	0.7101	0.7719	0.7993
Pseudo R ²	0.0869	0.176	0.210

Notes: Robust standard errors are in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Second, we calculate stabilized weights (Robins, Hernán, & Brumback, 2000), which account for the proportion of women in the access area (numerator) and the inverse probability of having access to microcredit, conditional on the covariates (denominator). These weights are defined as $P(A = 1) / P(A = 1|X)$ for women in the access area and $(1 - P(A = 1)) / (1 - P(A = 1|X))$ for women in nonaccess area.

Third, using these weights, we conduct a selection test to determine if access and nonaccess areas are similar in observed characteristics. We estimate the following equation by weighted least squares (WLS):

$$X_i = \beta_0 + \beta_1 A_i + \varepsilon_i. \quad (2)$$

As Table 4 shows, the selection test is satisfied.

Table 4 – Selection Tests

Variables	N	Access (IPTW)	Participation (IPTW)	Participation (DD)			
				0.5	Liu	Youden	Nearest to (0,1)
Adults	1228	-0.0254 (0.198)	-0.110 (0.195)	-0.0361 (0.339)	-0.499 (0.347)	-0.581 (0.451)	-0.261 (0.325)
Children	1228	-0.180 (0.332)	-0.119 (0.224)	0.371 (0.328)	-0.497 (0.420)	-0.865 (0.599)	-0.393 (0.371)
Age	1228	-0.0486 (0.802)	0.126 (0.736)	-2.298 (1.547)	-0.0103 (1.303)	1.23 (1.552)	-0.522 (1.226)
Temne	1228	-0.0392 (0.0400)	-0.0319 (0.0358)	0.225 (0.160)	-0.0959 (0.0823)	-0.227*** (0.0800)	-0.00484 (0.0798)
Muslim	1228	-0.0251 (0.0299)	-0.0219 (0.0285)	0.355** (0.156)	-0.143** (0.0688)	-0.153** (0.0750)	-0.0854 (0.0700)

Notes: Robust standard errors are in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Fourth, using the same stable weights, we estimate the impacts of microcredit access on each outcome Y by WLS, with the following equation:

$$Y_i = \beta_0 + \beta_1 A_i + \varepsilon_i. \quad (3)$$

Measuring the impacts of microcredit participation. Because we are interested in the impacts of microcredit on women who actually participated in the program, we also use two alternative methods to estimate the impacts. This measurement effort is more challenging, in that it entails both self-selection and program placement biases.

As a first strategy to estimate the impacts of microcredit participation, we control for selection biases using observed characteristics. We again apply IPTW, but in this case, the treatment is uptake of microcredit (U). We follow the same four steps and use Equations (1)–(3) but replace A (access) with U (uptake). Table 3 reveals that the probability of taking up microcredit depends on the women's age, number of children, and district in which they live.

The results of the selection test in Table 4 further show that there are no significant differences between participants and nonparticipants. With this approach, we thus can estimate the impacts of microcredit participation, controlling for program placement bias with observed characteristics. However, it cannot address selection biases due to unobserved characteristics.

Therefore, we use an alternative strategy as well, following the approach proposed by Coleman (1999), who evaluated the impact of group lending by taking advantage of a unique situation in Northeast Thailand. That is, he identified participants and nonparticipants in a microcredit program in eight villages where the program had already existed for two to four years. Then he noted six villages where the microcredit program would be available the following year and identified residents in these villages who would or would not participate. By identifying future borrowers and nonborrowers in regions where microcredit was not yet available, he specified an empirical model that controlled for both self-selection bias and program placement bias. Effectively, this approach represents a double-difference methodology in space. Accordingly, we identified areas with and without access to microcredit; within the access area, we surveyed participants and nonparticipants. For the area outside the 4 km radius, we could identify eligible women who met all other requirements, such that they would be allowed to borrow if microcredit if it were available. However, we lack information about people's willingness to take up microcredit outside the access area. Therefore, we adapt Coleman's approach (see also Belissa, Lensink, & Winkel (2018)).

First, using the sample of individuals in the access area, we estimate their propensity to uptake microcredit and conduct an out-of-sample forecast of expected participants and expected nonparticipants outside the access area. Second, we estimate the impact of microcredit with a double-difference (DD) methodology in a cross-sectional framework, which includes three steps:

1. We compare predicted borrowers and predicted nonborrowers in the access area. We use predicted borrowers instead of actual borrowers, because unobserved factors may affect both the decision to borrow and the outcome variables.
2. We compare predicted borrowers and nonborrowers in the nonaccess area.
3. We compare the differences obtained in the previous two comparisons.

We thus combine propensity scores with a DD specification to avoid selection biases. In so doing, our methodology reveals whether predicted borrowers in the access area perform better than nonborrowers in the access area, compared with the difference between predicted borrowers and nonborrowers outside the access area. A standard DD approach would compare between years and borrowers and nonborrowers, with an assumption of unobserved heterogeneity between the treatment and control groups that is constant over time. Using data from both groups, before and after the treatment, it is possible to difference out the constant unobservable factors. With our cross-sectional DD approach, we thus compare access areas and nonaccess areas and borrowers and nonborrowers, with the assumption of unobserved heterogeneity between participants and nonparticipants, which is constant over access and nonaccess areas. In other words, the unobservable factors should be the same for uptake in the access and nonaccess areas, and they also should be the same for non-uptake in the access and nonaccess areas. Data from participants and nonparticipants in access and nonaccess areas enable us to difference out these constant unobservable factors.

In turn, the validity of our approach depends on our ability to identify expected participants and nonparticipants in the access and nonaccess areas accurately. Therefore, we conduct out-of-sample forecasts of estimates of the propensity to participate in the microcredit program in the access area using a logit model. Table 3 presents the model specification that predicts the

propensity to participate among individuals in the access area, controlling for the following observed and exogenous characteristics: number of adults in the household, number of children in the household (linear and squared terms), age, Temne (dummy for the main ethnic group), Muslim (dummy for the main religion), and dummies for the village districts. The number of children, age, and districts emerge as the main determinants of microcredit participation.

We draw the receiver operating characteristic (ROC) Curve which illustrates the accuracy of the classification, by plotting sensitivity against 1-sensitivity. Sensitivity measures the proportion of participants classified correctly and specificity measures the proportion of correctly classified nonparticipants. Then we calculate the Area Under the Curve (AUC) as measure of the predictive power (performance) of our model. If AUC equals 1, the model perfectly classifies participants and nonparticipants; an AUC equal to 0.50 does not discriminate between the two groups (Zweig & Campbell, 1993). Our model AUC of 0.7993 indicates that it performs well in classifying participants versus nonparticipants.

Finally, to identify expected borrowers and nonborrowers, we must establish a threshold borrowing probability, above which a person is classified as a borrower. Table 5 outlines four methods to determine this cutoff point, using data from the access area. For each method, we present the cutoff point, implied sensitivity, specificity, and percentage of correctly classified borrowers. If the model perfectly predicts borrowers, sensitivity and specificity each take values of 100%. Changing the cutoff value affects both sensitivity and specificity, often in opposite ways.

The most straightforward method uses a cutoff point at 0.5, but it only correctly classifies 53% of participants and nonparticipants in the access area. Three other methods appear commonly in epidemiology literature to find an optimum cutoff point: the Youden (1950) index

method, which maximizes the difference between sensitivity and specificity; Liu's (2012) method, which maximizes the product of sensitivity and specificity; and the nearest to (0,1) method, which minimizes the Euclidean distance between the ROC curve and the (0,1) point, that is, the point on the ROC curve closest to the (0,1) point (Perkins & Schisterman, 2006). We prefer the optimal cutoff point, according to three criteria: (1) the number of individuals correctly classified, (2) the smallest difference between sensitivity and specificity because we are interested in correctly classifying participants and nonparticipants, and (3) the validity of the selection test.

Table 5 – Cutoff Points

	0.5	Liu	Youden	Nearest to (0,1)
Cutoff point	0.5	0.7660	0.8085	0.7472
Sensitivity at cutoff	98%	64%	56%	67%
Specificity at cutoff	8%	83%	93%	79%
Correctly classified	53%	74%	75%	73%

With regard to this third criterion, a key assumption of our approach is that selection into the borrowing group in the access and nonaccess areas is the same. We therefore test whether selection on observable variables is the same in both areas. Using each cutoff point, we classify individuals in both areas into (expected) participants and nonparticipants. In a regression framework, the selection test comes down to:

$$X_i = \beta_0 + \beta_1 A_i + \beta_2 \widehat{U}_i + \beta_3 A_i \times \widehat{U}_i + \varepsilon_i, \quad (4)$$

where X is a vector of observed characteristics of women (same observable traits we used for the propensity score model); A is a binary variable equal to 1 if woman i lives within the access area, and 0 otherwise; \widehat{U} is a binary variable equal to 1 if woman i is (re)classified as a participant, and 0 otherwise; $A \times \widehat{U}$ is the interaction term between these two variables; and ε_i is the error term.

Our coefficient of interest is β_3 . A non-significant coefficient indicates that selection into participation is the same in both areas. Table 4 shows the results of this test for each cutoff point.

These criteria indicate that the cutoff point derived from the nearest to (0,1) method is optimal, because it classifies 73% of the women in the access area correctly, produces a difference between sensitivity and specificity of only 12%, and is the only cutoff point that satisfies the selection test. The new sample frame using this cutoff point is in Table 6.

Table 6 – Predicted Sample Frame Using Nearest to (0,1) Cutoff Point

	Access area (Inside 4 km radius)	Nonaccess area (Outside 4 km radius)	Total
Eligible participants	581	65	646
Eligible nonparticipants	431	151	582
Total	1012	216	1228

Next, we specify the cross-sectional DD model to estimate the impact of the microcredit program:

$$Y_i = \beta_0 + \beta_1 A_i + \beta_2 \hat{U}_i + \beta_3 A_i \times \hat{U}_i + \beta_4 X_i + \beta_5 Z_i + \varepsilon_i, \quad (5)$$

where Y is the outcome variable; Z is a vector of district dummies; and the other variables are as in Equation (4). The constant β_0 measures the mean of the outcome Y for nonparticipants in the nonaccess area, $\beta_0 + \beta_2$ is the mean for participants in the nonaccess area, $\beta_0 + \beta_1$ indicates the mean for nonparticipants in the access area, and $\beta_0 + \beta_1 + \beta_2 + \beta_3$ measures the mean for participants in the access area. The parameter of interest is β_3 ; it captures differences between participants and nonparticipants, controlling for self-selection bias (β_1) and program placement bias (β_2). Intuitively, the cross-sectional DD approach works as follows: The first differences are between participants and nonparticipants within each area, which eliminates program placement bias, such that $(\beta_0 + \beta_1 + \beta_2 + \beta_3) - (\beta_0 + \beta_1) = \beta_2 + \beta_3$ for the access area and $(\beta_0 + \beta_2) -$

$\beta_0 = \beta_2$ for the nonaccess area. The second difference is between the two areas, which eliminates self-selection bias, that is, $(\beta_2 + \beta_3) - \beta_2 = \beta_3$.

Results

Table 7 contains a summary of the results using the three identification strategies. The Appendix provides the detailed results achieved with our DD approach.

Table 7 – Impacts of Microcredit

Outcome variables	N	Access (IPTW)	Participation (IPTW)	Participation (DD)
<i>Hope</i>				
Hope index	1,161	-0.00439 (0.198)	0.0694 (0.167)	0.441 (0.342)
Log of monthly income in good year	1,119	0.185* (0.105)	0.0762 (0.0949)	0.392** (0.169)
Log of monthly income in bad year	1,118	0.258** (0.104)	0.119 (0.0972)	0.277* (0.166)
<i>Aspirations</i>				
Life aspirations	1,165	0.409** (0.203)	0.381** (0.184)	0.724** (0.323)
Life aspiration gap	1,165	0.0828 (0.209)	-0.0768 (0.183)	-0.472 (0.311)
<i>Subjective well-being</i>				
Life satisfaction	1,165	0.326 (0.219)	0.458** (0.195)	1.197*** (0.287)
Locus of control index	1,158	-0.0187 (0.0517)	-0.00611 (0.0438)	-0.0177 (0.0954)
<i>Economic welfare</i>				
Log of monthly income current month	1,106	0.213* (0.115)	0.150 (0.0968)	0.109 (0.178)
Housing conditions index	1,158	0.259** (0.120)	0.118 (0.0994)	0.0668 (0.191)
Household durable assets index	1,148	0.672*** (0.257)	0.374 (0.249)	1.556*** (0.401)

Notes: Robust standard errors are in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Hope

We find modestly negative but non-significant effects of microcredit access on the hope index and positive but non-significant effects of microcredit participation on this index. The results on hope of economic welfare suggest a more positive picture. The monthly income if the coming year is a good year would be 18.5% higher for those women with access to the microcredit program. However, these effects are only significant at a 10% level. We find stronger, larger effects on the anticipated monthly income if the next year is a bad one (25.8% higher, 5% level). That is, access to microcredit potentially increases women's income during bad times, which implies that microcredit helps them cope with difficult periods. With our DD approach, we find significantly positive impacts of microcredit participation on hope or economic welfare, i.e. monthly income if the next year is either good or bad. Specifically, women participating in the microcredit program would have 39.2% higher monthly income under favorable conditions and 27.7% higher monthly income under unfavorable ones, compared with women who do not participate.

Aspirations

We find positive, statistically significant impacts on life aspirations, and this result is robust across all our identification strategies. Access to microcredit induces a 0.409-point increase in life aspirations (1–10 scale). Participation in microcredit leads to aspiration increases of 0.381 points if we use IPTW and 0.724 points if we use our preferred specification, cross-sectional DD. Although the effect of microcredit participation on the life aspiration gap is negative, it is not significant. The negative gap results from increased life satisfaction, which is higher in magnitude than the increase in life aspirations. Thus, the aspiration gap narrows mainly because life satisfaction improves.

Subjective well-being

Similar to Angelucci et al. (2015) and Karlan and Zinman (2011), we find positive but not significant effects of microcredit access on life satisfaction. However, significant effects of microcredit participation emerge when we use the IPTW method (5% level) or DD approach (1% level). Microcredit participation increases life satisfaction by 0.458 points according to IPTW method and 1.197 points according to DD. Also in line with Angelucci et al. (2015), the impact of microcredit on the locus of control index is not significant. However, we note that women already believe they can control their lives: the average index value for the full sample is 1.7.

Economic welfare

The impact of microcredit access on income suggests a more positive picture than many previous studies. Among women in the access area, income in the current month is 21.43% higher. Using the DD approach, the coefficient drops to 10.9% but it becomes insignificant.

Finally, we note positive, significant effects of microcredit access on the housing condition index and the household durable assets index. We also find positive, significant effects of microcredit participation on the household durable assets index according to our DD approach. These results suggest that microcredit increases material standards of living.

Microcredit effects on aspirations

On the basis of our theoretical framework, mainly on the Ray's (2006) concepts, we predict three pathways through which microcredit might affect aspirations. First, group lending methodology with joint liability offers a coordination device. Without this program, the women would not be able to borrow. Imagine a woman living in a community where few people have access to credit. Even if she has aspirations, she will not have the financial resources to reach them. Therefore, her aspirations for a better future will fade. However, group lending with joint liability might

break this trap. Coordinated borrowing by the group represents an opportunity to realize their aspirations, which narrows the aspiration gap and creates a different equilibrium.

Second, aspirations are socially determined (Ray, 2006), so they should be reinforced by the group lending methodology with joint liability. Every week, the group meetings bring together similar women from several small groups into a big group. These meetings improve their social interaction and connectedness, which potentially improve their aspirations by widening the aspiration window.

Third, group leaders can raise aspirations effectively. Several empirical studies (Beaman et al., 2012; Bernard et al., 2014; Lybbert & Wydick, 2017a; Macours & Vakis, 2014, 2016) offer consistent evidence that leaders in communities serve as role models for other members. If role models are better off, women likely form a wider aspiration window that appears reachable, because they belong to the same groups and communities. In our study, the presidents of the small and big lending groups, who organize meetings and repayments, or the most well-off or successful members of the groups all may act as role models.

We test the last two pathways using information from 343 microcredit participants, organized into 22 big lending groups, from one of the BRAC office branches. Specifically, to measure social interaction and connectedness, we use three variables: (1) frequency of attendance at weekly meetings, measured from 1 = never to 4 = always; (2) walking distance to the weekly meeting place, measured in minutes; and (3) number of weekly meetings missed in the previous three months. We regress the life aspirations of the group members on these three variables using ordinary least squares:

$$Y_{ij} = \beta_0 + \beta_1 M_{ij} + \beta_2 X_{ij} + \varepsilon_{ij}, \quad (6)$$

where Y indicates the life aspirations of woman i in group j ; M represents the three variables measuring social interaction and connectedness; X is a vector of controls; and ε is the error term. As we show in Table 8, controlling for observable features, the more frequently members attend meetings, the higher are their life aspirations (0.314 points, 5% level). The farther away a member lives from the weekly meeting place, the lower her aspirations; when a member misses more weekly meetings, her life aspirations also are lower. The coefficients of these last two variables are not significant, but they exhibit the expected sign. Overall, this evidence suggests positive relationships of social interaction and connectedness with life aspirations.

To test for role modeling effects, we analyze the effect of the big group president's current level of life satisfaction on each member's life aspirations. We link each group member to her president and this president's life satisfaction (S_j). Then we regress the life aspirations of group members on the life satisfaction of the group president, using ordinary least squares:

$$Y_{ij} = \beta_0 + \beta_1 S_j + \beta_2 X_{ij} + \varepsilon_{ij}. \quad (7)$$

The results in Table 8 suggest that leaders who are better off have a modestly positive but not significant influence on the aspirations of group members. In addition, we identify the most well-off member of the group (highest life satisfaction), who is not always the group president. With the same analysis and Equation (7), we find a significantly positive relationship between the most well-off person in the group and the life aspirations of other group members. Therefore, this successful group member appears to function as a role model for others.

Table 8 – Life Aspirations

Variables	Dependent variable: Life aspirations									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Frequency attending meetings	0.282 (0.180)	0.314* (0.180)								
Distance to meeting place		-0.00756 (0.00822)	-0.00724 (0.00832)							
Missed meetings in last 3 months				-0.0140 (0.0649)	-0.00500 (0.0645)					
Group president satisfaction level						0.0572 (0.0493)	0.0523 (0.0513)			
Person within the group with highest satisfaction								0.208* (0.104)	0.219* (0.112)	
Constant	8.277*** (0.711)	8.311*** (0.887)	9.343*** (0.141)	9.581*** (0.500)	9.293*** (0.0897)	9.475*** (0.498)	8.832*** (0.378)	9.115*** (0.740)	7.495*** (0.957)	7.388*** (1.331)
Control variables	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	316	301	326	311	325	309	268	254	295	280
R-squared	0.022	0.038	0.003	0.015	0.000	0.010	0.004	0.031	0.045	0.061

Notes: Clustered (by group) standard errors, which are in parentheses. Control variables: age, adults, children (linear and squared), Temne (tribe), Muslim (religion).

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Conclusions

This study provides an initial evaluation of the impact of microcredit on hope and aspirations and it is one of just a few studies to examine the impact on subjective well-being. In addition, we consider the influences on economic welfare. To provide these novel analyses, we use identification strategies that rely on one of the eligibility rules established by BRAC, based on distance to the branch office. We use IPTW to control for selection biases on observable variables and estimate the effects of microcredit access and participation. Then we consider a strategy that leverages the cross-sectional DD method to control for selection biases due to both

observable and unobservable factors. With this method, we find positive, significant impacts of microcredit on hope about economic welfare, life aspirations, life satisfaction, and the household durable assets index.

We hypothesize that the effects on life aspirations, which we find to be robust across three identification strategies, occur through three channels: (1) group lending provides a coordination device, (2) microcredit improves social interaction and connectedness, and (3) role models in lending groups increase the aspirations of other group members. In tests of the last two channels, we find indicative evidence of correlations of aspirations with both social interaction and connectedness and role models.

Overall, this study suggests that microcredit plays an important role in reducing internal psychological constraints. In light of the somewhat disappointing outcomes suggested by several recent randomized controlled trials which mainly focus on the microcredit impacts on external constraints, this research also provides a more positive picture of the potential contribution of microcredit in realizing the SDGs.

We also note some caveats of our preferred cross-sectional DD specification though. By identifying participants and nonparticipants in access and nonaccess area, we compare four groups and address selection biases due to observable and unobservable factors. However, our model correctly classifies only 73% of the women in our sample. In addition, this approach relies on the strong assumption that unobserved characteristics are the same for participants in the access and nonaccess areas, and unobserved characteristics are the same for nonparticipants in the access and nonaccess areas. This assumption must hold for the results to be valid, but we cannot test it. We accordingly encourage further research to deepen the insights into the impact

of microcredit on aspirations. More evidence about this causal relationship, as well as richer data to test the mechanisms driving the effects, all are required to draw clear conclusions.

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Appendix. Impacts of Microcredit Participation Using Cross-Sectional DD

Variables	Hope index	Log of monthly income in good year	Log of monthly income in bad year	Life aspirations	Life aspirations gap	Life satisfaction	Locus of control index	Log of monthly income current month	Housing condition index	Durable assets index
Uptake x Access	0.441 (0.342)	0.392** (0.169)	0.277* (0.166)	0.724** (0.323)	-0.472 (0.311)	1.197*** (0.287)	-0.0177 (0.0954)	0.109 (0.178)	0.0668 (0.191)	1.556*** (0.401)
Uptake	-0.565 (0.355)	-0.265 (0.171)	-0.0236 (0.167)	-0.671** (0.327)	0.0441 (0.303)	-0.715*** (0.275)	-0.120 (0.101)	0.317* (0.174)	0.190 (0.202)	-1.249*** (0.410)
Access	-0.376* (0.198)	-0.0515 (0.0796)	0.0685 (0.0925)	-0.0846 (0.144)	0.242 (0.151)	-0.327** (0.136)	0.0310 (0.0568)	0.142 (0.0947)	0.0613 (0.113)	-0.457** (0.214)
Adults	-0.0254 (0.0320)	0.0235 (0.0169)	-0.0161 (0.0175)	0.0148 (0.0248)	-0.0254 (0.0320)	0.0402 (0.0284)	-0.0161* (0.00930)	-0.0140 (0.0186)	0.0137 (0.0194)	0.107** (0.0465)
Children	0.0229 (0.0589)	-0.00912 (0.0304)	-0.00327 (0.0312)	0.0416 (0.0467)	-0.0156 (0.0648)	0.0572 (0.0610)	-0.0134 (0.0151)	-0.0200 (0.0386)	0.0585 (0.0413)	0.0558 (0.0893)
Children squared	-0.000446 (0.00377)	0.00175 (0.00191)	0.00137 (0.00184)	-0.00173 (0.00297)	-0.000912 (0.00489)	-0.000814 (0.00467)	0.00109 (0.000831)	0.00214 (0.00296)	-0.00441 (0.00294)	-0.00102 (0.00544)
Age	-0.00447 (0.00672)	-0.00207 (0.00372)	-0.00406 (0.00388)	0.000201 (0.00543)	0.00344 (0.00703)	-0.00324 (0.00647)	-0.000346 (0.00187)	-0.0101** (0.00398)	0.00780* (0.00432)	0.0129 (0.00949)
Temne	0.292** (0.138)	-0.0508 (0.0701)	-0.0762 (0.0758)	0.131 (0.0969)	0.0253 (0.134)	0.106 (0.123)	0.116*** (0.0408)	-0.138* (0.0807)	-0.130 (0.0834)	-0.0202 (0.201)
Muslim	0.0426 (0.156)	-0.00174 (0.0786)	-0.146* (0.0821)	0.178 (0.124)	0.171 (0.138)	0.00671 (0.132)	-0.0467 (0.0395)	-0.179** (0.0804)	-0.223** (0.0912)	-0.755*** (0.201)
Constant	0.189 (0.276)	13.03*** (0.195)	12.37*** (0.207)	9.396*** (0.296)	3.376*** (0.373)	6.021*** (0.342)	1.516*** (0.115)	13.16*** (0.215)	4.634*** (0.230)	8.868*** (0.524)
District dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,161	1,119	1,118	1,165	1,165	1,165	1,158	1,106	1,158	1,148
R-squared	0.014	0.064	0.069	0.037	0.026	0.091	0.060	0.052	0.043	0.039

Notes: Robust standard errors are in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

