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## European Economic Review

journal homepage: [www.elsevier.com/locate/eer](http://www.elsevier.com/locate/eer)

# The development of egalitarianism, altruism, spite and parochialism in childhood and adolescence

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## ARTICLE INFO

## Article history:

Received 12 October 2012

Accepted 24 September 2013

Available online 15 October 2013

## JEL classification:

C91

D03

## Keywords:

Other-regarding preferences

Egalitarianism

Altruism

Spite

Parochialism

## ABSTRACT

We study how the distribution of other-regarding preferences develops with age. Based on a set of allocation choices, we classify each of 717 subjects, aged 8–17 years, as either egalitarian, altruistic, or spiteful. We find a strong decrease in spitefulness with increasing age. Egalitarianism becomes less frequent, and altruism much more prominent, with age. Females are more frequently classified as egalitarian than males, and less often as altruistic. By varying the allocation recipient as either an in-group or an out-group member, we also study how parochialism develops with age. Parochialism emerges significantly in the teenage years.

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## 1. Introduction

Other-regarding preferences are a fundamental cornerstone in the human ability to cooperate in large groups of genetic strangers (Bowles, 2004; Boyd and Richerson, 2005). This raises the important question how other-regarding preferences develop in human life, in particular examining the age at which other-regarding behavior sets in and whether there are gender differences in behavior. Recent research has focused on the development of the upside of other-regarding preferences by showing that egalitarianism and efficiency concerns become more prominent as children and teenagers get older (Fehr et al., 2008; Almàs et al., 2010). However, theory suggests that other-regarding behavior in groups may co-evolve with parochialism, a potentially harmful downside of other-regarding preferences (Choi and Bowles, 2007). The development of parochialism – implying in-group favoritism and out-group hostility – has received little attention so far (see Bernhard et al., 2006; Goette et al., 2006, for studies with adults). The same holds true for the development of spitefulness, a human trait that puts negative value on the other person's well-being. While spitefulness seems to be a

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robust phenomenon of a non-negligible minority of adult subjects (Falk et al., 2005; Herrmann et al., 2008; Kerschbamer, 2013), nothing is known so far about the relative frequency of spiteful behavior in childhood and adolescence and how it might change with age.

In this paper, we study in a unified framework how both benevolent and malevolent other-regarding preferences develop in a sample of 717 subjects aged 8–17 years. We allow each subject to make three simple allocation choices from which we can classify her preference type as either egalitarian, altruistic, or spiteful. Egalitarian types prefer allocations that yield equal payoffs for both parties over those with unequal payoffs. Altruistic types value the other person's payoff or the joint payoff positively, and spiteful types put a negative value on the other person's payoff. We also vary whether the recipient of the allocation is an in-group or an out-group member, in order to study parochialism and how it develops with age. While there is already quite some evidence on other-regarding preferences and the influence of age on them, little is still known about the emergence of parochialism with age.

We find a strong decrease of spitefulness with increasing age. Egalitarianism becomes less frequent and altruism much more prominent with age, the latter implying that the choice of the pie-maximizing allocation increases with age. Females are more frequently classified as an egalitarian type than males are (which is similar to findings for adults; see Croson and Gneezy, 2009), and females are less often what we call an altruistic type. Interestingly, parochialism in the form of a worse treatment of out-group members, compared to in-group members, emerges and first becomes significant in the teenage years. Hence, while altruism becomes more important in adolescence, we observe more discrimination against out-group members at the same time, which is consistent with the main result in Choi and Bowles (2007).

Studying the benevolent and malevolent aspects of other-regarding preferences is important because knowledge about other-regarding preferences is key in designing institutions and their associated incentives. In particular, egalitarianism (i.e., inequality aversion) and reciprocity are likely to be important in employer–employee relationships in labor markets (Bewley, 1998). Negative other-regarding preferences – like spite – have been found to be influential on behavior as well, for instance by inducing sabotage in tournaments (Harbring and Irlenbusch, 2011). Beyond influencing behavior in small-scale groups, other-regarding preferences may also shape a society decisively by affecting decisions on social welfare or taxation (Fortin et al., 2007).

While many studies have examined other-regarding preferences in adults (see Camerer, 2003, or Cooper and Kagel, 2012, for surveys), much less is yet known about how these preferences develop with age, in particular before humans enter working life. Studying the development of other-regarding preferences is interesting for several reasons. First, from a theoretical perspective, it can illuminate how models of economic behavior (e.g., Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000; Charness and Rabin, 2002) can account for the behavior of children and teenagers. These models were developed on the basis of experimental evidence from adult subjects, but it is unclear whether adult behavior is the consequence of any directional development in the prevalence of other-regarding preferences. The fact that economic decision making “may well change over the long term, with changes in age, education, political and religious beliefs, and other characteristics” (Bolton and Ockenfels, 2000, p. 171) has been well acknowledged. In our paper, we hope to contribute to a more detailed understanding of how age influences distributional preferences. Second, from an applied perspective, knowing more about the different types of other-regarding preferences and their intensity in childhood and adolescence can provide a benchmark against which adult behavior can be measured. A comparison of the intensity of benevolent other-regarding preferences observed in adulthood compared to childhood and adolescence is of great interest. If it is stronger in adulthood, this would imply that socialization in the teenage years should be considered as helpful for promoting efficient interactions in the workplace; if it is weaker, humans would seem to “lose” efficiency-promoting other-regarding preferences in the transition from childhood to adult age. Third, empirical evidence proves that children and adolescents influence to a large extent many household decisions and over the past few decades their purchasing power has increased substantially – at least in highly developed countries (McNeal, 1992; Dauphin et al., 2011). Fourth, and more generally, given the fact that children's economic decisions differ in many areas from adults' decisions, important sociopolitical consequences emerge. Policies, imposed by adults on children, may not be in accordance with the preferences of the affected children if adults do not know the children's preferences well. Beyond this aspect, if other-regarding preferences were to be found to be susceptible to policy interventions in education – a question that is still open to thorough investigation – knowing the distribution and the developmental changes of other-regarding preferences during childhood and adolescence would be a prerequisite for any kind of intervention.

The economic decision making of children and adolescents has received increasing attention in recent years. William Harbaugh and Kate Krause pioneered the systematic investigation of how children make economic decisions in a wide array of domains, such as rationality in revealed preferences (Harbaugh et al., 2001), risk taking (Harbaugh et al., 2002), or trust and trustworthiness (Harbaugh et al., 2003b). As far as other-regarding preferences in children and teenagers are concerned, the overall evidence seems to suggest that humans become less selfish as they grow older (Murnighan and Saxon, 1998; Harbaugh et al., 2003a; Benenson et al., 2007; Sutter and Kocher, 2007; Gummerum et al., 2008, 2010). These studies, however, have concentrated on a binary classification of more or less selfish behavior, preventing the classification of subjects into different types of other-regarding preferences and, hence, leaving open the investigation of how the distribution of types changes with age.

Fehr et al. (2008) took a first step in classifying different types of children's other-regarding preferences by devising three simple allocation tasks from which they can infer a subject's type as egalitarian, altruistic, or spiteful. Their experiment with 229 children, aged 3–8, shows that egalitarianism (i.e., inequality aversion) develops strongly between the ages of 3 and 8.

While selfishness clearly dominates in 3-year-olds, many 7–8-year-olds prefer egalitarian allocations.<sup>2</sup> More precisely, about 60% of children aged 7–8 can be classified as having egalitarian preferences, while the corresponding share for 3–4-year-olds is smaller with around 20%. While it is true that also preschoolers can share equally (Sigelman and Waitzman, 1991; Olson and Spelke, 2008), the fraction seems to increase with age. Related research has also found that starting from an age of 6–8 years, children show already a tendency to sacrifice their own resources in order to be fair, increasing the likelihood of egalitarian allocations (Blake and McAuliffe, 2011; Shaw and Olson, 2012).<sup>3</sup>

We use the experimental design of Fehr et al. (2008) and extend their analysis to adolescence in order to study how the transition to adulthood shapes subjects' other-regarding preferences. This will allow us to bridge the gap between children (as in Fehr et al., 2008) and adults, while keeping the design identical. The age span considered in our paper is similar to that investigated in a paper by Almàs et al. (2010) on the development of inequality acceptance. They ran experiments with 486 subjects, aged 10–18, who had to make distributional choices in modified dictator games where the pie to be distributed could depend – in addition to own productivity – on luck and the efficiency of giving away money to the recipient. They found that older children are more willing to accept inequalities when the latter are the consequence of individual achievements; furthermore, they care more about efficiency than younger children do. The authors also observe gender differences in efficiency concerns. From the 9th grade onwards efficiency considerations play a more important role for male than for female participants. Overall, their findings imply that children's fairness norms evolve from favoring equality in their youngest cohort of 10-year-olds (similar to 8-year-olds in Fehr et al., 2008) to favoring equity in the older age groups. Compared to Almàs et al. (2010), our design also allows us to study the development of spitefulness and, in particular, the influence of parochialism, which is the main innovation in our paper.

A paper by Martinsson et al. (2011) studied the development of social preferences in a sample of 650 Austrian and Swedish children and teenagers aged 10–15 years. In six dictator games subjects had to choose one of two possible payoff allocations. From these choices subjects were classified into four preference types: self-interest, social welfare, difference aversion and competitive. The core finding of the paper is that difference aversion (which is a similar concept to inequality aversion) decreases while social-welfare considerations become more important with age, which is in line with our findings. Compared to the paper by Martinsson et al. (2011) we are also able to study spitefulness and parochialism. The latter feature of our study is also the main, and important, difference to a working paper by Sutter et al. (2010) in which they use the design of Engelmann and Strobel (2004) to classify subjects into inequality averse, maximin, efficiency-loving and selfish. While Sutter et al. (2010) use almost the same subject pool as here (separated by more than 6 months, though), they do not study spitefulness and parochialism. As far as the development of egalitarianism and altruism is concerned, it is reassuring that both papers yield similar results, despite employing two different research designs. As children and teenagers grow older, inequality aversion becomes less important, while efficiency concerns increase in importance for boys and maximin-preferences gain importance in shaping behavior of girls.

Studying both spite and parochialism in our paper will shed light on the malevolent side of other-regarding preferences. This is also important from a theoretical point of view, since recent evolutionary theories suggest that prosocial behavior (i.e., the benevolent side) and parochialism (i.e., the malevolent side of other-regarding preferences) evolve jointly (Choi and Bowles, 2007). An examination of common developmental origins of the benevolent and malevolent aspects of other-regarding preferences is therefore of great interest.

The rest of the paper is organized as follows. We introduce the experimental design and procedure in Section 2. Section 3 presents the results, and Section 4 concludes the paper.

## 2. Experimental design and procedure

### 2.1. Design

Participants in our study had to make decisions in three simple allocation tasks that we will refer to as games below.<sup>4</sup> Each participant was matched with one anonymous partner from the same age cohort, and had to choose between two allocations that assigned money between the two players. The order of presentation of the three decisions and two allocations was randomized.

The prosocial game offered a choice between the allocation (1,1) – that is, 1 point for the decision maker, 1 point for the recipient – and the allocation (1,0). This game serves as a measure of the most basic form of prosociality, namely the willingness to avoid advantageous inequality for the benefit of the partner. Importantly, prosociality in this game has no

<sup>2</sup> Interestingly, the desire for egalitarian allocations seems to be deeply rooted in infants already, as recent research has shown. Children who are 15–21-month old show some fairness understanding and altruistic behavior by gazing significantly longer when resources are distributed unequally between two recipients as opposed to equally (Schmidt and Sommerville, 2011; Sloane et al., 2012). Egalitarian allocations seem also to make an allocator more attractive to infants, because 16-month-olds have a clear preference for a fair rather than an unfair allocator (Geraci and Surian, 2011).

<sup>3</sup> Another strand of literature deals with the question whether what is observed by a researcher as fair behavior is partly motivated by a desire of experimental subjects to appear fair. While this has been shown to be the case for adults (Batson et al., 1997, 2002), only recent work by Shaw et al. (2013) has illustrated the same pattern for children. In their study, children as young as of age 6–8 years show fair behavior that is not only motivated by means of true fairness, but also in order to appear fair to others. See also Houser et al. (2012) for how reputation concerns affect children's decision making.

<sup>4</sup> Of course, the allocation tasks are not interactive games, but rather individual decision making tasks. However, for notational convenience, we prefer the term "game" for the three different tasks.

costs for the decision maker, enabling various different motives to drive the choice (1,1): an egalitarian preference that avoids inequalities (Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000), efficiency-seeking (Charness and Rabin, 2002), a desire to maximize the payoff of the worst-off subject (maximin; Rawls, 1974), or even self-interested behavior because a purely self-interested individual would randomly choose between the two allocations as she receives one point regardless of her decision.

In the envy game, the decision maker had to choose between allocations (1,1) and (1,2). As in the prosocial game, the decision maker can increase the partner's payoff at no cost to herself, but now this choice results in disadvantageous inequality. Looking at a subject's pattern of choices in both the prosocial and the envy games allows distinguishing inequality aversion from a motive to be altruistic towards the partner by increasing his payoff, or from a motive of spite that minimizes the partner's payoffs. If an individual wants to avoid inequality, she chooses (1,1) in both games. An altruistic individual who cares for the partner's payoff, however, would choose (1,1) in the prosocial game and (1,2) in the envy game. A spiteful individual, finally, would pick (1,0) in the prosocial game and (1,1) in the envy game.

The sharing game let subjects choose between allocations (1,1) and (2,0). Contrary to the previous games, the egalitarian choice of (1,1) is costly for the decision maker and thus indicates a strong form of inequality aversion. Note that the prediction for a selfish decision maker implies unambiguously the choice of (2,0) in this game, while picking the egalitarian option clearly indicates prosocial behavior.

Considering a subject's pattern of choices across all three games allows the classification of different types of other-regarding preferences. In particular, we will classify subjects into five behavioral types. *Strongly egalitarian* subjects pick the egalitarian allocation (1,1) in all three games. *Weakly egalitarian* subjects choose the egalitarian allocation in all games except the sharing game, where egalitarian behavior is costly. *Strongly altruistic* subjects always select the allocation that maximizes the partner's payoff and at the same time the joint payoff. *Weakly altruistic* subjects opt for the allocation that maximizes the partner's payoff and the joint payoff in all games except the sharing game. Finally, *spiteful* subjects always prefer the allocation that minimizes the partner's payoff or maximizes the positive difference in own versus partner's payoff.<sup>5</sup> Table 1 summarizes the classification of subjects.

In order to study the development of parochialism, we implemented an in-group and an out-group condition across subjects. While the recipient in the in-group condition was known to be from the same class (his or her identity remained secret, of course), the recipient in the out-group condition attended another school, but was in the same grade. This was common knowledge to students (see the instructions in the Appendix). The in-group condition was implemented in two different ways. In the "*in-group all*" condition, all students from a respective class participated once as sender to another in-group member and once as recipient of a transfer from another in-group member in the experiment. In contrast, only half of the students from a respective class participated in the experiment as sender the "*in-group half*" condition, while the remaining students acted as recipients of the senders' transfers and thus did not make any decisions. We chose the *in-group all* condition as a method to collect more data from our subject pool. Moreover, this allowed us to investigate whether it makes a difference if each subject participates in the experiment as sender as well as receiver (as in the *in-group all* condition) or only as a sender (as in the *in-group half* condition). Separate  $\chi^2$ -tests for each age group and game reveal that no significant differences between the two in-group conditions could be observed (see Table 2), allowing us to pool the data from both conditions.

## 2.2. Subject pool and procedure

This experiment was part of a 2-year project run in seven schools in Tyrol, which is a federal state in western Austria. The project was approved by the State Board of Education in Tyrol, and the headmasters of participating schools gave permission to conduct several experiments in intervals of 2–3 months. These experiments were run in class during regular school hours. We randomly selected a total of 38 classes in the 3rd, 5th, 7th, 9th, and 11th grades at the beginning of the project, and followed them for two school years. Parents were informed about the project, which was described as a scientific project that studies decision making in children and teenagers, but without revealing any details on any of the experiments. All students except five received their parent's permission to participate in the project. Besides asking parents for consent, we also solicited each student's willingness to participate in the experiments. No single student dissented. This whole procedure constitutes a particularly noteworthy feature of our experiment, as it avoids any kind of problems due to self-selection into an experiment.

The experiment was carefully explained in class, and all participants had to answer two control questions to check their understanding before starting the experiment (see Appendix).<sup>6</sup> We proceed in our analysis with those 717 participants in the role of a decision maker who answered both questions correctly, and exclude 35 other decision makers with incorrect answers from the following analysis (see Table 3). The results presented below remain qualitatively identical if the 35

<sup>5</sup> Note that we do not differentiate between spiteful types who minimize the partner's payoff and competitive types who try to do as good as possible compared to the partner. We also do not elicit envious types who reduce the partner's payoff only when they are ahead and do not care about the partner's payoff in all other cases.

<sup>6</sup> Note that this is different from the paper by Fehr et al. (2008), where the experiment was explained and carried out individually with each subject. Given the fact that we wanted to implement a design which was identical for all age groups and obvious problems like a higher tendency to elicit socially desired behavior in individual interactions among older participants and experimenters we decided to run the experiments in class with pen and paper.

**Table 1**  
Definition of other-regarding preference types.

Type	Prosocial game	Envy game	Sharing game
Strongly egalitarian	(1/1)	(1/1)	(1/1)
Weakly egalitarian	(1/1)	(1/1)	(2/0)
Strongly altruistic	(1/1)	(1/2)	(1/1)
Weakly altruistic	(1/1)	(1/2)	(2/0)
Spiteful	(1/0)	(1/1)	(2/0)

**Table 2**  
 $\chi^2$ -tests for behavioral differences in “in-group all” and “in-group half”.

Age group	Prosocial game	Envy game	Sharing game
8/9 years	$p=.157$	$p=.979$	$p=.791$
10/11 years	$p=.856$	$p=.382$	$p=.913$
12/13 years	$p=.678$	$p=.083$	$p=.923$
14/15 years	$p=.923$	$p=.342$	$p=.925$
16/17 years	$p=.902$	$p=.532$	$p=.536$

The table shows that there is no significant difference between the *in-group half* and the *in-group all* condition at the 5%-level in any of the comparisons. The one weakly significant difference (in the envy game for 12- to 13-year-olds) is well within the limits of chance.

**Table 3**  
Sample size.

Grade	Age group	Control question		Total
		Correct	Wrong	
3rd	8/9 years	71	17	88
5th	10/11 years	207	13	220
7th	12/13 years	172	3	175
9th	14/15 years	135	2	137
11th	16/17 years	132	0	132
		<b>717</b>	<b>35</b>	<b>752</b>

excluded subjects were included in the analysis. In addition to the 752 decision makers, we had 443 subjects as passive recipients of the decision makers' choices. Recall that 309 subjects (out of the 752 decision makers) participated in the in-group all condition where they were both active decision makers and passive receivers.

The points earned in the experiment were converted into Euros for payment. The exchange rate was made roughly proportional to the average weekly pocket money within each grade (see Table 4). This approach was taken to ensure that the marginal incentives were comparable across grades.

Finally, we would like to mention that the use of one-shot games under anonymity, as in this study, is a key factor in distinguishing prosocial behavior from purely selfish motives. Selfish motives may also play a role in repeated interaction or face-to-face contacts, meaning that subjects behave prosocially just to benefit in future interactions. This is ruled out in our study.

### 3. Experimental results

Below we will first analyze behavior in single games, and then study the pattern of other-regarding preferences that emerges when all three decisions of a subject are considered. Within each subsection, we proceed with an analysis that addresses the influence of (i) age, (ii) parochialism, and (iii) gender.

#### 3.1. Behavior in single games

##### 3.1.1. Age

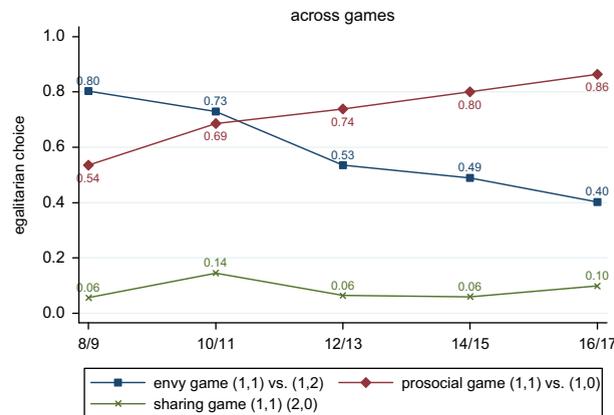
Fig. 1 shows the relative frequency of choosing the egalitarian allocation (1,1) in each game across our five different age cohorts. The figure pools data from the in-group and out-group conditions as well as from girls and boys, in order to present

**Table 4**

Exchange rate and weekly average pocket money.

Age group	Exchange rate of 1 point	Increase (%) <sup>a</sup>	Weekly pocket money (average)	Increase (%)
8–9 years	.5€		2.9€	
10–11 years	.75€	+50	4.7€	+62
12–13 years	1€	+33	6.5€	+38
14–15 years	2€	+100	13.4€	+106
16–17 years	3€	+50	23.7€	+77

<sup>a</sup> Measures the relative increase in pocket money by age group in row  $x$  over age group in row  $x-1$ .



**Fig. 1.** The relative frequency of egalitarian choices across games and age groups.

the overall pattern of results. **Fig. 1** reveals important and systematic behavioral changes across age. In the prosocial game, the relative frequency of choosing (1,1) over (1,0) increases monotonically with age. Almost 90% of 16- to 17-year-olds choose the egalitarian allocation, while only 54% of 8- to 9-year-olds do so. An inverse pattern is found for the envy game. Here we note a marked decline of the egalitarian choice from 80% for 8- to 9-year-olds to 40% for 16- to 17-year-olds. Hence, the altruistic allocation of (1,2) is much more frequently chosen at older ages, indicating that tolerance towards disadvantageous inequality increases in older subjects (which is similar to the main finding in *Almås et al., 2010*). We do not find a monotonic age effect in the sharing game. On average, only around 10% of subjects in each age group choose the (costly) egalitarian allocation (1,1) over (2,0).<sup>7</sup> Hence, when it costs money, the egalitarian choice is selected much less frequently than when it is not costly. **Table 5** presents the results of probit regressions for the three games in which the decision to choose the egalitarian allocation (1,1) is the dependent variable. As independent variables, we consider a dummy for *female* and *in-group*, as well as the variable *age exact* which measures the exact age of our participants in years and months. The results in **Table 5** reveal a significantly positive age effect for the prosocial game and a negative one for the envy game.

### 3.1.2. Parochialism

**Fig. 2** illustrates the effects of parochialism. Panel (a) shows that the egalitarian allocation of (1,1) is chosen more frequently in the in-group than in the out-group condition from the age of 12 to 13 years onward in the prosocial game. While **Table 5** presents a significant main effect of *in-group*, adding an interaction term *in-group\*age exact* (as well as an interaction term *female\*age exact*) to the specification in **Table 5** reveals that the in-group effect is significant only from the

<sup>7</sup> Note, that our results for 8- to 9-year-olds are different from the results of *Fehr et al. (2008)* for 7- to 8-year-olds. Yet, this difference can be attributed to a difference in rewards used in both studies, as is shown in unpublished work by *Fehr et al. (2012)*. They show that if sweets are used as a reward medium, 54% of the 8- to 9-year olds prefer the egalitarian option in the sharing game, which is no longer significantly different from the 45% of 7- to 8-year olds in the study by *Fehr et al. (2008)*. This means that *Fehr et al. (2012)* can basically replicate the *Fehr et al. (2008)* results when sweets are used as reward medium. Concerning the prosocial game, results are even closer. While *Fehr et al. (2012)* find that 79% of subjects prefer the egalitarian choice when their behavior is incentivized with sweets, *Fehr et al. (2008)* report 80% of egalitarian choices. The paper by *Fehr et al. (2012)* is intended to study the effects of the reward medium, but does not consider any aspects of development of choice behavior with age, which distinguishes it clearly from this paper. Here, we have used money as a reward medium in order to have an attractive reward medium especially for our oldest subjects. On a more general level, we note that as economists we prefer, in general, the use of monetary rewards since money is a general means of exchange – while non-monetary rewards typically lack this property and therefore might inhibit the generalizability of behavior with particular rewards. However, using money is not always possible when working with children (for instance due to restrictions from participating schools), for which reason *Fehr et al. (2012)* has been written as a contribution to understand how different rewards influence behavior.

**Table 5**  
Probit regressions with egalitarian choice as dependent variable.

Independent variables	Prosocial game	Envy game	Sharing game
<i>female</i>	.028	.174***	.053***
<i>age exact</i> <sup>a</sup>	.037***	-.059***	-.004
<i>in-group</i>	.097**	-.056	.071***
BIC <sup>b</sup>	811.3	917.8	449.2
# Observations	717	717	717

The table shows marginal effects. Robust standard errors clustered on class level.

Including controls for only child, a dummy for youngest child, the number of siblings and the amount of pocket money per week separately to the regressions does not yield any significant effects.

\*\*\* Denotes significance at the 1% level.

\*\* Denotes significance at the 5% level.

<sup>a</sup> *age exact* in years and months.

<sup>b</sup> Bayesian information criterion.

age of 12/13 years on ( $p < .05$  for females and males).<sup>8,9</sup> This additional specification is included in Table A1 in the Appendix.<sup>10</sup> Panel (b) reveals that the decline in the relative frequency of choosing (1,1) is much steeper for the in-group than the out-group condition in the envy game. This indicates that as subjects get older, they are relatively more willing to accept disadvantageous inequality in the in-group than in the out-group condition. The in-group effect – while non-significant in the main specification of Table 5 – is significant for the oldest two age groups of 14- to 15- and 16- to 17-year-olds ( $p < .01$  for females and males; see Table A1 in the Appendix).<sup>11</sup> In the sharing game in panel (c), we note that sharing is, in general, more frequently observed in the in-group than in the out-group condition. This difference is significant from the age of 10 to 11 years onwards ( $p < .05$  for females,  $p < .1$  for males; see Table A1).<sup>12</sup>

### 3.1.3. Gender

Fig. 3 presents the behavior of girls and boys in the three games. While there is no clear cut pattern of gender differences at the aggregate level in the prosocial game in panel (a), girls are always more likely to choose the egalitarian allocation (1,1) in the envy game in panel (b). Table 5 illustrates that the gender effect is significant, and an extended model that includes an interaction term of *female\*age exact* (as well as an interaction term *in-group\*age exact*) shows that the gender effect is present and significant in each single age group ( $p < .1$  for in-group and out-group; see Table A1 in the Appendix). Girls are also more likely to choose (1,1) in the sharing game in each age group, except in the oldest one, as can be seen in panel (c) of Fig. 3. We note from Table A1 that the gender difference is significant for the three youngest age groups, i.e., up to the age of 12–13 years ( $p < .05$  for in-group and out-group).

### 3.2. Distribution of other-regarding preference types – behavior across all three games

Recall from Table 1 the classification of other-regarding preference types from a subject's pattern of choices across all three games. While the three games allow for 8 different choice patterns, it is reassuring to note that the five types listed in

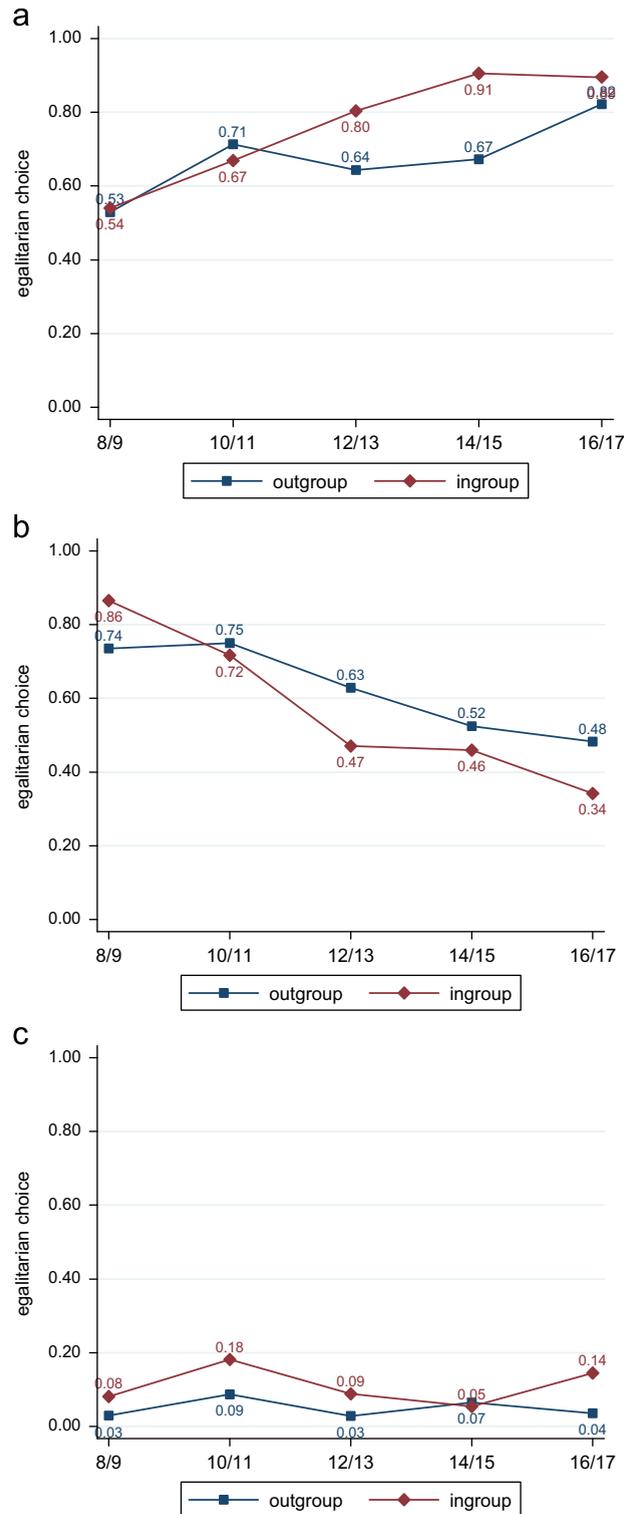
<sup>8</sup> Note, that in Fig. 2(a) the difference between the in- and out-group condition for the oldest age group of 16- to 17-year olds is small. However, the difference is significant in a multiple regression controlling for additional factors such as gender and the exact age and not only the condition.

<sup>9</sup> Table 5 (and Table 6) use individual level data, applying robust standard errors on the class level. A fairly conservative approach would be to take the average behavior within one class as one independent unit of observation and then apply non-parametric tests. Given that we have at most eight classes per grade (six in grade 3, and eight in each of the grades 5, 7, 9, and 11), such conservative testing typically fails significance at conventional levels. For this reason, we have pooled the classes in grades 5 and 7 (the first 4 years in this type of school) and grades 9 and 11 (the final 4 years in this type of school), yielding 16 classes in each subsample to perform Mann-Whitney *U*-tests. Then we take the average choice in the prosocial game within one class as one unit of observation and compare classes in the in-group condition with those in the out-group condition. This yields a significant difference for pooled grades 9 and 11 ( $p < .01$ ;  $N = 16$ ).

<sup>10</sup> We do not present the extended models with interaction terms in the main body of the text for reasons of succinctness. Note that standard software does not correctly calculate marginal effects and *p*-values of interaction terms in nonlinear models (see Ai and Norton, 2003). We corrected for this and present the adjusted tests on joint coefficients in the Appendix. It is noteworthy, however, that the extended models shown in the Appendix have a worse fit – according to Bayesian information criterion (BIC) – than the models shown in Table 5.

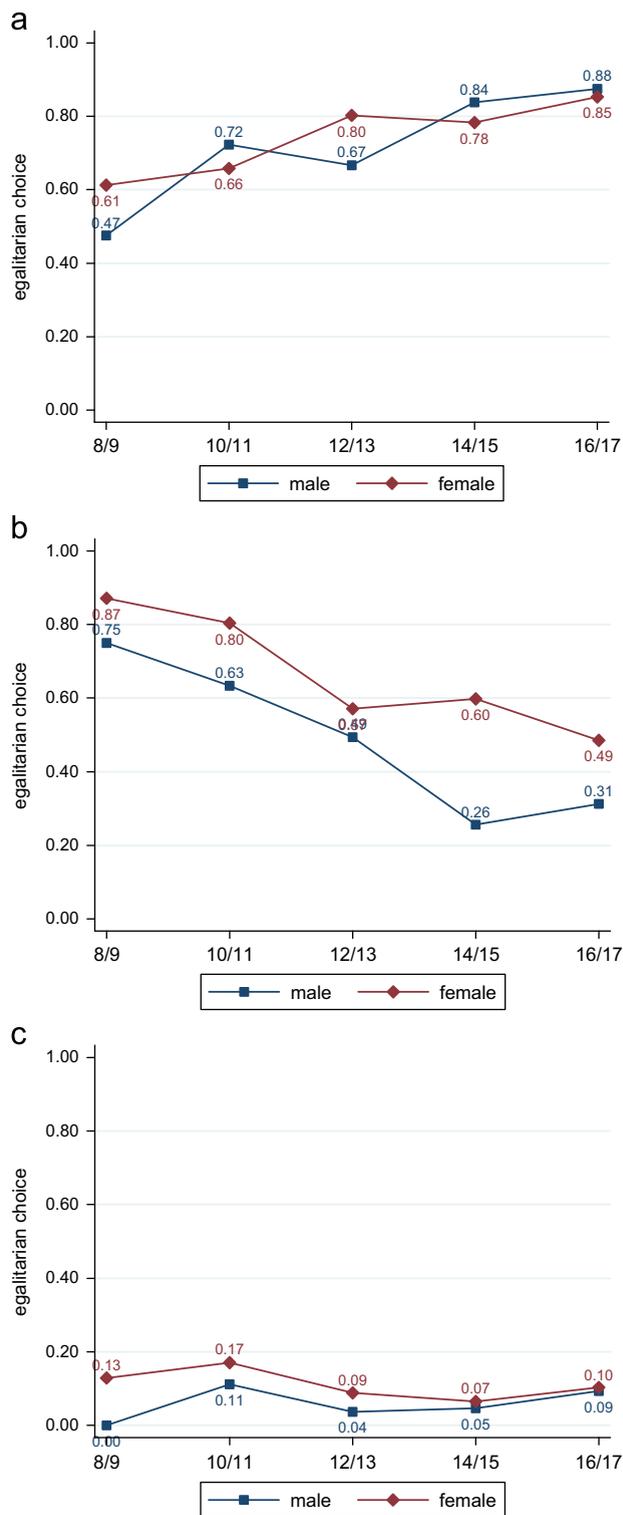
<sup>11</sup> A (weakly) significant difference in grades 9 and 11 is also confirmed in the conservative testing approach described in footnote 9 above ( $p = .06$ ;  $N = 16$ ).

<sup>12</sup> Note that panel (c) of Fig. 2 cannot perfectly convey this significant in-group effect in the sharing game, especially for 14- to 15-year-old teenagers, since the multiple regression model can control more appropriately for the variation in the data than the figure can. If we use a non-parametric Mann-Whitney *U*-test with the average choices in a class as the unit of observation, we get  $p = .14$  ( $p = .15$ ) for the subset of 10/11- and 12/13-year olds (14/15- and 16/17-year olds), with  $N = 16$  per subset.



**Fig. 2.** The relative frequency of egalitarian choices in in-group and out-group condition. (a) Prosocial game: (1,1) vs (1,0), (b) envy game: (1,1) vs (1,2) and (c) sharing game: (1,1) vs (2,0).

Table 1 cover the vast majority of subjects. In the data presented in Figs. 4–6, between 92% and 100% of subjects belong to one of these 5 types. The share of subjects which can be classified into these 5 types slightly increases with age. Note also that strongly egalitarian and strongly altruistic types are rare, meaning that three types (spiteful, weakly altruistic, and



**Fig. 3.** The relative frequency of egalitarian choices of males and females. (a) Prosocial game: (1,1) vs (1,0), (b) envy game: (1,1) vs (1,2) and (c) sharing game: (1,1) vs (2,0).

weakly egalitarian) characterize the large majority (of at least 77%) of subjects. The infrequency of strong types (versus weak types) leads us to pool strongly and weakly egalitarian types, respectively strongly and weakly altruistic types, in the regressions reported in Table 6.

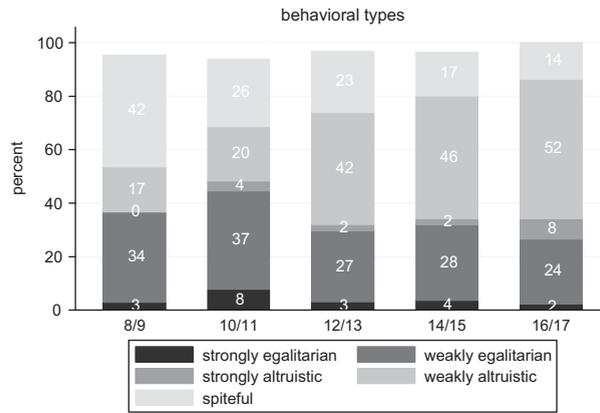


Fig. 4. Behavioral types across age groups.

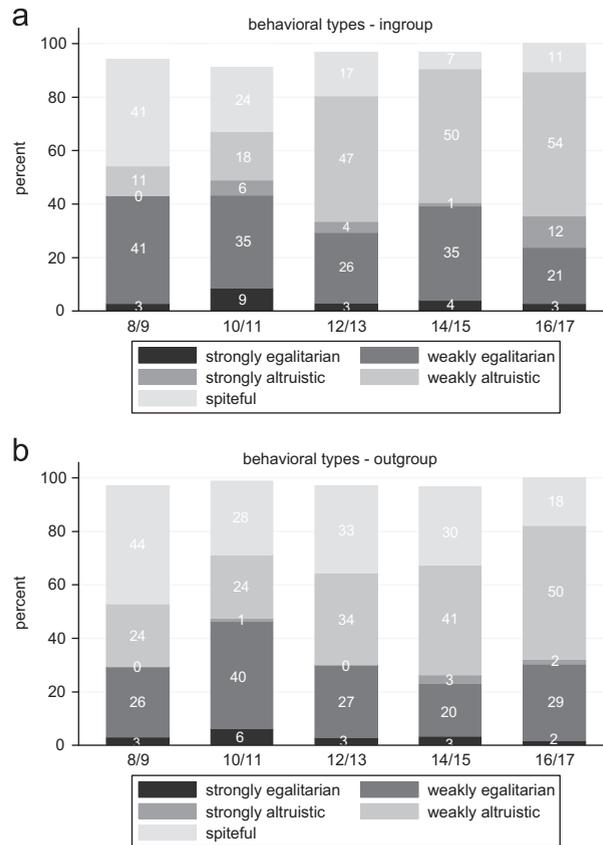


Fig. 5. Behavioral types and parochialism.

3.2.1. Age

Fig. 4 shows that the relative frequency of egalitarian and spiteful types decreases typically with age, while altruistic types become more frequent with age. The modal type is the spiteful one for 8- to 9-year-olds, while it is the weakly altruistic type for the 16- to 17-year-olds. Table 6 presents probit regressions for each type, confirming a significantly

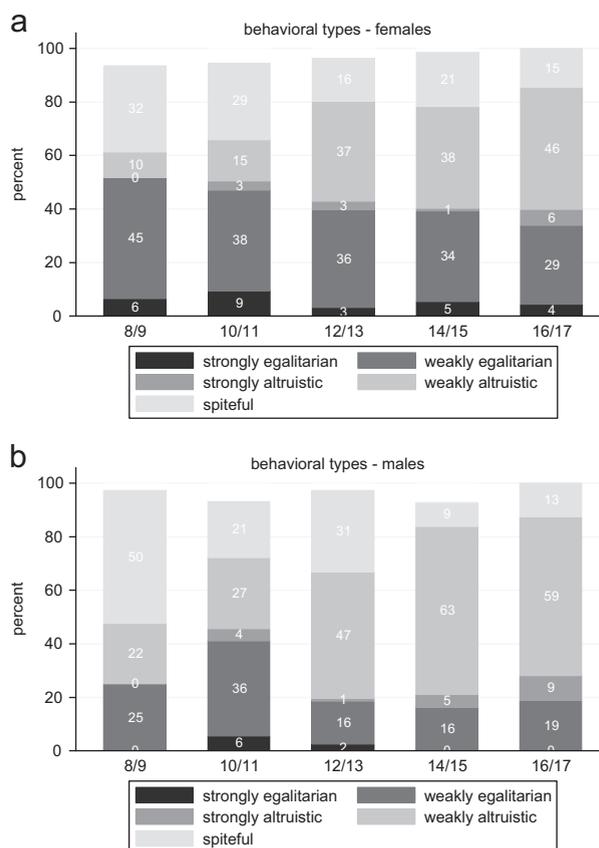


Fig. 6. Behavioral types and gender.

positive effect of age on altruism, and a significantly negative effect on spitefulness and egalitarianism ( $p < .01$  in each case).<sup>13</sup>

### 3.2.2. Parochialism

Comparing the upper and lower panels in Fig. 5 reveals that spiteful types are always more frequent in the out-group condition than in the in-group condition. An extended probit regression (shown in Table A2 in the Appendix) shows that parochialism becomes significant from the age of 12 to 13 years onwards ( $p < .01$  for each age group and gender in this range). For altruistic types, we find significant parochialism in 14- to 15- and 16- to 17-year-olds ( $p < .05$  for both age groups as well as gender; see Table A2). Egalitarian types are the only group for which we do not observe any significant difference between the in-group and out-group conditions.<sup>14</sup>

### 3.2.3. Gender

Fig. 6 shows marked gender differences. We note a larger fraction of egalitarian types and a smaller fraction of altruistic types in girls than in boys for each single age group (for in-group and out-group; for 8- to 10-year-olds the gender effect fails significance at  $p = .148$ ). These main effects of gender are documented in Table 6 and also in Table A2. Only for spiteful types we do not find any significant gender differences.

<sup>13</sup> One might think that the increase of altruistic types could be due to social ties increasing as many children might stay within the same class as they get older. Yet, there is an increase in such types from 8/9-year olds to 10/11-year olds, although 8/9-year olds have been in the same class for 3 years, while 10/11-year olds are in a completely new class (since after primary school children change schools and seldom stay on with former classmates). Furthermore, since there is a substantial reshuffling of classes, and many new entrants, at the beginning of grade 9 (the 14/15-year olds), such an argument would also not fully explain why the trend is fairly monotonic across all age groups. Moreover, as altruism towards the out-group is also increasing with age, this indicates that the increase of altruism with age cannot (only) be driven by a potential development of social ties.

<sup>14</sup> Using average choices within a class as unit of observations and applying non-parametric Mann–Whitney  $U$ -tests, we find that spiteful types are more frequent in the out-group than in the in-group condition both in the set of children aged 10/11 and 12/13 ( $p = .1$ ;  $N = 16$ ) and the set of 14/15- and 16/17-year olds ( $p = .02$ ;  $N = 16$ ). For altruistic types, we have  $p = .06$  for the group of 14/15- and 16/17-year olds ( $N = 16$ ). For egalitarian types, we find no significant effects of parochialism in any non-parametric test.

**Table 6**  
Probit regressions with other-regarding preference type as dependent variable.

Independent variables	Egalitarian type	Altruistic type	Spiteful type
<i>female</i>	.175***	–.152***	–.023
<i>age exact</i> <sup>a</sup>	–.024***	.062***	–.030***
<i>in-group</i>	.048	.048	–.118***
BIC <sup>b</sup>	916.0	902.7	761.4
# Observations	717	717	717

The table shows marginal effects. Robust standard errors clustered on class level. Including controls for only child, a dummy for youngest child, the number of siblings and the amount of pocket money per week separately to the regressions does not yield any significant effects.

\*\*\* Denotes significance at the 1% level.

<sup>a</sup> *age exact* in years and months.

<sup>b</sup> Bayesian information criterion.

#### 4. Conclusion

We studied how egalitarianism, altruism, spitefulness and parochialism change in late childhood and adolescence. Using a sample of 717 students, and avoiding any kind of self-selection into the experiment, we find significant changes in the distribution of other-regarding preferences from the age of 8 to 9 years until the age of 16 to 17 years. While previous studies have found that egalitarianism increases sharply in 3- to 8-year-old children (Fehr et al., 2008), this motive loses its dominance in adolescence when the altruistic type becomes prevalent. Overall, the evidence from Fehr et al. (2008) for young children and from Almås et al. (2010) and this submission for adolescents suggests that there is peak in the quest for egalitarianism around the age of 8 years. Before that age, egalitarian motives become more important with age, while beyond this age they are pushed more into the background by an increasing influence of efficiency-considerations.

This strong development of what we have called an altruistic type in adolescence contributes to an increase in overall efficiency, which is an important prerequisite for smooth interactions later on as adults in the workplace. The tendency to accept disadvantageous inequality more often later on in adolescence as well as increasing concerns for efficiency are mirror findings and a confirmation of the work by Almås et al. (2010). The relatively strong decline in egalitarian motives is an important qualification of the earlier results by Fehr et al. (2008) for 3- to 8-year-old children, where egalitarianism is the overarching motive for 8-year-olds. Our study shows that egalitarianism peaks around the age of 8–11 years. Inequality aversion in dictator games may thus be a more influential motive relatively early on in life, i.e., in late childhood, while altruistic motives become more important in adolescence. In our design, altruism is associated with the motive of maximizing the sum of payoffs, a concern that the theory of Charness and Rabin (2002) stresses. Our evidence suggests that their theory becomes relatively more suitable as an explanation for human behavior when subjects reach their later teenage years (which is also confirmed for adults in the work by Engelmann and Strobel, 2004).

We find that the frequency of spiteful behavior decreases strongly with age. The incidence of spiteful behavior among the oldest adolescents in our study is fairly similar to that observed in adults (Falk et al., 2005; Herrmann et al., 2008), indicating that the significant changes in the prevalence of spite occur in adolescence and have been captured in our study.

With respect to gender differences, we found that girls are significantly more likely to have egalitarian preferences than boys. In the age group of 16- to 17-year-olds, roughly one-third of women can be classified as egalitarian, while this is true for less than 20% of men. This gender difference with respect to egalitarianism fits with the data of Almås et al. (2010) for teenagers, but also with Güth et al. (2007) who have shown in a large-scale newspaper experiment with several thousands adult participants that women care more for egalitarian distributions of a pie than men. In our experiment, it is important to note, however, that the preference for egalitarian allocations becomes weaker in both males and females as they get older. The share of altruistic types increases with age, and it is always significantly higher for males than females. No gender differences have been found with respect to the fraction of spiteful types.

A particularly noteworthy finding of our study is the fact that parochialism – i.e., the differential treatment of in-group and out-group members – emerges in adolescence.<sup>15</sup> While the age in which parochialism becomes significant varies slightly across single games (see Table A1), the general pattern emerging from our experiment suggests that the distinction between in-group and out-group members becomes behaviorally relevant in the course of socialization in adolescence. Concerning the different types of other-regarding preferences, we observe significant in-group favoritism of altruistic types starting at the age of 14/15 years, and spitefulness is significantly stronger towards out-group members from the age of

<sup>15</sup> Evidence for parochialism among adults is given in Bernhard et al. (2006). They show in a somewhat different context (a third party punishment experiment) that third-party punishers protect ingroup victims much more than they do outgroup victims, regardless whether the distributing norm violator belonged to their own social group or not. Moreover, norm violators expect less punishment if the punisher is an ingroup member. Our results show that parochialism seems to materialize before adulthood already.

**Table A1**

Probit regressions with egalitarian choice as dependent variable – interaction of in-group condition and age group as well as gender and age exact (corrected for interaction terms).<sup>a</sup>

Independent variables	Prosocial game	Envy game	Sharing game
<i>female</i>	.103	.087	.207**
<i>age exact</i>	.023*	–.051***	.002
<i>in-group</i>	–.297*	.236	.050
<i>in-group*age exact</i>	.032**	–.022**	.002
<i>female*age exact</i>	–.005	.006	–.012*
BIC <sup>b</sup>	818.6	928.8	460.2
# Observations	717	717	717
Marginal effects			
In-group-effect (for female age 9)	–.043	.025	.104
In-group-effect (for female age 11)	.032	.000	.096**
In-group-effect (for female age 13)	.093**	–.039	.087***
In-group-effect (for female age 15)	.134***	–.086***	.078***
In-group-effect (for female age 17)	.154***	–.131***	.068**
In-group-effect (for male age 9)	–.044	.035	.041
In-group-effect (for male age 11)	.034	.000	.046*
In-group-effect (for male age 13)	.099**	–.044	.051***
In-group-effect (for male age 15)	.142***	–.085***	.056***
In-group-effect (for male age 17)	.161***	–.112***	.062*
Gender effect (for in-group age 9)	.070	.094*	.147***
Gender effect (for in-group age 11)	.052	.134***	.110***
Gender effect (for in-group age 13)	.033	.166***	.075***
Gender effect (for in-group age 15)	.017	.181***	.042
Gender effect (for in-group age 17)	.006	.174***	.012
Gender effect (for out-group age 9)	.068	.104*	.085**
Gender effect (for out-group age 11)	.054	.134***	.060**
Gender effect (for out-group age 13)	.039	.161***	.039***
Gender effect (for out-group age 15)	.025	.182***	.021
Gender effect (for out-group age 17)	.013	.193***	.006

The table shows marginal effects. Robust standard errors clustered on class level.

Including controls for only child, a dummy for youngest child, the number of siblings and the amount of pocket money per week separately to the regressions does not yield any significant effects.

\*\*\* Denotes significance at the 1% level.

\*\* Denotes significance at the 5% level.

\* Denotes significance at the 10% level.

<sup>a</sup> Note that standard software does not correctly calculate marginal effects and *p*-values of interaction terms in nonlinear models (see Ai and Norton, 2003). We corrected for this and present the adjusted tests on joint coefficients.

<sup>b</sup> Bayesian information criterion.

12/13 years onwards (see Table A2). One explanation could be that the increasing exposure to and membership in new social groups (e.g., in school, clubs, or peer groups) makes the difference between in-group and out-group members more salient in the later teenage years, thus triggering different behaviors across in-groups and out-groups.

Perhaps the most important finding in our study – from an evolutionary perspective – is the joint development of altruism and parochialism. The evolutionary model developed by Choi and Bowles (2007) postulates that altruism towards fellow group members and parochialism in the form of hostile acts against out-group members may have evolved jointly in the history of humankind. This evolutionary theory is attractive for explaining why altruistic behavior and spiteful behavior can co-exist simultaneously within the same individual. The theory is generally hard to test with field data from the historic development of societies, however, because it is practically impossible to quantify the level of generosity or parochialism in ancient societies. Our experiment can shed light on how the levels of altruistic behavior and parochialism change in childhood and adolescence. While our results should not be viewed as a literal test of the evolutionary theory of parochial altruism, it is telling that altruism and parochialism develop during the same time period, namely adolescence.

## Acknowledgments

We received very helpful comments from an Associate Editor, three referees, Samuel Bowles, Armin Falk and audiences at EWEBE in Innsbruck, ESA in Copenhagen, Max-Planck Institute of Economics in Jena, University of Munich, and University of Zurich. We would like to thank Thomas Plankensteiner from the State Board of Education in Tyrol (*Landesschulrat für Tirol*) and the headmasters of the participating schools (Max Gnigler, Sigmund Heel, Gottfried Heiss, Ulrike Künstle, Hermann Lergetporer, Bernhard Schretter, and Peter Paul Steinringer) for making this study possible. Financial support from the Austrian Central Bank (Jubiläumsfonds Projects 12588 and 14680) and the Tiroler Wissenschaftsfonds (Project 0404/790) is gratefully acknowledged.

**Table A2**

Probit regressions with other-regarding preference type as dependent variable – interaction of in-group condition and age group as well as gender and age exact (corrected for interaction terms).<sup>a</sup>

Independent variables	Egalitarian type	Altruistic type	Spiteful type
<i>female</i>	.036	–.043	–.143
<i>age exact</i>	–.029*	.052***	–.023*
<i>in-group</i>	.067	–.313**	.182
<i>in-group*age exact</i>	–.001	.027***	–.023**
<i>female*age exact</i>	.011	–.008	.009
BIC <sup>b</sup>	928.5	912.5	770.5
# Observations	717	717	717
Marginal effects			
In-group-effect (for female age 9)	.061	–.042	–.023
In-group-effect (for female age 11)	.058	–.017	–.075
In-group-effect (for female age 13)	.054	.027	–.114***
In-group-effect (for female age 15)	.050	.084**	–.140***
In-group-effect (for female age 17)	.046	.141***	–.152***
In-group-effect (for male age 9)	.057	–.056	–.025
In-group-effect (for male age 11)	.051	–.022	–.081
In-group-effect (for male age 13)	.044	.031	–.122***
In-group-effect (for male age 15)	.037	.085**	–.144***
In-group-effect (for male age 17)	.030	.124***	–.149***
Gender effect (for in-group age 9)	.143	–.065	–.081
Gender effect (for in-group age 11)	.163**	–.104**	–.051
Gender effect (for in-group age 13)	.178***	–.142***	–.026
Gender effect (for in-group age 15)	.188***	–.164***	–.007
Gender effect (for in-group age 17)	.193***	–.162***	.003
Gender effect (for out-group age 9)	.140	–.079	–.082
Gender effect (for out-group age 11)	.156**	–.109**	–.057
Gender effect (for out-group age 13)	.168***	–.138***	–.034
Gender effect (for out-group age 15)	.175***	–.163***	–.012
Gender effect (for out-group age 17)	.177***	–.179***	.007

The table shows marginal effects. Robust standard errors clustered on class level.

Including controls for only child, a dummy for youngest child, the number of siblings and the amount of pocket money per week separately to the regressions does not yield any significant effects.

\*\*\* Denotes significance at the 1% level.

\*\* Denotes significance at the 5% level.

\* Denotes significance at the 10% level.

<sup>a</sup> Note that standard software does not correctly calculate marginal effects and p-values of interaction terms in nonlinear models (see Ai and Norton, 2003). We corrected for this and present the adjusted tests on joint coefficients.

<sup>b</sup> Bayesian information criterion.

## Appendix A

See Tables A1 and A2.

### Appendix A. Supplementary materials

Supplementary data associated with this article can be found in the online version at: <http://dx.doi.org/10.1016/j.eurocorev.2013.09.006>.

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