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Like mother like son? Experimental evidence on the transmission of values from parents to children☆

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ABSTRACT

This paper studies whether prosocial values are transmitted from parents to their children. We do so through an economic experiment in which children and their parents play a standard public goods game. The experimental data presents us with a surprising result. While we find significant heterogeneity in cooperative preferences in both parents and children, we cannot reject the null that the correlation between the degree of cooperation of a child and that of his or her parent is zero. That is, there is lack of evidence in our data that prosocial values are transmitted from parents to children. This finding is robust to the inclusion of demographic and socio-economic controls. Finally, parents show a significant degree of conditional cooperation, thus confirming the results of the existing experimental literature; such conditional cooperation is however absent in children.

1. Introduction

A large and growing literature has found that cultural traits and values, such as trust, the propensity to cooperate and that to free-ride on others are important determinants of economic outcomes, such as growth, economic development and international trade.[1]

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[1] Cultural differences across countries have been considered an important determinant of differences in economic growth rates (Putnam et al., 1994; La Porta et al., 1997; Knack and Keefer, 1997; Zak and Knack, 2001; Tabellini, 2010), trade flows (Fershtman and Gneezy, 2001; Guiso et al., 2009; Bornhorst et al., 2010) and financial development (Guiso et al., 2005).

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But where do these differences in attitudes come from? Social scientists generally view the family as a potentially important determinant of individual personality, beliefs and values. In particular, a large part of the psychological literature is devoted to understand better the extent and channels of family influence. This literature has not reached robust conclusions regarding the effect of parenting. On the one hand, Eisenberg and Mussen (1989) suggest that if parents are nurturing, generous and altruistic, their children may develop prosocial behavior, by adopting these characteristics through identification. On the other hand, in her review of developmental behavioral genetics, Harris (1995) suggests that the socialization processes that most influence individual behavior are not the result of learning from one's parents, but take place primarily in childhood and adolescence peer groups.[2]

In the theoretical economic literature on the transmission of values, several economic models assume that the family is the primary locus of values transmission, posing that parents act consciously to socialize their children to particular cultural traits. For instance, in Bisin and Verdier (2000) the intergenerational transmission of cultural traits happens as a result of family socialization and intragroup marriages. Bisin and Verdier (2001) study the long-run pattern of preferences in the population, in a model where parents socialize and transmit their preferences to their offspring. Corneo and Jeanne (2010) develop a theory of occupational choice in a model where values are endogenous and taught by parents to their children. Doepke and Zilibotti (2005) explain the economic decline of the aristocracy during the industrial revolution with a model where altruistic parents can affect their offspring's degree of patience.

Although the assumption that values relevant for economic behavior are transmitted from parents to children is pervasive in the theoretical economics literature, the empirical evidence on it is almost nonexistent. Our paper tries to start filling this gap, by gathering experimental data on Hispanic and African American parents and children from a public school in Washington, DC.

In the experiment, we study whether the propensity to cooperate is transmitted from parents to their children by having them play a standard public goods game: each subject is given a money endowment and asked to share it between him or herself and a group fund. We take the contribution of an individual to the group as an indicator of his or her "prosociality," i.e., a reflection of his or her values regarding the importance of contributing to the common good. We would expect altruistic people to contribute to the group fund, and self-interested subjects to free-ride. We measure the correlation between the prosociality of a parent and that of his or her child, in order to gauge the extent to which it is transmitted across generations.[3] If self-interest is a family-transmitted value, we would expect a positive correlation between the behavior of parents and their children during the game.

There is a very large experimental literature on public goods games.[4] The experiments, mainly run with US undergraduate students, tend to show that contributions range between one-third and two-third of the endowment. These results are usually interpreted as a proof that subjects' choices are partially determined by altruism. The experimental literature on children's behavior is, instead, relatively recent. Harbaugh and Krause (2000) have contrasted the behavior of children with that of adults, and found a similar level of contribution. Peters et al. (2004) found that both parents and children contributed more to a public good fund when their group consisted of family members than when the group consisted of strangers. Ours is the first paper to study the correlation between the behavior of children and that of their parents in an experimental setup.

In the analysis of the experimental data, we focus on individual contributions following Fischbacher and Gachter (2010), who show that both heterogeneity of attitudes toward cooperation and the response to other subjects' behavior in the experiment (what the authors call conditional cooperation) are important to explain individual contributions in a public good game. We follow their specification in studying parents' and children's behavior, adding parents' behavior as an explanatory variable for children's contributions to test whether attitudes toward cooperation are transmitted within the family.

The experimental data presented us with surprising results. We cannot reject the null of no correlation between the degree of cooperation of a child and that of his or her parent at all conventional significant levels. That is, there is lack of evidence in our data that prosocial values are transmitted from parents to children. The lack of significant correlation between parents and children's behavior goes against the view that individual values are primarily the outcome of a simple process of transmission from the parents to their children (at least for those in our age group), and is more consistent with the views of Harris (1995) than those of Eisenberg and Mussen (1989). At least in the African American and Hispanic populations, there is no evidence that the socialization processes that matter for economic behavior takes place inside the family. Further research is needed to gauge whether this result extends to other populations within the US (e.g., the white majority) and to other countries, and whether there are other socializing factors (e.g., peer groups) that are important for the determination of individual values.

The lack of evidence in favor of transmission may be due to the fact that the family is not the primary agent of socialization or to limitations arising from the use of abstract experiments to assess the transmission of preferences from parent to child. Nevertheless, since the fact that values are transmitted from parents to children is an unchallenged assumption in the

[2] In the political science literature, Hyman (1959) has argued that the family is the primary agent of political socialization. Through an empirical analysis, Jennings and Niemi (1968) find that the correlation in political values between children and their parents is strong on concrete issues (such as allowing prayers in schools), but almost zero on more abstract ones (such as party affiliation).

[3] Note that our work focuses on the similarity of behavior between parents and children (measured as the outcome of a public goods game) rather than on the mechanism of "transmission" itself. Nevertheless, the lack of correlation between the behavior of parents and that of their children (which is the main result of the paper) suggests that the transmission of prosocial attitudes from parents is not significant.

[4] For a review of these experiments see Ledyard (1995).

Table 1
Number of subjects by session.

Sessions	Subjects	Groups
1	18	5
2	8	3
3	12	3

theoretical economic literature, showing that there is no evidence of transmission of pro-social attitudes in a simple public goods game is an important piece of empirical evidence, and a call for future work on the topic.

Our paper is the first to illustrate how experimental games can be designed to study the transmission of values across generations. Alternatively, the extent of the intergenerational transmission of values can also be estimated by gathering survey data. For instance, in a recent paper, Dohmen et al. (2012) report that children's trusting behavior, as measured by a survey, is strongly correlated to that of their parents.[5] Our experiment adds additional evidence to this debate. The difference between their results and ours could be due to several competing reasons. First, the empirical evidence on whether surveys and experimental games capture the same individual characteristics is mixed;[6] this may be the case because in surveys, as opposed to experiments, subjects are not remunerated (and therefore have no incentive) to choose what they consider to be the best answer.

Second, whereas we concentrate on the transmission of attitudes toward cooperation between parents and young children (we ran the experiment in a public elementary school), in Dohmen et al.'s survey children are much older (their average age is 23).[7] On the one hand, it is possible that the transmission of cultural traits across generations happens when children are young adults; on the other hand, it is also possible that whatever correlation exists between adult children and parents, is not due to parents' influence over their children, but to the fact that children's socialization outside the family nevertheless happens within the same community in which their parents live.

Third, our experimental sample is constituted by African American and Hispanic families, whereas Dohmen et al.'s survey is representative of the German population. As we wrote above, it is possible that the degree to which values are transmitted across generations changes across countries, ethnicities and levels of income.[8]

The paper is structured as follows. Section 2 presents the main features of our experiment, Section 3 reports our results, Section 4 concludes.

2. The experiment

2.1. Recruitment and sample description

The families participating in the experiment were recruited at Bruce Monroe Elementary School, a public elementary school in Washington, DC. A parent meeting takes place each week at Bruce Monroe from 8:30 a.m. to 10:30 a.m.; all parents in the school can attend the meeting. Before each session of the experiment, the children–parents coordinator advertised the experiment distributing flyers in class and calling parents from the school list. After the parents had played the game, we gathered the children from their classes and ran the experiment with them.

We attended three parent meetings and were able to recruit 76 subjects, 38 children and 38 parents. A breakdown of the three sessions is presented in Table 1. All the parents were mothers, except for one father.[9] Moreover, one of the parents was the child's grandmother, whom we accepted in the experiment because she raised her grandchild.

Before running the experiment, we asked parents to fill out a questionnaire where we gathered information about their demographic characteristics and those of their children. Table 2 presents descriptive statistics for our sample. Seventy-six percent of subjects are Hispanics and the rest African Americans. This reflects the fact that the vast majority of the students at Bruce Monroe are either Hispanic (about 50 percent) or African-American (in total those two ethnicities constitute 98 percent of the student body).

The parents' average age is 37 years and ranges between 24 and 63. Fifty percent of them are married, twenty-six percent are single mothers and the rest are divorced, widowed or separated. The average number of children in each family is

[5] Dohmen et al. (2012) also report a positive association between parents' and adult children's levels of risk aversion; similar results regarding the transmission of risk-taking behavior between parents and adult children have been found by Charles and Hurst (2003).

[6] Glaeser et al. (2000) find that survey-based measures of trusting attitudes are not significantly related to individual behavior in a trust game; in contrast, Anderson et al. (2004) find that survey-based attitudinal or behavioral measures of trust are significant determinants of contribution levels in a canonical public-goods experiment.

[7] Similarly, Fernandez et al. (2004) and Knowles and Postlewaite (2005) have found evidence of family transmission respectively of individual preferences for mates and of consumption versus savings by comparing the behavior or parents with that of their adult children. These papers look at individual level data (e.g., in the case of Fernandez et al.'s paper, whether the wives of those whose mothers are workers work) in order to gauge the intergenerational transmission of cultural preferences.

[8] For instance, Henrich et al. (2001) found that there is considerable variability in the degree of altruism, as measured by dictator, ultimatum or public games among 15 small-scale tribal societies.

[9] We tested the robustness of our results to the exclusion of the father; none of our results is affected in a significant way.

Table 2
Summary statistics.

	Mean/proportion	St. dev.	Min	Max	Obs.
Children					
Grade, from 0 (Pre-K) to 6	2.684	1.923	0	6	38
Girls	0.395	0.489	0	1	38
Hispanic	0.763	0.426	0	1	38
Parents					
Age	36.68	8.819	24	63	38
Female	0.974	0.160	0	1	38
Married	0.50	0.500	0	1	38
Never married	0.263	0.441	0	1	38
Divorced, widowed or separated	0.237	0.426	0	1	38
Number of children	3.263	1.870	1	10	38
Religious	0.842	0.365	0	1	38

relatively high (3.26), ranging from a minimum of 1 to a maximum of 10. Both the relatively low percentage of married families and the relatively high number of children are in line with the demographic characteristics of African American and Hispanic families in the United States. Finally, 84% of the parents indicate that they follow a religion.

As for the children, 40 percent of them are girls. The children's level of education goes from zero (Pre-K) to sixth grade; the average school grade is 2.68.

2.2. The game

We run a standard public goods game. In a public goods game, subjects are put into groups of size n and endowed with an initial amount of tokens. Subjects need to choose whether to keep those tokens for themselves or to contribute to the group fund. Contributions to the group are multiplied by a parameter, a, which is greater than one and less than n, and then divided equally among the group members. The marginal private return to a contribution is the ratio $a/n < 1$. The socially optimal solution is to contribute the full endowment to the group fund since a is greater than one, whereas the dominant strategy for self-interested subjects is to contribute nothing, as a is smaller than n.

In our experiment, we chose $a = 2$ and assigned people to groups of four subjects (this implies a marginal private return of 1/2).[10] The assignment of subjects to different groups was done automatically by the computer and subjects were not told to which group they belonged. When the number of subjects was not divisible by 4, we constructed a "synthetic" group, using the decisions of randomly selected members of another group.[11] To ensure that the behavior of parents and children is comparable, each subject's group in the children's session had the same composition as the subject's group in the parents' session.[12]

Note that we chose to run our experiment with a public goods game (as opposed to, say, a trust game or a dictator game) because this offered some advantages to the experimentalist. First, public goods games have been used before with children and in families, which gave us natural benchmarks of comparison in the literature. Second, a public goods game is symmetric (in the sense that everyone plays the same game)[13] and can easily be repeated in several rounds, which is useful to generate more data given the constraint on the number of subjects.

2.3. Implementation

We ran three sessions of the experiment. Over the three sessions, all the parameters were kept the same (number of tokens, marginal private return, number of rounds and number of subjects per group). Nevertheless, since the number of parents participating in the meeting varied from one meeting to the other, the number of groups changed over the three sessions. Note that we did not allow a parent-child pair to participate in more than one session of the experiment.[14] The

[10] In the linear public goods game literature there is a variety of choices with respect to a and n. Our choices of $a = 2$ and $n = 4$ are somewhat middle of the ground.

[11] There was one synthetic group (with one actual subject) in the first session, two synthetic groups (with three and one actual subject respectively) in the second session; there was no synthetic group in the third session. We had two synthetic groups in the second session because, after reading the instructions but before starting the game, one of the parents realized she would have had to leave in the middle of the game. One must notice that the contributions of the synthetic groups' virtual members did not respond to the other subject's (or subjects') behavior in the same way as in a regular group. Because of this difference between synthetic and regular groups, we test the robustness of our results to the exclusion of synthetic groups. Excluding synthetic groups reduces the number of subjects from 76 to 64.

[12] That is, the children of two parents playing in the same group also play in the same group. However, we took care of not reproducing the same seating arrangement with the children as with their parents.

[13] By contrast, for instance, a trust game has two types of players, the sender and the receiver, which reduces the data on which it is possible to compute the correlation.

[14] That is, a parent was not allowed to participate twice with two different children. Moreover, if a parent participated in a session, the other parent was not allowed to participate in another session with a sibling.

Table 3
Parents' contributions-descriptive statistics.

	Mean	St. dev.	Min	Max	Obs.
Parents					
Tokens shared, first round	2.76	0.998	1	4	38
Tokens shared, last round	2.95	1.469	0	5	38
Tokens shared, all rounds	2.90	1.346	0	5	38

three sessions took place on three different days. In a given day, we ran the experiment with the parents first and then with their children.

Each session took approximately 2 h. The experiment was run in the following way:

- Before starting the game, parents filled out a simple questionnaire. The questionnaire contained basic demographic questions (age, race, marital status, family composition, etc.).
- The subjects were assigned a number. The number determined the group to which a subject belonged. Subjects remained in the same group throughout the sessions and were not told to which group they belonged.
- We read the instructions aloud.[15] We read the same instructions to the parents and to the children. As standard in the experimental literature with children,[16] the instructions (available from the authors) were somewhat longer and contained more examples than those usually read in a public goods game.
- The explanation of the rules, which included both the reading of the instructions and several mock simulations of the game played by the experimenters, took an average of 40 min. After reading the instructions, we asked the subjects whether they had questions and offered to answer them in private.
- After explaining the game, subjects were seated and separated by partitions so that their actions would remain confidential. In his or her position, each subject had an envelope and a cup, both bearing the subject's number. The envelope was used for the tokens that the subjects wanted to share. The cup for the tokens (s)he wanted to keep for him(her)self.
- We gave each subject 5 tokens. Then we told the subjects to decide how many tokens they wanted to share and put them in the envelope.
- After subjects had made their choices, we collected the envelopes, computed the payoffs and returned the earnings to the subjects.[17]
- We then distributed 5 new tokens to each subject and started a new round. The game was repeated 10 times.

Obviously, as noted by Harbaugh and Krause (2000), confusion is always a concern in experiments with children. We followed their procedures in order to make the game as understandable as possible to children. In particular, we emphasized that contributing would lead less for each child, but more for the group; and that if everyone contributed, everyone was better off. Moreover, as in Harbaugh and Krause (2000), we acted out different scenarios, showing what happened if everyone contributed everything, nothing, or only two tokens out of four.

Overall, subjects received 50 tokens; therefore, if everyone behaved cooperatively, the maximum possible gain was 100 tokens. After the experiment, we exchanged tokens for money at the exchange rate of 20¢ per token for the parents and at the exchange rate of 10¢ per token for the children. Children were not given real money, but vouchers that they could use to "buy" toys at the end of the experiment from a toy stand we had set up. On average, parents earned almost $16 during the game; children almost $8 worth of toys.[18] Finally, parents received a show up fee of $12 and children a show-up fee of one extra-toy in addition to those that they could buy.

3. Results

The main goal of our paper is to look at the relationship between the behavior of a child and that of his or her parent. Before we do this, however, it is useful to characterize the behavior of parents and children separately, and compare it to the results that have been obtained in the literature on public goods games.

3.1. Parents' behavior

Table 3 shows the average parents' contribution across all rounds. We find that the average contribution over all rounds is 2.90 for parents, 58 percent of the maximum amount (5 tokens). These numbers are in line with the results obtained in

[15] The instructions to the parents were read aloud both in English and in Spanish since not all the parents could speak English fluently.
[16] See, e.g., Harbaugh and Krause (2000).
[17] In the experiment, we used red tokens. Sometime, we had to return a subject half a token; in this case we used a blue token for half of a red token.
[18] As a point of reference, the median household income in the school's zip code is $25,095, which translates into a gross income of $13 per hour for a fully employed person.

Table 4
Parents' per-round contribution regression.

	Dependent variable: parents' contribution							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Others' contribution ($t-1$)	0.125*	0.159**	0.131**	0.122*	0.121*	0.126*	0.126*	0.066**
	(0.058)	(0.062)	(0.057)	(0.056)	(0.059)	(0.059)	(0.058)	(0.027)
Parents' first round								0.711***
								(0.113)
Hispanic			−0.406					
			(0.300)					
Age				0.027**				
				(0.012)				
Married					0.247			
					(0.306)			
Number of children						0.090**		
						(0.035)		
Religiosity							0.194	
							(0.412)	
Observations	342	288	342	342	342	342	342	342
R^2	0.083	0.097	0.098	0.112	0.091	0.097	0.085	0.322

Notes: [1] Standard errors are clustered at the group level. [2] Column 2 excludes synthetic groups. [3] * Significant at 10%.; ** Significant at 5%; *** Significant at 1%.

the literature for similar games.[19] Therefore, our findings show that the degree of cooperative behavior in both Hispanic and African American subjects is not different to that measured in other experiments covering representative samples of the US population. This contrasts with survey evidence on the degree of prosociality in minority groups. For instance, using data from the General Social Survey, Alesina and La Ferrara (2002) find that the level of trust is lower in minorities (and in African Americans in particular). The difference between our results and theirs may be explained by the fact that minorities are reluctant to cooperate with whites (since there are no whites in our sample), but willing to cooperate with other minorities.

In studying parents' contributions, we follow the specification of Fischbacher and Gachter (2010). In their paper, the authors show that individual per-round contributions depend on the degree of conditional cooperation, i.e., the response to the cooperative behavior of the other subjects in the same group.[20]

Following their methodology, we estimate a panel regression of per-round parents' contributions on the contributions of the other parents in the group in the previous round (which is meant to capture the response to the behavior of others). The results are reported in Table 4 (column 1). The contribution by the other group members in the previous round is positive and significant, showing that parents in our sample exhibit the kind of "conditional cooperation" identified by Fischbacher and Gachter (2010).

In Table 4, column 2 we repeat the same specification excluding the synthetic groups whereas in columns 3–7, we include a series of demographic variables (race, age, marital status, number of children, and whether the parent is religious or not). The regression results do not change. Moreover, none of the demographic variables is significant, except for the parents' age (older parents contribute more than younger ones), and number of children (parents with larger families contribute more than parents with smaller families).

Following Fischbacher and Gachter (2010) we also studied whether there is heterogeneity in attitudes toward cooperation among the subjects in our sample. We do so by including as a dependent variable in the panel regression the parents' contributions in the first round. The regressor is meant to be a proxy of parental attitudes toward cooperative behavior.[21] As shown in Table 4 (column 8), the coefficient on the first round contribution is positive and significant,[22] showing that there is heterogeneity in parents' attitudes toward co-operation that affects their behavior throughout the game. The results are robust to the inclusion of demographic controls (see Table A1 in the Appendix).

[19] In his review of the literature on public goods games Ledyard (1995) reports that total contributions in public goods games similar to ours can be expected to lie between 40 percent and 60 percent of the maximum contribution. That the contributions in our sample are close to the high end of this range might be due to group solidarity: our subjects may know each other (the children study in the same school) and, although separated by partitions, play in the same room. Physical proximity and group solidarity are known to increase the average contribution (see, e.g., Orbell et al., 1988).

[20] We thank the editor for suggesting this approach.

[21] In Fischbacher and Gachter (2010), each subject's individual cooperation preference is measured through the contribution to a first game (what they call the P-experiment), which is followed by the main game in the experiment (the C-experiment). Because of data constraints, we use first-round contributions as a proxy for individual cooperation preferences.

[22] In this regression analysis and in those that follow, standard errors were clustered at the group level, and corrected for heteroskedasticity. Note that the choices of parents and children playing in the same session, but belonging to different groups, are assumed to be statistically independent, since there was no meaningful interaction between subjects belonging to different groups.

Table 5
Children's contributions-descriptive statistics.

	Mean	St. dev.	Min	Max	Obs.
Children					
Tokens shared, first round	2.39	1.534	0	5	38
Tokens shared, last round	2.73	2.023	0	5	38
Tokens shared, average	2.76	1.798	0	5	38

Table 6
Children's per-round contribution regression.

	Dependent variable: children's contribution							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Others' contribution ($t-1$)	0.003	0.071	−0.006	−0.021	−0.001	0.005	0.004	0.004
	(0.083)	(0.083)	(0.079)	(0.070)	(0.085)	(0.077)	(0.082)	(0.056)
Children's first round								0.488**
								(0.218)
Hispanic			0.478					
			(0.391)					
Grade				−0.162				
				(0.099)				
Boy					−0.202			
					(0.457)			
Number of children						−0.156		
						(0.087)		
Religiosity							−0.105	
							(0.251)	
Observations	342	288	342	342	342	342	342	342
R^2	0.000	0.015	0.012	0.028	0.003	0.025	0.000	0.165

Notes: [1] Standard errors are clustered at the group level. [2] Column 2 excludes synthetic groups. [3] * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

3.2. Children's behavior

As Table 5 shows, the average children contribution across all rounds is 2.76, 55 percent of the maximum amount (five tokens). The difference between the children's average contribution and the parents' average contribution is not statistically significant at the 10 percent level, using a Mann–Whitney test (p-value 0.57). This is consistent with Harbaugh and Krause's (2000) finding that the level of altruistic behavior in children is similar to that of adults. The contribution of the children over the course of the game, however, is more variable than that of their parents, both in the cross-section and over time; the average standard deviation of contributions over the ten rounds is 1.08 for children and 0.80 for parents.[23] Moreover, there is a difference between parents and children at the tails of the distribution. The shares of parents who contribute more than 4 tokens and less than 1 token on average are respectively 16 percent and 8 percent; the same numbers are 24 percent and 11 percent in children. That is, there appears to be a higher proportion of "extreme contributions" in children than in parents. Indeed, we observe three cases of children contributing zero or five in all the rounds,[24] which never occurs in the case of the parents.[25]

We repeated for the children the individual contribution analysis that we carried out for the parents, trying to gauge the importance of conditional cooperation. The results are reported in Table 6, column 1. As the regression results show, differently from their parents (and from the subjects in the Fischbacher and Gachter sample), children do not "conditionally cooperate," i.e., they do not adjust the level of their contributions to the behavior of their peers in previous rounds (the coefficient in the regression, although positive, is very small and highly insignificant). The results do not change when we exclude from the sample synthetic groups or when we include demographic controls (see Table 6, columns 2–7).

Nevertheless, individual preferences (measured as first-round contributions) are as important for the children as they were for the parents (the coefficients are positive and statistical significant, see Table 6, column 8).[26]

Finally, as a robustness check we repeated the regression only using the last 6 rounds and measuring individual preferences as the average contribution in the first three rounds. We do so in order to study whether, in children, conditional

[23] The difference is significant (p-value equals 0.08) using a Mann–Whitney test.
[24] One child contributing zero in all the rounds and two children contributing 5.
[25] Because of the difference in standard deviation and proportion of extreme contributions, the hypothesis that the two distributions are identical can be rejected at the 1 percent level, using a Kolmogorov–Smirnov test.
[26] Robustness checks to the addition of demographic controls and the exclusion of synthetic groups are shown in the Appendix (Table A2).

Table 7
The relationship between children's and parents' contributions.

	Dependent variable: children's contribution									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Others' contribution ($t-1$)	−0.003	0.001	0.000	0.002	−0.011	0.064	0.071	0.066	0.071	0.033
	(0.072)	(0.079)	(0.078)	(0.083)	(0.055)	(0.070)	(0.074)	(0.075)	(0.084)	(0.058)
Children's first round					0.528**					0.468*
					(0.190)					(0.241)
Parents' average	0.101				0.268	0.177				0.241
	(0.267)				(0.250)	(0.315)				(0.293)
Parents' first round		0.091					0.167			
		(0.271)					(0.284)			
Parents' fixed effect			0.119					0.164		
			(0.256)					(0.346)		
Parents' deviation from group mean				0.054					0.134	
				(0.374)					(0.482)	
Observations	342	342	342	342	342	288	288	288	288	288
R^2	0.003	0.002	0.005	0.001	0.187	0.025	0.023	0.023	0.018	0.162

Notes: [1] Standard errors are clustered at the group level. [2] Columns 6–10 exclude synthetic groups. [3] Parents' average denotes parents' mean contribution. Parents' first round denotes parents' contribution in the first round. Parents' fixed effect denotes the fixed effects as estimated in the baseline parents regression. Parents' deviation from group mean denotes the difference between a parent's contribution and that of his/her group. [4] * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

cooperation arises later in the game. This is not the case, as the regression analysis results are very similar to those using the entire dataset.[27]

The lack of conditional cooperation among children that we find in our experiment is consistent with the observation in the psychological literature that although altruism develops in early age, its intensity and sophistication increase with time. For instance, Chambers and Ascione (1987) and Staub (1979) argue that although altruism is already present in very young children, it increases with age as they become more sensitive to social norms and develop more sophisticated moral reasoning capabilities. Similarly, Cialdini et al. (1981) show that older children, but not younger ones, increase their donations when there is a social expectation to do so.[28] These findings could explain why in our experiment children contribute to the public good even if there is no evidence of conditional cooperation among them.

3.3. The correlation between parents and children

We now study the relationship between children's and parents' contributions. We do so by studying children individual contributions through a regression analysis similar to the one described above. The explanatory variable is a measure of their parents' preferences for contribution, captured by one of four different variables: parents' mean contributions; parents' contributions in the first round; parents' fixed effects as estimated in the baseline parents' regression; the difference between a parent's contribution and that of his or her group.

The main result of the analysis is that there is no evidence that a parent's contribution affects that of the child. As the first column of Table 7 shows, the coefficient on parents' contributions (when measured as the mean contribution) equals 0.10 and is not significant. The regression results are not meaningfully different independently of which variable described above is used to capture parental attitudes toward cooperation (see columns 2–4). Moreover, the qualitative result, and also the magnitude of the coefficients, are robust to the exclusion of synthetic groups (Table 7, columns 6–9), and to the addition of demographic controls (Table 8).[29]

Note that if we add to the regression the children's first-round contributions, the coefficient of parents' contribution remains insignificant, whereas the coefficient on first round contribution is significant and of a magnitude similar to that reported in the previous section (see Table 7, columns 5 and 10 and, in the Appendix, Tables A3 and A4). This reinforces the fact that children's heterogeneous attitudes toward co-operation are not correlated with those of their parents.

As a final step, we test the robustness of our results to alternative specifications (Table 9). First, we studied the relation between children's contributions and those of their parents in the first round of the experiment, which are interpreted as measures of their preference toward co-operation:[30] the slope coefficient (reported in Table 9, column 1) is negative and non

[27] Results available from the authors.
[28] For a review of the literature, see also Piliavin and Charng (1990).
[29] None of the demographic controls is significant with the exception of the number of children, which has a negative coefficient. Note that, in the table, we use as a measure of parents' preferences for cooperation the parents' contributions in the first round. The results are unchanged if we use the other measures of parents contributions illustrated above (parents' mean contributions, fixed effects and differences with respect to each parent's group mean).
[30] Moreover, Harbaugh and Krause (2000) argue that first round contributions could be the best measure of a subject's cooperative behavior since they are not influenced by the other subjects' behavior in the previous rounds.

Table 8
The relationship between children's and parents' contributions, robustness to children's controls.

	Dependent variable: children's contribution				
	(1)	(2)	(3)	(4)	(5)
Others' contribution ($t-1$)	−0.010	−0.023	−0.004	0.004	0.002
	(0.072)	(0.066)	(0.079)	(0.074)	(0.077)
Parents' first round	0.139	0.091	0.107	0.054	0.089
	(0.305)	(0.244)	(0.256)	(0.266)	(0.273)
Hispanic	0.546				
	(0.516)				
Grade		−0.162			
		(0.098)			
Boy			−0.234		
			(0.439)		
Number of children				−0.152*	
				(0.084)	
Religiosity					−0.095
					(0.290)
Observations	342	342	342	342	342
R^2	0.018	0.030	0.006	0.026	0.003

Notes: [1] Standard errors are clustered at the group level. [2] Parents first round denotes parents' contribution in the first round. [3] * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table 9
The relationship between children's and parents' behavior, robustness to alternative specifications.

	(1) Children's contribution	(2) Children's contribution	(3) Children's deviation from group
Parents' contribution	−0.202	0.156	
	(0.311)	(0.275)	
Parents' deviation from group			−0.524
			(0.361)
Observations	38	38	38
R^2	0.017	0.013	0.079

Notes: [1] Standard errors are clustered at the group level. [2] Column 1 shows the regression of children's contribution on parents' contribution in the first round. Column 2 shows the regression of children's contribution on parents' contribution in the last round. Column 3 shows the regression of the deviation of the average children's contribution from the average group contribution. [3] * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

significant. Second, one could argue that attitudes toward cooperation are best captured by the behavior in the last round (where the only Nash equilibrium for a self-interested player is not to cooperate[31]). For this reason, we re-estimated the effect of parents' contributions on children's contributions in the last round (Table 9, column 2). The coefficient of parents' contributions on children's contributions is again insignificant. The last column of Table 9 reports the correlation between individual children's deviation from their group average on parents' deviations from their group average. The coefficient is again insignificant.[32]

Overall, the results are robust to a wide array of different specifications. The experimental data show a significant heterogeneity of behavior among children (as there is among parents). Nevertheless, differences in cooperative behavior among the children in the sample are not significantly related to that of their parents.[33]

Our results are subjects to several caveats. First, because of the different levels of sophistication of children and their parents, there were very minor differences in the protocol used with the two groups of subjects (namely, as we detail

[31] One could argue that, although ours is a finitely repeated game, ten repetitions are sufficient for cooperation to arise as a Nash equilibrium when agents are quasi rational.

[32] We also checked whether a higher correlation between parents and children existed within demographic groups (i.e. in boys versus girls, in Hispanic children versus African American children, and in older children versus younger children). None of the interaction terms was significant or economically meaningful.

[33] In the public-goods game there is an additional aspect of preferences that could be transmitted besides the understanding of what is the right thing to do: namely, guidelines about how to react to others' behavior. As we mentioned in the previous section, the panel regression shows that, on average, children do not significantly react to the behavior of other subjects in their group. Nevertheless, we can estimate reaction coefficients to group behavior child by child, and correlate the coefficients with that of their parents. If we do so, coefficients are significant for only two children. Moreover, the correlation of the transmission coefficients with those of their parents is very small and insignificantly different from zero.

in Section 2.3, children were paid in toys and not in currency, and were explained the game procedures at more length). Although minor, these differences may have affected subjects' perception of the game they were playing.[34]

Second, in our experiment, parents' contributions follow a similar pattern to the one identified by Fischbacher and Gachter (2010): individual attitudes toward co-operation are important, as is the behavior of other subjects in the group. This, however, is not the case for children: although, similarly to parents, individual attitudes toward cooperation are important and shape children's behavior throughout the game, there is no evidence of conditional cooperation. Because children play the game in a simpler, more static approach (which does not involve responding to the decisions of the other subjects), simply interpreting children and parents' contribution as a measure of the "pro-social" attitudes may be problematic. In the paper, we address this issue in two ways. We try to disentangle subjects' attitudes toward prosocial values from reputation concerns and other strategic considerations using an empirical strategy similar to that proposed by Fischbacher and Gachter (2010).[35] Additionally, we also show that lack of evidence in favor of parents–children correlation is robust to looking only at the first round or only at the last round (where strategic considerations should not be relevant).

Third, as in all experimental work, noise due to lack or partial understanding of the game may confound the results. Of course, this issue is more of a problem with children. Although there is evidence in the data that children understood (at least in part) the public-good game they were playing and that their choices were not entirely driven by confusion, any noise affecting their strategy would result in an attenuation of the estimates of parents–children correlation.

4. Concluding remarks

A relevant issue for many areas of economics is to understand how values influencing individual behavior in basic economic settings are formed. Our paper is the first to illustrate how experimental games can be designed to produce new knowledge on this issue. In a simple public goods game, we do not find evidence that parents' attitudes toward free-riding have a significant effect on their children's dispositions. This finding is robust to the inclusion of demographic and socio-economic controls.

Appendix.

Tables A1–A4

Table A1
Parents' per-round contribution regression, controlling for their contributions in the first round.

	Dependent variable: parents' contribution						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Others' contribution ($t-1$)	0.066**	0.089**	0.066**	0.062**	0.062**	0.064*	0.067**
	(0.027)	(0.032)	(0.024)	(0.024)	(0.028)	(0.029)	(0.028)
Parents' first round	0.711**	0.637***	0.708***	0.716***	0.710***	0.744***	0.712***
	(0.113)	(0.120)	(0.101)	(0.129)	(0.113)	(0.114)	(0.116)
Hispanic			−0.021				
			(0.209)				
Age				0.029***			
				(0.007)			
Married					0.246		
					(0.280)		
Number of children						0.138***	
						(0.030)	
Religiosity							0.221
							(0.267)
Observations	342	288	342	342	342	342	342
R^2	0.322	0.290	0.322	0.355	0.330	0.356	0.326

Notes: [1] Standard errors are clustered at the group level. [2] Column 2 excludes synthetic groups. [3] Parents' first round is the contribution of parents in the first round. [3] * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

[34] It is not uncommon in the experimental literature to compare experimental outcomes across experiments with slightly different protocols. For example, Henrich et al. (2001) compare results of ultimatum games in 15 different societies. In the paper, the stakes of the game often changed (sometimes subjects were paid with money, sometimes with tobacco or other goods). In addition, results obtained with the 15 small-scale societies were compared with results of ultimatum games where the subjects were college students. Similarly, Roth et al. (1991) compare results of ultimatum games where the protocol was translated in different languages and subjects paid different amount of money, both in nominal and in real terms (e.g., in Yugoslavia the university authorities considered inappropriate to pay subjects for participation altogether).

[35] If reputation formation concerns are not fully captured by their regression model, our measure of correlation may still mix ex-ante preferences with subjects' heuristics in the experiment.

Table A2
Children's per-round contribution regression, controlling for their contributions in the first round.

	Dependent variable: children's contribution						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Others' contribution ($t-1$)	0.004	0.042	−0.002	−0.006	0.001	0.005	0.004
	(0.056)	(0.058)	(0.055)	(0.052)	(0.057)	(0.055)	(0.057)
Children's first round	0.488**	0.452	0.481**	0.467**	0.488**	0.475*	0.489**
	(0.218)	(0.264)	(0.215)	(0.209)	(0.216)	(0.227)	(0.216)
Hispanic			0.365				
			(0.351)				
Grade				−0.070			
				(0.085)			
Boy					−0.196		
					(0.442)		
Number of children						−0.035	
						(0.059)	
Religiosity							0.053
							(0.230)
Observations	342	288	342	342	342	342	342
R^2	0.165	0.145	0.172	0.170	0.168	0.166	0.165

Notes: [1] Standard errors are clustered at the group level. [2] Column 2 excludes synthetic groups. [3] * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table A3
The relationship between children's and parents' contributions, controlling for children's contributions in the first round.

	Dependent variable: children's contribution							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Others' contribution ($t-1$)	−0.011	0.001	−0.003	0.003	0.033	0.043	0.032	0.037
	(0.055)	(0.050)	(0.049)	(0.054)	(0.058)	(0.051)	(0.058)	(0.060)
Children's first round	0.528**	0.504**	0.557**	0.597***	0.468*	0.456	0.492*	0.536**
	(0.190)	(0.202)	(0.179)	(0.168)	(0.241)	(0.250)	(0.225)	(0.204)
Parents' average	0.268				0.241			
	(0.250)				(0.293)			
Parents' first round		0.192				0.190		
		(0.251)				(0.285)		
Parents' fixed effect			0.353				0.306	
			(0.228)				(0.296)	
Parents' deviation from group mean				0.522				0.477
				(0.343)				(0.407)
Observations	342	342	342	342	288	288	288	288
R^2	0.187	0.176	0.202	0.207	0.162	0.155	0.171	0.180

Notes: [1] Standard errors are clustered at the group level. [2] Columns 5–8 exclude synthetic groups. [3] Children's first round denotes children's contribution in the first round. Parents' average denotes parents' mean contribution. Parents' first round denotes parents' contribution in the first round. Parents' fixed effect denotes the fixed effects as estimated in the baseline parents' regression. Parents' deviation from group mean denotes the difference between a parent's contribution and that of his group. [4] * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table A4
The relationship between children's and parents' contributions controlling for children's contributions in the first round, robustness to children's controls.

	Dependent variable: children's contribution				
	(1)	(2)	(3)	(4)	(5)
Others' contribution ($t-1$)	−0.008	−0.009	−0.004	0.001	0.000
	(0.050)	(0.047)	(0.052)	(0.050)	(0.051)
Children's first round	0.499**	0.484**	0.506**	0.498**	0.506**
	(0.194)	(0.192)	(0.199)	(0.208)	(0.200)
Parents' first round	0.234	0.189	0.211	0.187	0.194
	(0.275)	(0.239)	(0.260)	(0.246)	(0.252)
Hispanic	0.475				
	(0.462)				
Grade		−0.067			
		(0.090)			
Boy			−0.258		
			(0.460)		
Number of children				−0.017	
				(0.041)	
Religiosity					0.079
					(0.266)
Observations	342	342	342	342	342
R^2	0.187	0.180	0.180	0.176	0.176

Notes: [1] Standard errors are clustered at the group level. [2] Children's first round denotes children's contributions in the first round. Parents' first round denotes parents' contributions in the first round. [3] * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

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