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Social Preferences and Environmental quality: Evidence from School Children in Sierra Leone

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Abstract:

In this paper we examine the effects that variations in the quality of the environment at birth have on children's other-regarding preferences, as measured through four binary-choice dictator games run with school-age children in rural Sierra Leone. We examine the effect of exogenous variations in rainfall level by location and year on children's social preferences. We also study how age at which children had access to improved water sources, such as protected wells, correlates with preferences. Children born within a healthier environment are more generous, when generosity comes at no personal cost, more likely to choose socially efficient allocations and less averse to advantageous inequality. The correlation between rainfall shocks at birth and children's height-for-age suggest that environmental quality affects preferences through its impact on health. We find that proxies for early childhood health affect experimental outcomes in a similar way as age, which helps to explain the process by which individuals develop social preferences. No significant relationship is found in our data between environmental quality and educational outcomes, such as school attendance and grades.

Keywords: Field experiments, Health and Economic Development, Altruism, Inequality Aversion

JEL: C93, I15, D64

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1. Introduction

While social preferences and other-regarding behavior have been observed in the lab and field for some time, there is less evidence on how preferences are acquired and how they differ between individuals and across societies. Understanding this process can carry benefits, both at the individual and social level, as other-regarding preferences foster behavior that can lead to more efficient outcomes and can improve social welfare when there is an incentive for free-riding or when societies face coordination problems (Fehr and Fischbacher, 2003). This may be of particular significance in developing economies where informal institutions often play a larger role than in developed settings (Cardenas and Carpenter, 2010). At the individual level, pro-sociality may promote academic and professional success and social integration (Capara et al., 2000).

This paper focuses on one potential determinant of the development of social preferences: health shocks during childhood. Health during early childhood has a large impact on the development of cognitive skills (Berkman 2002), and health shocks around birth are associated with lower academic outcomes and income later in life (Akresh et al. 2012). To our knowledge, no other study focuses on the impact of health during childhood on non-cognitive social skills in a developing setting. Given the higher returns from health among the poor, this choice of setting enhances the policy relevance of our results.

In this paper, we use data from an artifactual field experiment conducted in rural Sierra Leone to investigate how children's economic decision making is affected by variations, at birth, in two exogenous environmental factors associated with health: rainfall and quality of domestic water sources. We quantify the impact of environmental shocks on preferences using experimental data from Bauer et al. (2011), which consist of four binary-choice dictator games that were played with school-age children. The results of these four mini-dictator games can be combined to reveal a variety of social preferences, including inequality aversion, generosity and a propensity for maximizing social efficiency. Experimental treatments manipulated whether the receiver in the games was a child in the subject's class or a child living in a different village.

Our results show that children who were born under healthier environmental conditions are more generous and less averse to advantageous inequality. We find that rainfall level impacts children's health, as measured by height-for-age, whereas there is no significant correlation with children's school attendance or grades. This suggests that environmental quality affects preferences through its impact on health. We find a stronger effect for boys than for girls. These results are robust to the use of two different proxies for environmental shocks at birth and early childhood: rainfall and length of exposure to high quality water sources. We find that these proxies for early childhood health affect experimental outcomes in a similar way as age, which helps to explain the process by which individuals develop social preferences.

This paper makes two main contributions to the literature. First, it contributes to the debate on the formation of social preferences by showing evidence of the influence that environmental factors at birth can have on the development of pro-sociality and inequality aversion later in life. This complements previous studies that show that age, social background and experiences can have a similar impact on related preferences. Second, our findings add to the literature on the importance childhood health, by providing evidence of an additional channel through which health can affect productivity and income.

This paper is structured as follows. The next section provides a theoretical background and reviews existing literature. Section 3 presents the experimental protocol and econometric approach. Results are presented and discussed in section 4 and section 5 concludes.

2. Theoretical background and motivation

As we explain differences in social preferences in children through exogenous variations that affect early childhood health, this paper is motivated by and contributes to both the literature on the development of social preferences as well as literature on the effects of environmental shocks on health and development. This section proceeds by discussing each of these areas of research in turn.

The experimental economics literature provides a great deal of evidence that individuals are motivated not only by their personal well-being, but also by concerns for others' utility (Charness and Rabin, 2002; Fehr and Fischbacher, 2003). Furthermore, research has shown that social preferences, which have traditionally been taken by economists as exogenous, are in fact influenced by a variety of environmental factors, which recent economic experiments have sought to identify (Fehr and Hoff, 2011), and a growing literature demonstrates the influence of individual, demographic and cultural characteristics on social preferences (Henrich et al., 2006,; Habyarimana et al., 2007; Fershtman and Gneezy, 2001; Croson and Gneezy, 2009).

Features of individuals' background and environment appear to influence social preferences. Fehr et al. (2008) find that group identity has influences social preferences in children, who are more averse to inequality within their own social group. Bauer et al. (2011) show that exposure to violent conflict makes group identity more salient and leads to higher rates of parochial inequality aversion—an effect which they observe among parents of the children in the sample that we consider here. Additionally, Voors et al (2010) find increased altruism among individuals exposed to conflict in Burundi. While few papers concentrate on the effect of health, Bartling et al. (2011), find that pre-school children in Germany whose parents reported more doctors' visits were less likely to compete against peers. While willingness to compete is not in and of itself an other-regarding preference, the study suggests a link between economic decision making and health in a similar vein as the argument we present in this paper.

Particularly relevant for this paper are studies with children that report changes in altruistic and egalitarian behavior with age. Harbaugh et al. (2003) show that norms of fairness increase with age in children ranging from 7 to 18. Fehr et al. (2008) find a simultaneous increase in egalitarian preferences and parochialism from the 3-4 year-old cohort to the 7-8 cohort, and Fehr et al. (2011) replicate this result, while finding that egalitarian preferences give way to increased altruism and decreased spite as children approach adolescence.

Bauer et al. (2012), using a nearly identical experimental protocol to the one described in this study, find an increase in altruism and a decrease in spitefulness with age. While they do not report any significant results for the effect of cognitive ability or for indicators of health, they do find that children's parental background predicts social preferences. Specifically, children with less educated parents were less sharing. Benenson et al. (2007) similarly find that children from schools with a higher proportion of students from a lower socio-economic background share less in a dictator game. While they find that older children are generally more altruistic, the difference in behavior between children from high and low socio-economic backgrounds is starker as subjects' age increases from 4-9 years.

The literature suggests a few mechanisms by which social preferences might develop within individuals. The most widely accepted explanation is that preferences change with age as children are socialized. An additional possibility is cognitive development is linked with the development of social preferences. Almas et al (2010), for example, attribute an observed increase in preferences for efficiency over self interest as children move towards adolescence to both socialization and an increase in cognitive ability, the latter of which allows children to distinguish between fair and unfair outcomes. The development of social preferences might also be related to an ability to empathize with others, and children might develop the non-cognitive skills to do this as they age, which is supported by results from Gummerum et al. (2008), who show that pre-schoolers' understanding of "moral emotions" predicted allocations in dictator games.

It is also likely that social preferences are, to some degree, innate. Fehr et al. (2008) raise the possibility that there is a genetic component to parochial altruism and there is some empirical support for this in a recent paper from the psychology literature, which provides evidence that egalitarian preferences and altruistic behavior may already have developed at less than one year of age (Schmidt and Sommerville, 2011).

We posit that health in early childhood may affect the development of social preferences directly in much the same way that health in early childhood has been shown affect the rate of cognitive and physical development, or indirectly by affecting the way in which children are socialized.

The effects of exogenous environmental shocks on health may be easier to observe in developing economies, especially among the poor, as access to health and sanitation infrastructure may vary dramatically across individuals. This increased vulnerability to environmental shocks can lead to different rates of physical and cognitive development, that vary randomly between individuals.

Exogenous variation in rainfall has been shown in several studies to have an effect on both physical and cognitive development. Maccini and Yang (2009), working with Indonesian data, show that exposure to rainfall in early childhood has an effect on improved health, schooling and socioeconomic status for women. Thai and Falaris (2011) come to similar findings using data from Vietnam, observing a larger effect in regions where it is more difficult for families to smooth consumption. Akresh et al. (2012) use rainfall as an instrument to measure investment in children's education within households. A number of studies confirm that poor health in *utero* and during infancy can slow down a child's physical and cognitive development, with repercussions on her academic outcomes and future income (Berkman 2002; Case 2005; Eppig 2010; Bryce and Shah 2012; Kremer and Miguel, 2004; Baird et al., 2011).

While these studies show a positive relationship between rainfall and health outcomes, due to the effect of rainfall on agricultural output, we observe a different pattern in our data: higher rainfall actually leads to *lower* health on average, as captured by height-for-age. We attribute this pattern to the particular climatic conditions found in Sierra Leone: being a tropical country, Sierra Leone experiences higher rainfall levels than the countries investigated by previous studies. Consistent with this, data from the Center for Epidemiology and Natural Disaster show that the type of natural disaster associated with the highest number of victims and displaced people in Sierra Leone over the past century is flood, while droughts are extremely rare.

Flooding in tropical regions has been linked with higher rates of disease, such as malaria and water-borne illnesses. Wiwanitkit (2006) finds a positive correlation between rainfall level and incidence of malaria in Thailand. In Sierra Leone, Barnish et al. (1993) find that high levels of rainfall increase the rate of malaria in children seven and younger, from 30% before the rains to 58% after.

3. Design

We measure social preferences using the results of four binary-choice dictator games, from Bauer et al. (2011), which were administered to school children in rural communities in Sierra Leone. The design is based on Fehr et al. (2008). Each child played all four games and earned experimental currency that could be used to purchase items in a "store" set up for purposes of the experiment. The experiment with children was conducted one-on-one, while the parents were given instructions in a group and made decisions individually.[1] In both sets of experiments, the order in which the games were played was randomized across subjects.

Subjects were drawn from 21 primary schools in the Bombali district of Sierra Leone. In each school, students from one class were selected to take part in the experiment. There were on average 29 students per class, and we have matched parent-children observations for a total of 559 students. Parents and children were separate for the duration of the experiment, as to prevent parents from influencing children's decisions. All participants were instructed to refrain from discussing the experiment among themselves until after we had left.

Each student was told that she would play a series of games and, based on her choices, she would receive a number of tokens that would allow her to buy items in our store. The subject was then given a one-token show-up fee and allowed to trade this token for one item (pencils, notebooks, sweets and toys) before playing the games. The experiments with children were conducted one-on-one with one of three experimenters in the local language (either Temne or Krio).

At the beginning of each session, we photographed all students from the selected class. This picture was then downloaded onto notebook computers, and this photograph (for the *in-group* treatment) or a photograph of a different class from the study with similar characteristics (in the *out-group* treatment) was displayed during the experiment. Each student was randomly allocated to either the *in-group* or *out-group* photograph treatment and played all games under the same treatment. In each game the child was shown two cardboards, each with two circles with arrows. One circle on each cardboard pointed to the

[1] While choices in the experiment were kept private from other subjects, neither experiments with children nor adults were anonymous. With adults, decisions were made privately, but payment was not anonymous.

child while the other circle pointed to the computer screen which displayed either the in-group or out-group photograph. The enumerator then placed tokens in the circles on each cardboard and explained that the child would receive the tokens in the circle pointing towards her on whichever cardboard she chose, while the tokens in the circle pointing towards the computer would go to one of the children in the photo. Subjects did not know which specific child in the photo would receive the tokens, and were told that the child in the photo would not know who sent the tokens either.

In each game, the subject had to decide between an equal and an unequal allocation of tokens: in all games, one of the two cardboards contained one token in each circle (1,1) - one token for the child playing and one for the anonymous partner. The amounts contained on the second cardboard varied across the four games, with allocations designed to capture inequality aversion as well as other social preference (see Fehr et al., 2008; Bauer et al., 2011). In the “pro-social” game, the alternative is (1,0), giving subjects the opportunity of enriching their counterpart by forgoing advantageous inequality, which captures an “elementary form of pro-sociality” (Fehr et al., 2008). The “envy game,” (1,1) vs. (1,2), is similar, in that it allows the subject to choose the socially optimal choice at no personal cost, but produces disadvantageous inequality. In the “sharing” game, the total amount of tokens is equal to 2 in both choices, and the subject chooses between keeping both, (2,0), and sharing, (1,1). Finally, the “spite” game presents a choice between disadvantageous inequality (2,3), and an egalitarian allocation (1,1), that offers a lower payoff for both parties. We refer to those who choose the (1,1) allocation in each game as *pro-social*, *envious*, *sharing* and *spiteful*, respectively.

The results of these four binary choices can be combined into a series of preference profiles. Similar to Fehr et al (2008), we define as *weakly generous* those who choose (1,1), (1,2), (2,0) and (2,3), respectively. Other preference profiles capture attitudes towards inequality: *behind averse* and *ahead averse* individuals choose the (1,1) allocations when their partner would otherwise receive a relatively higher or lower payoff, respectively. We classify an individual as *socially efficient* is she maximizes the total payoff to both parties, which entails choosing (1,1) in the pro-social game, (1,2) in the envy game and (2,3) in the spite game. Finally, a subject is classified as *homo economicus* if she maximizes her own payoff by choosing (2,0) in the sharing game and (2,3) in the spite game. A full description of these classifications is given in Table 1.[2]

After concluding the games, both parents and children completed brief questionnaires, separately and with the help of an enumerator in the local language. We asked children their age in years. In addition to biographical and basic personal information, we collected information from parents about a variety of behaviors related to health and sanitation. This included the primary source from which the individual's household accessed water for drinking and cooking, the type of water source (e.g. unprotected well, protected well, stream or river) and whether they use any methods of treatment before using water. Additionally, we measured children's height.

We also interviewed village leaders, teachers and representatives from local committees responsible for maintaining water sources. We collected from them detailed information on each water source, including the source type, the year in which it was built, past maintenance projects, whether the water-source committee (or village leader in the absence of such a committee) considered the water source to be safe to drink, whether any purification methods were used at the source (i.e. adding chlorine to a well) and whether there were any problems associated with the water source. This information allows a better understanding of which children have access to clean water and for how long (based on the child's age and the year the particular source was constructed or improved).

We also combine experimental results with data on precipitation in the year and place of birth of each subject from the CPC/Famine Early Warning System Daily Estimates data of the National Oceanic and Atmospheric Administration (NOAA). This database spans the years from 1983 to 2010 and contains daily precipitation figures at 0.1 degree precision, obtained by combining actual rainfall measures and estimates from satellite data.

The next section discusses the experimental results. Since we have height data only for children, the analysis of the effect of health shocks on preferences is restricted to the use of experimental outcomes for the kids' sample.

4. Results

4.1. Descriptive statistics

[2] Additional preference profiles have been defined by aggregating the binary choices from the four games. In the empirical analysis, we focus on the subset of profiles reported in the main text, principally because the frequency of some profiles is not high enough to allow for meaningful analysis.

Summary statistics for a set of individual and village characteristics are presented in Table 2. The average age of children in the sample is ten years, and 51% are male. Average household expenditures over the week prior to the study is on average 50,000 Leones (9.5 USD). Almost 80% of adult subjects are farmers, while 50% of households report experiencing water-related health shocks over the previous year. There are, on average, 158 households per village.

The experimental results for the games are reported in Table 1. For the pro-social game, 60% choose the (1,1) allocation (*pro-social*), while 51% maximize their partner's payoff by choosing the (1,2) allocation in the *envy* game. 32% of the subjects choose (1,1) in the *sharing* game, and 29% of the ample is *spiteful.*

Figure 1 shows mean rainfall for the regions covered in our sample by year. There does not appear to be a clear trend in rainfall over time. This finding is reassuring, as it addresses concerns that the effect of rainfall may simply capture a correlation between kids' social preferences and their age.

As mentioned above, the data show a negative correlation between levels of rainfall and our indicator of health. Figure 2 plots mean rainfall in subject's birth year against z-score of height-for-age, calculated using data from the Center for Disease Control Growth Reference from the year 2000 in the United States. The negative relationship that we observe in our data is in contrast to previous studies which show a positive correlation between rainfall and health. We attribute this pattern to higher incidence of disease due to flooding during the rainy season. In what follows, we identify rainfall shocks as occurring whenever rainfall over a year in a specific location was more than 1 standard deviation below the median rainfall in the region over the 35 years for which we have data. Given the negative correlation between rainfall and health in Sierra Leone, such negative rainfall shocks are associated with better health outcomes, as shown below.

We investigate a second source of variation in environmental quality: the age at which children had access to an improved water source. This empirical specification focuses on households for which the primary reported water source is an improved one. Improved water sources in this area are protected mechanical wells or boreholes. This classification is based on the World Health Organizations literature on water and sanitation (WHO, 2008).[3]

[3] The World Health Organization classifies water sources as either "piped into dwelling, plot or yard" "other improved" or "unimproved." In our sample, we only observe the latter two categories. "Improved" water sources include "public taps or standpipes, tube wells or boreholes, protected dug wells, protected springs and rainwater collection," while "unimproved" refers to an "unprotected dug well, unprotected spring, cart with

Unprotected wells—which are easily contaminated by debris and surface water—and streams or rivers are classified as unimproved water sources. We define the age at which a child is exposed to an improved water source as the age of the child when the primary water source, used by the household at the time of the study, was constructed.[4]

In the empirical analysis, we consider availability of improved water sources as an exogenous variation in environmental quality. One potential concern related to this approach is that individual and village-level characteristics might simultaneously affect social preferences and water-source quality. Moreover, the choice of water source within a village is not random. We do assume, however, that there is exogenous variation in the timing in which water sources are constructed. This is supported by the fact that the majority of improved water sources were constructed or improved with the assistance of non-governmental organizations (NGO), and therefore influenced by a variety of factors that lie outside the control of village leaders and residents. It may be the case that NGO activity has an independent effect on social preferences, to which end we include a control on NGO activity and include fixed-effects at the village level in all regressions.

In spite of the use of these strategies to minimize endogeneity and selection concerns, biases may limit the possibility to interpret variations in the age at which children were exposed to an improved source as completely exogenous. However, unobservable variables that affect both water-source construction and social preferences are very unlikely to be related to our rainfall measurements. The fact that we obtain consistent results using these two unrelated sources of change in environmental quality enhances the robustness of our findings.

The mean number of total water sources per village is 4.1, of which an average of 1.8 are improved. Overall, 63% of respondents reported using improved water sources. Of the improved water sources in the sample, 63% were constructed/renovated with the aid of an NGO (no unimproved sources were constructed with NGO help). Of those individuals in the sample who reported using improved water sources, the average number of households using the respondent's water source is 120, compared to an average of 87 for unimproved sources

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small tank/drum, tanker truck, surface water (river, dam, lake, pond, stream, canal, irrigation channels), and bottled water" (WHO, 2008).

[4] Ideally, we would want to define improved water source availability as the presence of an improved water source within a certain distance from the child's household. However, we do not have data on the geographic location of participants' households and village water sources. If we define improved water source availability as presence of an improved water source in the child's village, the resulting does not present enough variation within each village to conduct any meaningful empirical analysis, since we have 21 villages in our sample, and children from the same village, being drawn from the same grade, have similar ages.

(p=0.00). Not surprisingly, improved water sources are also on average more recent: the weighted average age of improved sources is 11 years, compared to 31 years for unimproved sources (p=0.00). The civil war had an effect on water-source construction: of the 270 improved water sources for which we have data, only 7% were constructed between the beginning of 1991 and end of 2001, while 72% were constructed in the 9.5-year period after the conflict.

4.2. Analysis

Our main specification investigates the effect of rainfall shocks on social preferences. We run a probit regression of children's preferences on rainfall at the time of their birth. Since we do not have data on month of birth, we identify a child as experiencing a rainfall shock at the time of birth if the child's village suffered from low rainfall (more than one standard deviation below the long term average for the region) between the year before and the year after the child's birth year. About 39.8% of children were affected by rainfall shocks around birth. We estimate the following model:

$$C_i = \alpha + \beta R_i + \delta \boldsymbol{X}_i + \varepsilon_i \,, \qquad (1)$$

where C_i is the individual allocation in one of the four binary-dictator games or one of the preference profiles obtained aggregating choices in the different games, R_i is equal to 1 if the child experienced a rainfall shock around the time of birth, $\boldsymbol{X}_i$ is a vector of individual characteristics including gender, age, a dummy equal to one if the child was assigned to the in-group treatment, per-capita household expenditures and number of siblings, and ε_i is an error term.

Table 3 displays regression results. Children born in years of low rainfall, with lower levels of flooding and water-borne diseases, are significantly more likely to behave altruistically, when there is no cost to themselves, as measured by the weakly generous composite (column 6). Children born under healthier conditions are also significantly more likely to maximize their own payoff in the sharing game, to be classified as *homo economicus*, and are significantly less averse to advantageous inequality (columns 3, 7 and 8). Behavior in the pro-social, envy and spite games (columns 1, 2 and 4), and the results on the likelihood that a child is socially efficient and behind averse (columns 5 and 9), though not significant, are consistent with the idea that children who experienced more favorable environmental conditions at birth are more likely to choose welfare maximizing outcomes, regardless of whether they are disadvantageous for them or, in general, less fair. These results are statistically significant and are stronger for boys than for girls.[5]

The coefficient of the in-group treatment dummy, while not significant in any of the regressions, indicates a slight increase in both types of inequality aversion that we measure, ahead and behind aversion. Children in the in-group treatment are more likely to choose the pro-social and sharing options. This represents weak evidence for parochial egalitarian preferences.

To account for the possibility of that health shocks affect children in each treatment group differently, we divide the sample by in-group and out-group treatments and run regressions on choice variables in each. Estimates from equation (1) are reported in Table 4. The results on sharing and ahead averseness are significant only in the in-group sample, whereas rainfall shocks are associated with a lower likelihood that a child is spiteful and with a higher probability that he behaves selfishly in the out-group sample. While low rainfall in the in-group sample is still correlated with higher levels of weakly generous, socially efficient and *homo economicus* behavior, we see slightly higher levels of envy, spite and behind aversion associated with low rainfall in the in-group sample, although this results is not statistically significant.

Next, we check whether similar variations in social preferences are associated with children's access to improved water sources. For this analysis, we restrict our attention to those children whose parents reported using high-quality water sources. The reason for this is that we are aware that the choice of water-source may be influenced by village and household traits affecting at the same time children preferences. For instance, more educated and health conscious households are more likely to use improved water sources and at the same time raise pro-social children.[6] Restricting our attention to improved water source users minimizes the influence of such unobservable characteristics, since they should be common to all households using them.

While the choice of water source is endogenous, we assume a degree of exogeneity in timing of water source construction. Therefore, we focus on improved water source users and investigate the relationship between children's social preferences and their age when the improved water source was constructed. By focusing on water source quality, this analysis is likely to capture a different health channel than the rainfall one: rather than incidence of

[5] Result not shown.

[6] The concern that the effect of water source quality on kids' preferences may simply capture a correlation between parents and children's preferences is mitigated by the fact that we do not observe a significant correlation between parents and children's experimental choices in any of the four games.

malaria and other diseases that are correlated with high levels of rainfall, clean water reduces the diffusion of water-borne parasites.

We use a probit model to estimate the effect of the age at which children were exposed to the primary water source on experimental outcomes. In addition to child characteristics, we control for household and parents' characteristics, such as education and social preferences; water source characteristics, such as the number of households using the same source and distance of the source from the center of the village; and village-fixed effects.

Results are reported in Table 5 and generally support the findings on pro-sociality, weak generosity and social efficiency obtained using rainfall shocks. The older children were when exposed to a high quality water source—in other words the less exposure they have had in during early childhood to clean water—the lower the probability that they are pro-social, weakly generous, and maximize social welfare through their choices. Unfortunately, the size of the sample does not allow us to further analyze results by treatment, and therefore we cannot cross-check results from the rainfall regressions on inequality aversion between treatments.

The results presented so far suggest a link between environmental quality during early stages of children's development and their social preferences. The relationship between environmental shocks and children's preferences could be due to the direct effect of such shocks on health, or to the fact that healthier children spend more time at school and with their peers. We can only partially test the mechanism at work in our setting, since we do not have detailed time allocation data. However, we have data on a commonly-used indicator of health, height-for-age, and on children's school attendance and grades, proxied by the number of tests missed over the school year and by the grades obtained, respectively. We regress each of these variables on the rainfall shock dummy, controlling for the usual set of child characteristics.

Table 6 displays regression results. Consistent with the relationship between rainfall and health pictured in Figure 2, rainfall shocks are associated with a significant increase in children's height-for-age (columns 1 to 3). This holds both for boys and for girls. On the contrary, no significant effect of rainfall shocks is observed on educational outcomes (columns 4 to 9). The presence of significant correlations in the height-for-age regressions is remarkable, given the presence of measurement error in our data: our measure of children's age is self-reported by children and does not include exact month of birth and NOAA rainfall measurements rely on estimates rather than actual rain gauge measures.[7]

The data do not provide support for school attendance and educational attainment as channels by which behavior is affected. This indicates that rainfall shocks affect health directly, although our measures of academic outcomes and school attendance are very noisy indicators of cognitive ability and time spent among peers, respectively.

The findings presented so far are consistent with the notion that shocks *in utero* or during infancy have profound effects on subsequent levels of development. In order to test the robustness of our results, we conduct a placebo test, and regress children's social preferences on a dummy equal to one if the village where the child was born experienced environmental shocks 3 to 10 years before the child's birth. We choose this time frame in order to minimize the possibility that our placebo test captures lasting effects of rainfall shocks, through their impact on agriculture and income; weather shocks during the seasons immediately before a child's birth might have an impact on household income if they caused crop failure of deaths within the family due to illness. Moreover, the fact that we do not have data on month of birth makes it difficult to define the period when the child was *in utero*.

Regression results are presented in Table 7. Apart from pro-sociality, no social preference indicator appears to be significantly correlated with weather shocks before birth. We obtain similar results if we investigate the effect of availability of improved water sources before a child's year of birth.[8] This robustness check is reassuring of our ability to capture health effects at the individual level, and not through some other channel.

5. Discussion

The results of this study suggest a link between environmental quality during early stages of children's development and their social preferences. We use exogenous variation in rainfall in rural Sierra Leone to examine the effect of environmental shocks on behavioral measures of altruism, social efficiency and inequality aversion. We find that weather shocks at the time of birth predict weakly generous behavior—maximizing one's partner's payoff when there is no cost in doing so. In addition, children born in years of low rainfall, which is associated with higher rates of flooding and epidemics in this region, were more likely to choose socially efficient options and were less averse to inequality, especially when it was

[7] We use NOAA data as it is the only source of precipitation data at a level of precision (0.1 degree) sufficient to generate spatial variation in rainfall within our sample.
[8] Result not shown.

advantageous to them. When we consider sub-samples by treatment, the decrease in aversion to advantageous inequality associated with low rainfall is most pronounced in the in-group treatment. We find consistent results for exposure to improved water sources.

These results are very similar to the effect of age in our sample. Previous studies that examine the development of social preferences in children find an increase in aversion to inequality around pre-school age and then a shift towards preferences for altruism, social efficiency and personal gain as they approach adolescence (Fehr et al., 2011; Almas et al., 2010, Bauer et al., 2012). Our results demonstrate that the rate of non-cognitive development is influenced by health in infancy and early childhood in much the same way as cognitive and physical development are (Berkman, 2002; Maccini and Yang, 2009). The fact that we see a relationship between rainfall shocks and height-for-age among our subjects provides further support for this link.

While previous studies have failed to identify a link between health and social preferences in children, our research differs from these experiments in that we study a population that has more variation in health outcomes and is more susceptible to environmental shocks, which makes it possible to identify exogenous changes in health.

There are a few mechanisms by which health might affect social preferences: by directly influencing non-cognitive development; through cognitive development, whereby more intelligent children are better able to predict emotional states of others and recognize efficiency; or through socialization, if healthier children spend more time with peers. We use data on children's grades and missed tests to attempt to identify these channels and do not find a link between academic success or attendance and health shocks. These are not very precise measures, however, and this remains an open question that warrants further research.

The findings presented here have implications on a couple of levels. Firstly, providing evidence of a link between health and the acquisition of social preferences contributes to the field of behavioral and experimental economics. Our results help to explain variations both between individuals within societies and across age groups that have been observed in previous studies. Secondly, these results show that health can have an effect on non-cognitive development, which has implications for the provision of health services, especially in developing settings. The social preferences that we find to be influenced by health are linked to more efficient economic outcomes.

References

Akresh, Richard; Emilie Bagby; Damien de Walque and Harounan Kazianga. 2012. "Child Labor, Schooling, and Child Ability," World Bank Policy Research Working Paper 5965, The World Bank Development Research Group, Human Development and Public Services Team, February 2012.

Almas, Ingvild Alexander Cappelen; Erik Sørensen; and Bertil Tungodden. 2010. "Fairness and the Development of Inequality Acceptance," *Science* 328, p1176.

Baird, Sarah; Hicks, John Amory; Kremer, Michael and Miguel, Edward. 2011. "Worms at Work: Long-run Impacts of Child Deworming in Kenya," Poverty Action Lab Working Paper.

Bartling, Björn; Ernst Fehr, and Daniel Schunk. 2011. "Health Effects on Willingness to Compete," forthcoming in *Experimental Economics.*

Bauer, Michal; Alessandra Cassar; Julie Chytilova, and Joseph Henrich, 2011. "Warfare experience during Ontogeny Increases Egalitarian and Parochial Motivations." mimeo.

Bauer, Michal; Julie Chytilova and Barbora Pertold-Gebicka. 2012. " Parental Background and Other-regarding Preferences in Children." IZA Discussion Paper No. 6026 (R&R in Experimental Economics).

Berkman, Douglas; Lescano, Andres; Gilman, Robert; Lopez, Sonia; Black, Maureen. 2002. "Effects of stunting, diarrhoeal disease and parasitic infection during infancy on cognition in late childhood: a follow-up study", *The Lancet*, Vol. 359., February 16, 2002, pp.564-571.

Capara, Gian Vittorio; Claudio Barbaranelli; Concetta Patorelli; Philip G. Zimbardo. 2000. "Prosocial Foundations of Children's Academic Achievement," *Pyschological Science,* Vol.11 No.4, pp.302-306.

Cardenas, Juan Camilo and Carpenter, Jeffrey. 2006. "Behavioural Development Economics: Lessons from Field Labs in the Developing World," *Development Studies,* 44:3, 311-338.

Case, A., A. Fertig, and C. Paxson. 2005. "The Lasting Impact of Childhood Health and Circumstance," *Journal of Health Economics*, 24, 365-89.

Charness, Gary and Matthew Rabin. 2002. "Understanding Social Preferences with Simple Tests," *Quarterly Journal of Economics*, August 2002, pp.817-869.

Choi, J.K., and S. Bowles. 2007. *"The Coevolution of Parochial Altruism and War" Science 318(5850): 636-640.*

Croson, Rachel and Uri Gneezy. 2009. "Gender Differences in Preferences," *Journal of*

Economic Literature, 47:2, pp.1-27.

EM-DAT: The OFDA/CRED International Disaster Database –www.emdat.be – Université Catholique de Louvain – Brussels – Belgium.

Fehr, Ernst and Karla Hoff. 2011. “Introduction: Tastes, Castes and Culture: The Influence of Society on Preferences,” *The Economic Journal*, 121(November), pp.F396-F412.

Fehr, Ernst and Klaus E. Schmidt. 1999. “A Theory of Fairness Competition and Cooperation,” *The Quarterly Journal of Economics*, August 1999, pp.817-868.

Fehr, Ernst; Helen Bernhard and Bettina Rockenbach. 2008. Egalitarianism in young children, Nature, Vol 454 no.28, pp.1079-1084.

Fehr, Ernst; Daniela Rutzler and Matthias Sutter. 2011. “The Development of Egalitarianism, Altruism, Spite and Parochialism in Childhood and Adolescence. IZA Discussion Paper No. 5530, February 2011.

Fehr, Ernst and Urs Fischbacher. 2003. “The Nature of Human Altruism,” *Nature*, 425:23, pp.785-791.

Fershtman, C. and U. Gneezy. 2001. "Discrimination in a Segmented Society: An Experimental Approach," *The Quarterly Journal of Economics*, MIT Press, vol. 116(1), pages 351-377.

Harbaugh William T.; Krause, Kate and Steven G. Liday, 2002. "Bargaining by Children," University of Oregon Economics Department Working Papers 2002-04, University of Oregon Economics Department, revised 20 Jul 2002

Habyarimana, James; Humphreys, Macartan; Posner, Daniel and Weinstein, Jeremy. 2007. “Why Does Ethnic Diversity Undermine Public Goods Provision,” *American Political Science Review*, Vol. 101 No.4, pp.709-725.

Henrich, Joseph; McElreath, Richard; Barr, Abigail; Ensminger, Jean; Barrett, Clark; Bolyanatz, Alexander; Cardenas, Juan Camilo; Gurven, Michael; Gwako, Edwins; Henrich, Natalie; Lesorogol, Carolyn; Marlowe, Frank; Tracer, David and John Ziker. 2006. “Costly Punishment Across Human Societies,” *Science* Vol.312, No.1767, pp. pp.1767-1770.

List, John A. 2007. “On the Interpretation of Giving in Dictator Games,” *Journal of Political Economy*, Vol. 115 No.3, pp.282-493.

Maccini, Sharon and Dean Yang. 2009. “Under the Weather: Health, Schooling, and Economic Consequences of Early-Life Rainfall,” *American Economic Review*, 99:3, pp. 1006-1026.

Miguel, Edward and Michael Kremer. 2004. Worms: Identifying Impacts on Education and Health in the Presence of Treatment Externalities, *Econometrica*, Vol.72 No.1, pp.159-217.

Millett, Bryce and Manisha Shah. 2012. “Effects of In-Utero Shocks on Cognitive Test Scores: Evidence from Droughts in India,” PacDev 2012, UC Davis: http://i.pacdev.ucdavis.edu/files/conference-schedule/session/papers/Shah_pacdev.pdf

Slaughter, Virginia; Michelle J. Dennis and Michelle Pritchard. 2002. “Theory of mind and peer acceptance in preschool children,” *British Journal of Developmental Psychology*, 20, 545-564.

Thai, Thuan Q. and Evangelos M. Falaris. 2011. “Child Schooling, Child Health and Rainfall Shocks: Evidence from Rural Vietnam,” Max Planck Institute of Demographic Research Working Paper.

Vidmar, Suzanna; John Carlin and Kylie Hesketh. 2004. “Standarizing anthropometric measures in children and adolescents with new functions for egen,” *The Stata Journal*, Vol.4 No.1, pp.50-55.

Voors, M.J., Nillesen, E.E.M., Bulte, E.H., Lensink, B.W., Verwimp, P. and Soest, D.P. van. 2012. “Violent conflict and behavior: A field experiment in Burundi,” *American Economic Review*, 102(2), 941-64 l.

Figure 1. Mean rainfall by year

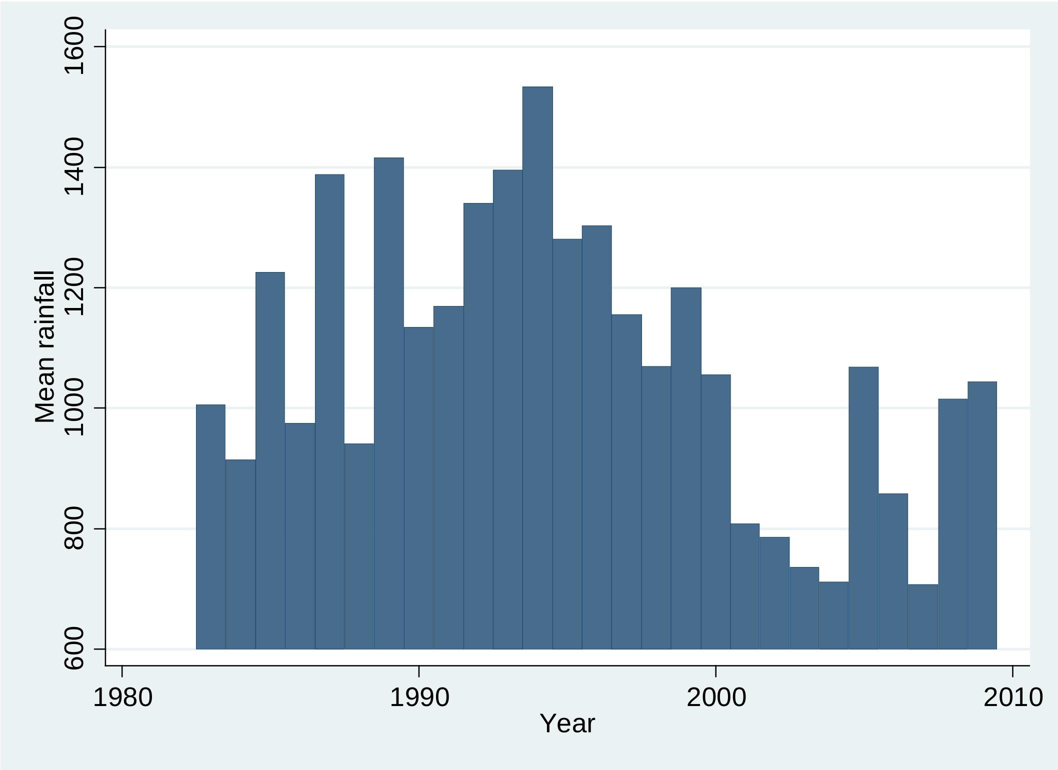

Figure 2. Rainfall and height for age

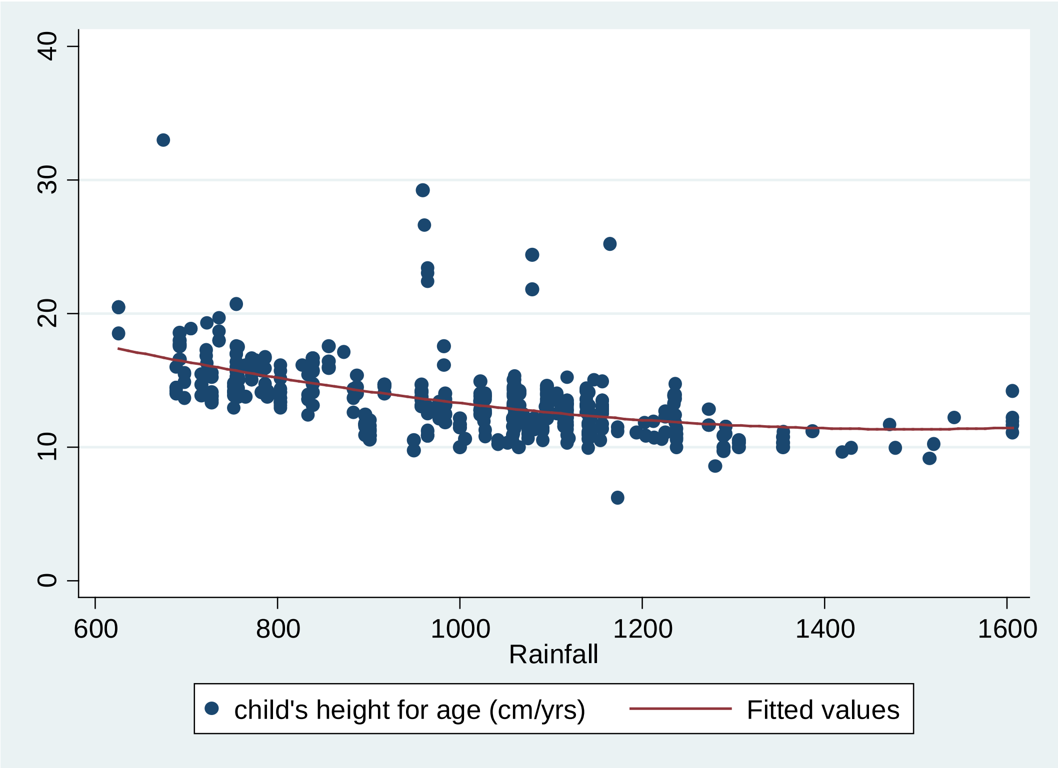

Table 1: Experimental results (children)

	Games				Frequency (children)
	Pro-social (1,1)/(1,0)	Envy (1,1)/(1,2)	Sharing (1,1)/(2,0)	Spite (1,1)/(2,3)	Overall
Pro-social	(1,1)	--	--	--	0.60
Envious	--	(1,1)	--	--	0.49
Sharing	--	--	(1,1)	--	0.32
Spiteful	--	--	-	(1,1)	0.29
Socially efficient	(1,1)	(1,2)	--	(2,3)	0.25
Weakly generous	(1,1)	(1,2)	(2,0)	(2,3)	0.16
Strongly generous	(1,1)	(1,2)	(1,1)	(2,3)	0.09
Homo economicus	--	--	(2,0)	(2,3)	0.19
Strongly Spiteful	(1,0)	(1,1)	(2,0)	(1,1)	0.05
Weakly spiteful	(1,0)	(1,1)	(2,0)	(2,3)	0.11
Strongly inequality averse	(1,1)	(1,1)	(1,1)	(1,1)	0.04
Ahead averse	(1,1)	--	(1,1)	--	0.20
Behind averse	--	(1,1)	--	(1,1)	0.16
N=					473

Table 2: Summary statistics.

	Mean	sd
Child characteristics		
Age	10	(2.23)
Female	.49	(.5)
Number of siblings	3.34	(1.71)
Knows war	.78	(.41)
Parent and household characteristics		
Age	40	(13.68)
Female	.67	(.46)
Mother	.51	(.5)
Father	.19	(.39)
Muslim	.61	(.48)
Temne	.61	(.48)
Attended school	.29	(.43)
HH size	9.18	(4.63)
Total weekly expenditure per capita (000 Leones)	49.59	(59.01)
Own radio	.59	(.49)
Own land	.77	(.41)
Farmer	.72	(.44)
Number of community meetings attended	5.87	(4.51)
Suffered water-related health shock	.49	(.5)
Forced to flee during war	.84	(.35)
Count of war exposure	5.17	(1.78)
Village characteristics (n=21)		
Number of HHs	157.51	(111.11)
Distance to town	5.37	(3.04)
Distance to paved road	4.6	(8.00)
Daily market	.28	(.45)
Health center	.38	(.48)
Number of water sources	4.1	(1.6)
Number of improved water sources	1.81	(1.04)
Children abducted during war	.84	(.36)
Women abducted during war	.61	(.48)

Table 3. Effect of positive rainfall shocks on children's preferences.

Dependent variable	Pro-social	Envious	Sharing	Spiteful	Socially efficient	Weakly generous	Homo economicus	Ahead averse	Behind averse
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Rainfall shock around birth	0.023	-0.053	-0.363***	-0.167	0.197	0.270*	0.277**	-0.328**	-0.151
	(0.127)	(0.126)	(0.132)	(0.133)	(0.139)	(0.154)	(0.127)	(0.144)	(0.150)
Female	0.183	-0.011	0.196	-0.047	0.089	-0.153	-0.037	0.194	-0.117
	(0.115)	(0.114)	(0.119)	(0.123)	(0.124)	(0.139)	(0.115)	(0.130)	(0.140)
Ingroup treatment	0.125	0.055	0.043	0.200	-0.186	-0.116	-0.129	0.046	0.019
	(0.115)	(0.114)	(0.119)	(0.123)	(0.124)	(0.138)	(0.114)	(0.130)	(0.139)
Age	-0.036	0.002	-0.057*	-0.063**	0.034	0.017	0.062**	-0.059*	-0.042
	(0.029)	(0.028)	(0.029)	(0.031)	(0.030)	(0.033)	(0.029)	(0.031)	(0.035)
Number of siblings	0.021	-0.056	0.034	0.023	0.034	0.033	-0.049	0.018	-0.014
	(0.036)	(0.036)	(0.035)	(0.035)	(0.033)	(0.033)	(0.035)	(0.036)	(0.043)
Total hh expenditure per capita	-0.000	0.000	0.000	-0.001	0.000	0.001	0.001	-0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	0.395	0.121	-0.025	-0.066	-1.200***	-1.318***	-0.441	-0.279	-0.507
	(0.340)	(0.333)	(0.340)	(0.356)	(0.352)	(0.391)	(0.334)	(0.359)	(0.410)
Village fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Obs	491	491	491	491	491	491	491	491	491
Pseudo R-squared	0.010	0.004	0.018	0.015	0.010	0.014	0.016	0.018	0.007

Table 4. Effect of positive rainfall shocks on children's preferences: by treatment.

Dependent variable	Pro-social	Envy	Sharing	Spite	Socially efficient	Weakly generous	Homo economicus	Ahead averse	Behind averse
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Ingroup									
Rainfall shock around birth	-0.129	0.092	-0.454**	0.012	0.178	0.330	0.227	-0.408**	0.083
	(0.184)	(0.177)	(0.188)	(0.184)	(0.199)	(0.228)	(0.178)	(0.206)	(0.209)
Number of Obs.	250	250	250	250	250	250	250	250	250
Outgroup									
Rainfall shock around birth	0.170	-0.195	-0.283	-0.362*	0.213	0.214	0.330*	-0.251	-0.349
	(0.182)	(0.181)	(0.190)	(0.197)	(0.197)	(0.211)	(0.181)	(0.210)	(0.220)
Number of Obs.	241	241	241	241	241	241	241	241	241

Note. Probit regression, marginal effects shown. Robust standard errors in parentheses.
Regressions control for age, gender, number of siblings, total hh income per capita, and village fixed-effects.
* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5. Effect of age exposed to improved water source on childre's preferences: improved water source users only.

Dependent variable	Pro-social	Envy	Sharing	Spite	Socially efficient	Weakly generous	Homo economicus	Ahead averse	Behind averse
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Age exposed to WS	-0.148***	0.010	-0.044	0.003	-0.100*	-0.158**	0.020	-0.032	0.030
	(0.051)	(0.045)	(0.045)	(0.048)	(0.051)	(0.073)	(0.048)	(0.057)	(0.049)
Female	0.504**	0.177	0.080	-0.463*	0.222	0.005	0.194	0.199	-0.513*
	(0.235)	(0.213)	(0.224)	(0.237)	(0.260)	(0.313)	(0.223)	(0.270)	(0.269)
Age	-0.010	0.004	0.070	-0.016	0.053	0.115	-0.035	-0.132	0.042
	(0.077)	(0.076)	(0.078)	(0.087)	(0.081)	(0.106)	(0.073)	(0.092)	(0.103)
Number of siblings	0.127	-0.045	0.055	0.046	0.052	0.044	-0.119	0.114	-0.168*
	(0.087)	(0.072)	(0.075)	(0.091)	(0.068)	(0.089)	(0.074)	(0.087)	(0.097)
Total hh income per capita	-0.002	0.002	0.001	0.001	-0.000	-0.001	0.001	0.001	0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)
Water source characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Parent/hh characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Village fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	5.390***	-1.193	-2.866	-4.638**	-1.431	4.050*	4.007**	-4.661*	-2.235
	(2.083)	(1.764)	(1.820)	(1.880)	(1.937)	(2.436)	(1.809)	(2.543)	(2.092)
Number of Obs	173	179	172	179	152	152	172	139	172
Pseudo R-squared	0.270	0.110	0.087	0.183	0.216	0.279	0.101	0.183	0.186

Note. Probit model. Marginal effects shown. Robust standard errors in parentheses. Water source characteristics: number of hhs using the source, and distance from the source to the centre. Parent and hh characteristics: age, gender, religion, ethnicity, education, membership of community organizations, trust, discount rate and generosity. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 6. Effect of rainfall shocks on health and education.

Dependent variable	Height-for-age z-score			Share of tests missed			Sum of grades		
	All	Girls	Boys	All	Girls	Boys	All	Girls	Boys
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Rainfall shock around birth	0.4685	0.4926	0.4229	0.0083	0.0286	-0.0095	-11.9643	-22.7314	-48.648
	(0.1344)**	(0.1930)*	(0.1905)*	(0.0238)	(0.0315)	(0.0366)	(20.5796)	(28.6994)	(29.5584)
Female	0.2920			-0.0442			0.9499		
	(0.1341)*			(0.0240)			(20.5626)		
Ingroup treatment	-0.0446	-0.1767	0.0924	0.0034	0.0101	-0.0003	-21.5927	-16.7379	-25.3928
	(0.1350)	(0.1908)	(0.1926)	(0.0242)	(0.0322)	(0.0361)	(20.8442)	(29.1765)	(28.9732)
Number of siblings	-0.0284	0.0848	-0.1133	0.0011	-0.0073	0.0077	-0.4461	4.8489	-4.1472
	(0.0406)	(0.0546)	(0.0588)	(0.0069)	(0.0086)	(0.0103)	(6.3140)	(9.2237)	(8.6758)
Total hh expenditure per capita	-0.0013	-0.0018	-0.0008	-0.0004	-0.0003	-0.0005	0.3019	-0.1450	0.6079
	(0.0011)	(0.0018)	(0.0013)	(0.0002)**	(0.0002)	(0.0002)*	(0.1552)	(0.2235)	(0.2145)**
Village fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Obs.	428	207	221	334	171	163	334	171	163
R-squared	0.05	0.05	0.05	0.02	0.01	0.02	0.01	0.01	0.05

Note. Linear regression. Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 7. Placebo test: effect of rainfall shocks before children's year of birth.

Dependent variable	Pro-social	Envy	Sharing	Spite	Socially efficient	Weakly generous	Homo economicus	Ahead averse	Behind averse
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Rainfall shock around birth	-0.323**	0.011	0.188	0.223	-0.250	-0.294	-0.191	-0.031	0.175
	(0.143)	(0.142)	(0.146)	(0.151)	(0.163)	(0.187)	(0.142)	(0.162)	(0.165)
Female	0.166	-0.009	0.171	-0.053	0.081	-0.155	-0.023	0.163	-0.124
	(0.116)	(0.114)	(0.119)	(0.123)	(0.124)	(0.138)	(0.114)	(0.129)	(0.140)
Ingroup	0.131	0.048	0.031	0.195	-0.169	-0.091	-0.120	0.035	0.015
	(0.116)	(0.114)	(0.119)	(0.123)	(0.124)	(0.137)	(0.114)	(0.129)	(0.139)
Age	-0.048*	0.002	-0.014	-0.036	0.009	-0.019	0.024	-0.032	-0.018
	(0.028)	(0.027)	(0.029)	(0.031)	(0.030)	(0.033)	(0.027)	(0.032)	(0.035)
Number of siblings	0.018	-0.053	0.036	0.023	0.028	0.027	-0.050	0.020	-0.016
	(0.036)	(0.036)	(0.035)	(0.035)	(0.033)	(0.033)	(0.035)	(0.036)	(0.042)
Total hh expenditure per capita	-0.001	0.000	0.000	-0.001	0.000	0.001	0.001	-0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	0.622**	0.081	-0.628*	-0.454	-0.790**	-0.768**	0.084	-0.654*	-0.837**
	(0.313)	(0.313)	(0.323)	(0.346)	(0.331)	(0.365)	(0.311)	(0.359)	(0.399)
Number of Obs	490	490	490	490	490	490	490	490	490
Pseudo R-squared	0.017	0.004	0.008	0.016	0.011	0.013	0.011	0.007	0.007

Note. Probit regression. Marginal effects shown. Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

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