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# How Does Socio-Economic Status Shape a Child's Personality?

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## **Abstract**

We show that parental socioeconomic status (SES) is a powerful predictor of many facets of a child's personality. The facets of personality we investigate encompass time preferences, risk preferences, and altruism that are important noncognitive skills, as well as crystallized, fluid, and overall IQ that represent cognitive skills. We measure parental SES by the mother's and father's average years of education and household income. Our results show that children from families with higher SES are more patient, less likely to be risk seeking, and score higher on IQ tests. About 20 to 40% of this relationship can be explained by dimensions of a child's environment that are shown to differ by parental SES: quantity and quality of time parents spend with their children, parenting style, the mother's IQ and economic preferences, a child's initial conditions at birth, and family structure. Personality profiles that vary systematically with parental SES offer an explanation for social immobility.

*Keywords:* human capital, skills, personality, risk preferences, time preferences, altruism, experiments with children, origins of preferences, social immobility, socio-economic status

*JEL-Codes:* C90, D64, D90, D81, J13, J24, J62

# 1 Introduction

Both economic theory and empirical evidence have established a robust link between many important outcomes in life and economic preferences as well as IQ. Time preferences are a major determinant of making investments that will only pay off in the future. More patient individuals achieve higher levels of educational attainment, resulting in substantially higher earnings (Golsteyn *et al.*, 2013; Shoda *et al.*, 1990). Furthermore, they are more likely to exercise, to be a non-smoker, and less likely to be obese (Chabris *et al.*, 2008; Sutter *et al.*, 2010; Golsteyn *et al.*, 2013). Risk preferences are another important predictor of both economic and health outcomes. A higher willingness to take risks is positively correlated with being self-employed, investing in stocks, with smoking, and taking exercises (Dohmen *et al.*, 2011). Social preferences that reflect an individual's degree of altruism are, e.g., related to overall satisfaction with life (Becker *et al.*, 2012). Finally, higher levels of IQ are associated with higher levels of education (Heckman and Vytlacil, 2001), income (Hanushek and Woessmann, 2008), and job performance (Schmidt and Hunter, 2004). Outcomes like educational attainment, occupational choice, health related behavior, or satisfaction with life shape an individual's life. At the aggregate level, these outcomes are also important for societies as a whole, since they, for example, affect productivity or costs of the health care system. A better understanding of how these outcomes come about requires understanding how economic preferences and IQ form.

Conceptually, economic preferences and IQ are important facets of a person's personality (Almlund *et al.*, 2011; Borghans *et al.*, 2008). Personality emerges in childhood and adolescence and is generally thought of as relatively stable afterwards.<sup>1</sup> This paper contributes to the understanding of the origins of economic preferences and IQ by documenting a systematic and strong relationship between parental socio-economic status (SES) and a child's economic preferences and IQ. We measure parental SES by the net household equivalence income and the mother's and father's average years of education. Previous work (Cunha and Heckman, 2007; Heckman, 2008) stresses the importance of parental investments in their children for shaping a child's personality. In the model suggested by Cunha and Heckman (2007) and Heckman (2008), parental SES is a prime candidate for shaping a child's personality since parental SES largely defines the monetary and cognitive resources available to parents for educating their child. These resources are a crucial

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<sup>1</sup>See Almlund *et al.* (2011), p.117ff or Borghans *et al.* (2008) for a general discussion on the stability of personality. During their development process, children typically become more patient (Bettinger and Slonim, 2007), less risk seeking (Paulsen *et al.*, 2011), and more altruistic (Fehr *et al.*, 2008).

prerequisite for parental investments.

We proceed in three steps. First, for each facet of personality under study, we document whether there is a significant relationship between parental SES and the respective facet of a child’s personality. For that purpose, we regress the different personality traits on parental education and household income only. Our results document a strong relationship between parental socio-economic status and a child’s risk preferences, time preferences, and IQ. An obvious question is whether differences in a child’s personality are only driven by differences in household income and parental education or whether they are also shaped by other dimensions of a child’s environment that differ by parental socio-economic status. We therefore, in a second step, investigate differences in family structure, initial conditions at birth, the personality profile of the child’s mother, and different aspects of parental behavior such as parenting style, the time parents spend with their children, and the quality of time spent together. In our analysis, we show that these environmental dimensions systematically differ according to parental SES. In a final step, we investigate to which extent the relationship between parental SES and a child’s personality is due to the documented differences in a child’s environment. The additional environmental variables add explanatory power and reduce the coefficients of household income and parental education by about 20 to 40%. However, household income and parental education remain significant and important predictors of a child’s personality.

The dataset that we use in this study comprises measures of time preferences, risk preferences, and altruism that are based on incentivized experiments with 732 children. All 732 children also participated in fluid and crystallized IQ tests. Moreover, for all children we have detailed questionnaire measures (completed by their mothers) on their family’s SES, the child’s initial conditions at birth (such as weight at birth, the week of gestation at birth, and the number of older siblings at birth), and family structure (whether the child lives with a single parent, the age of the mother at birth, and the current number of siblings at home). Using information on the mother’s IQ and the economic preferences of the mother, we partially control for genetic transmission of ability and a direct intergenerational transmission of economic preferences. Moreover, we have information on the parenting style, on how many hours per week the mother is the main carer of her child, and what parents actually do with their child when they spend time together.

Studying the relationship between parental SES and a child’s personality is important in at least three respects. First, it enhances our understanding of the sources of heterogeneity in personality. Second, it may be helpful in explaining social immobility. It is well documented that

individuals with different personality profiles are likely to end up with, e.g., different economic, social, and health outcomes in life (Chabris *et al.*, 2008; Sutter *et al.*, 2010; Golsteyn *et al.*, 2013; Dohmen *et al.*, 2011; Heckman and Vytlačil, 2001; Hanushek and Woessmann, 2008). An individual’s SES is one of those outcomes. Social immobility occurs if children from parents with high SES are more likely to develop a personality profile that is associated with outcomes that result in high SES. This is exactly the link we find.

Finally, the fact that children’s preferences vary systematically with the SES of their parents is also important when explaining (later) life outcomes with differences in preferences in childhood or adolescence. An example is the seminal work of Mischel *et al.* (1989) who show that the amount of “self-imposed delay of gratification” at the age of four is significantly related to academic and social competence and verbal fluency ten years later. In the light of our findings, it is important to include information on parental SES when analyzing the influence of preferences on outcomes to avoid potential omitted variable bias. A similar line of reasoning applies to Sutter *et al.* (2010) who document that more impatient adolescents are more likely to spend money on alcohol and cigarettes, have a higher BMI, and are less likely to save money.

To the best of our knowledge, this is the first study to focus on analyzing the effect of parental SES on children’s time preferences or risk preferences measured in incentivized experiments. In the domain of social preferences, Bauer *et al.* (2011) find that children from families with higher SES are more altruistic, i.e., more likely to donate to another child in a binary dictator game experiment. In contrast to their study, we do not find an effect of parental SES on children’s altruism. While research on the relation of parental SES and children’s economic preferences is still in its infancy, the relationship between parental SES and children’s IQ is well established and, according to Bradley and Corwyn (2002), especially clear cut: Children from high SES families score significantly higher on IQ tests.

The remainder of the paper is organized as follows: First, we describe the composition of our sample and our measures of economic preferences and IQ. Section 3 outlines the estimation strategy. Section 4 contains the results and embeds our findings in the existing literature. In the final section, we discuss the main implications of our findings.

## 2 The data

### 2.1 The sample

Our sample consists of 732 children and their mothers who were recruited using official registry data.<sup>2</sup> Interviews took place in Bonn and Cologne (Germany) and were conducted by trained university students (mostly graduates) of psychology or education science. Children participated in a sequence of 7 experiments, 2 short intelligence tests for fluid and crystallized IQ, and answered a brief questionnaire. In total, the interviews lasted about one hour. Children were paid and incentivized using toys and a small amount of money with a total average value of about 9 Euro. We introduced an experimental currency called “stars”. At the end of all experiments, children could exchange the amount of paper stars won into toys. Presents were arranged in four categories which visibly increased in value and subjective attractiveness to children (see figure A.1 in the Appendix). During the experiments, children knew that more stars would result in the option to choose a present from a higher category. We ensured that each additional star that would not result in a higher category still had an extra value to the children by converting these additional stars into Lego bricks.

During the time children participated in the experiments, their mothers<sup>3</sup> filled out a very comprehensive questionnaire with the following categories of topics:

- Basic information about the child, e.g., name, age, etc.
- Socio-economic background of the family
- Health status of the child and information about the early childhood environment
- Details about child care and parenting style
- Assessments of personality and attitudes of the child

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<sup>2</sup>We received a random selection of approximately 90% of the addresses of families living in Bonn and Cologne (Germany) who had children of age seven to nine. These families were informed about the study via postal mail. 12.5% (N=1874) of the contacted families were interested in participating. Mainly due to capacity constraints for the current study, we could not invite all families.

<sup>3</sup>Actually, 96% of the children were accompanied by their biological mother, 2% by their biological father, 3 children by a step or foster parent, one child by the new partner of a biological parent. We do not have unambiguous information on the accompanying person for about 1% of the children. Throughout the paper, we will use the term “mother” for the adult accompanying the child.

- Personality, preferences, and attitudes of the mother

Table 1 shows some basic characteristics of the participating children and their mothers. The monthly net household equivalence income (hereafter referred to as income) is calculated by dividing the total monthly nominal household income (including any transfers, but after taxes) by a factor that takes into account household size. In particular, the factor takes on the value 1 for a single-person household. For each additional person aged 14 years or older 0.5 is added, for each person younger than 14 years 0.3 is added. This approach of calculating the equivalence income is suggested by the OECD. The rationale for calculating the equivalence income is to account for the number of persons living in a household, while also taking into account economies of scale of a household. On average, income equals 1265 Euro and the median is 1111 Euro. The average income in our sample corresponds to a household that is roughly positioned at the 40% quantile of the German income distribution.<sup>4</sup> The level of education is measured in years of education averaged over mothers and fathers. This variable is created by adding up numbers of years of schooling and occupational training (including university). On average, parents have 12.8 years of education which corresponds to having completed a standard apprenticeship after obtaining the secondary school level certificate. Roughly 52% of the children are boys. On average, the children have 1.18 siblings. The number of siblings ranges from 0 to 7 siblings with a median of 1.

Table 1: Basic Characteristics of the Sample

Variable	Mean	Std. Dev.	Median	Min	Max
monthly net equivalence income (in 1000 Euro)	1.265	0.668	1.111	0.186	7.143
avg. parental years of education	12.81	2.79	12.25	7	18
male	0.52	—	—	—	—
age (in months)	93.39	6.29	92	84	113
number of siblings	1.18	1.05	1	0	7

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<sup>4</sup>This statement is based on own calculations using the self-reported income data from the SOEP in year 2009 and the cross-sectional weights provided in the SOEP data to make the data representative for the German population.

## 2.2 Description of experiments and IQ tests

In the following, we explain the three incentivized experiments used to measure time preferences, risk preferences, and altruism of the children. We then present the IQ tests.

### 2.2.1 Time preferences: Piggybank experiment

Children were endowed with seven 20 cent coins. They could choose how many coins to put in a piggybank and how many to take immediately. The amount put in the piggybank was doubled and sent to the children via postal mail one week after the interview. We took great care in ensuring that the amount of coins put into the piggybank was not influenced by children's trust in the saved money being indeed delivered to them: we explicitly addressed the letter to the children themselves, wrote addresses on the envelope, and put the saved amount of money in the envelope while the children were watching.<sup>5</sup> Understanding of the game was checked via a control question. The game only started after the children had fully understood its rules.

The amount of coins put into the piggybank is our observational measure for the child's discount rate. In particular, a higher number of coins put into the piggybank implies lower discounting of the future.<sup>6</sup> To see this, assume that the utility of consumption today and consumption in one week follows a twice differentiable utility function  $u$  with  $u'(x) > 0$ ,  $u''(x) < 0$ ,  $u'(0) \rightarrow \infty$  and let future utility be depreciated by  $\delta$  (discount factor), with  $0 \leq \delta \leq 1$ . Let  $a$  denote the number of coins put in the piggybank and let  $b$  denote the total number of coins available. Then, the child faces the following maximization problem:

$$\underset{a}{\text{maximize}} \quad u(b - a) + \delta u(a)$$

In the optimum, it holds

$$u'(b - a) = \delta u'(a).$$

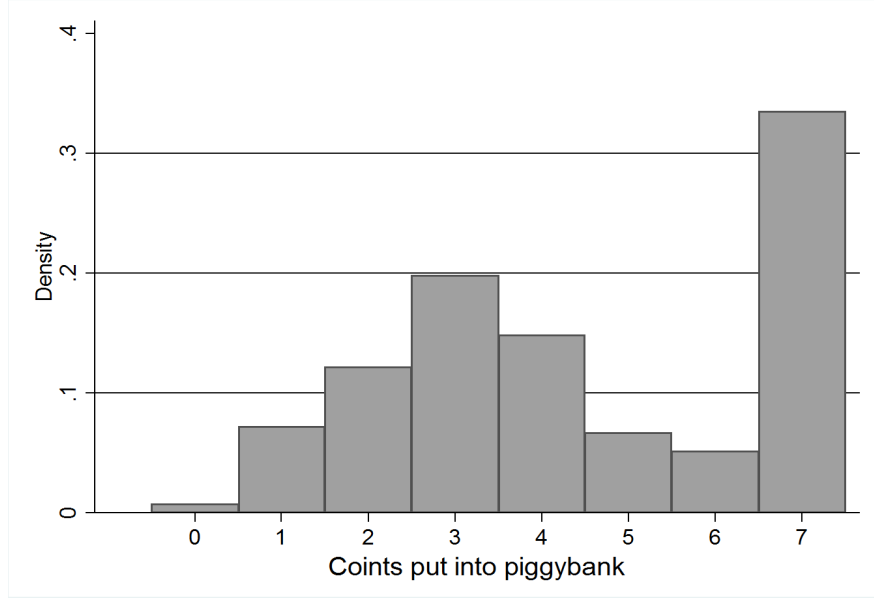
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<sup>5</sup>Moreover, detached from this experiment, we asked the children three questions concerning their general trust in other people. Using the answers to these questions, we build a standardized trust score. Neither Pearson nor Spearman correlations of the trust score with the number of saved coins are significantly different from zero at any conventional significance level. We infer that children's level of trust in other people does not influence their decision in the Piggybank experiment.

<sup>6</sup>This holds under the assumption that children do not take into account their current financial situation when evaluating the saving decision. Table 2 in section 4 provides some affirmative evidence for this assumption as net household equivalence income of the family is not significantly related to the decisions of the children.



Figure 1: Distribution of Saving Decisions (Histogram)



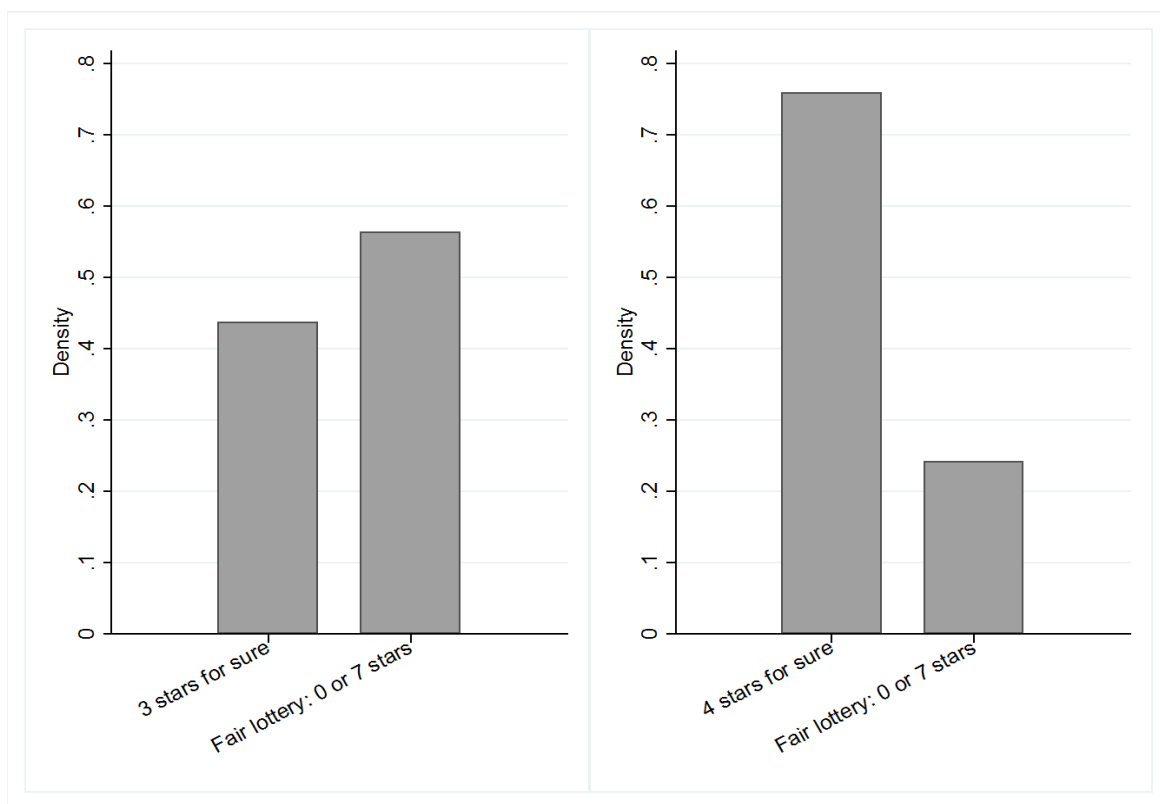
This implies that larger values of  $\delta$  result in larger values of  $a$ , i.e., the less the future is discounted, the more coins are put into the piggybank.

Figure 1 shows the distribution of saving decisions. About 35% of the children choose to “save” 7 coins. Overall, there is substantial variation in the saving choices. The average number of coins put in the piggybank is 4.49 with a standard deviation of 2.12 and a median value of 4.

### 2.2.2 Risk preferences: Coin flipping experiment

To elicit risk preferences, the interviewer presented two coins. One of the coins had three stars printed on each side. The other coin had one side with seven stars and one side with zero stars. Children chose which coin should be tossed. The interviewer explained that choosing the coin with three stars on each side implies winning three stars for sure. Choosing the other coin, however, implies that the outcome (seven or zero stars) is determined by chance, with equal likelihood for the occurrence of each outcome. The fact that the safe amount (three stars) was also ‘determined’ by a coin toss ensures that children did not choose the risky option only for entertainment or game value. After the children had made their decision, but before actually tossing the chosen coin, the interviewer presented them two more coins in another color. Now, one coin had four stars on

Figure 2: Distribution of Risk Decisions



each side, while the other coin again had zero stars on one side and seven on the other. Children made their second decision and the interviewer tossed the two chosen coins. The order in which the two variations of the game were played was randomized.

The certainty equivalent of the “lottery coin” is 3.5. As such, only risk averse subjects would choose the safe outcome of three stars over the lottery. Likewise, only risk seeking subjects would choose the lottery over the safe outcome of four stars. Thus, we have one situation in which we can identify risk averse subjects and one in which risk seeking subjects are identified. We classify a child as risk averse if he prefers three stars for sure over the lottery. A child is classified as risk seeking if he opts for the lottery instead of a safe amount of four. Finally, a child is risk neutral if he chooses the lottery instead of the safe amount of three and the safe amount of four instead of the lottery. Children who opt for the safe amount of three while choosing the lottery over the safe amount of four make an inconsistent choice and are excluded from the analysis.

Figure 2 depicts the frequencies of choices in the two lotteries excluding inconsistent choices. More children chose the lottery when the safe amount is lower. In particular, 56% of the children choose the lottery over the safe amount of three, while only 24% of the children choose the lottery in case the safe amount equals four. Overall, 39% of all children are risk averse, 29% are risk neutral, 22% are risk seeking, and 11% of the children make inconsistent choices.

### 2.2.3 Altruism: Dictator game experiment

Altruism was elicited using a binary sharing game (Fehr *et al.*, 2011). In the sharing game, subjects can decide between the allocations (2,0), i.e., two stars for themselves and no star for another child, or (1,1), i.e., one star for each child. Children were informed that the receiving child is of the about same age as they are, lives in the same city, but is unknown to them and has no relation to the interviewer.

Figure 3: Share of Altruistic Children

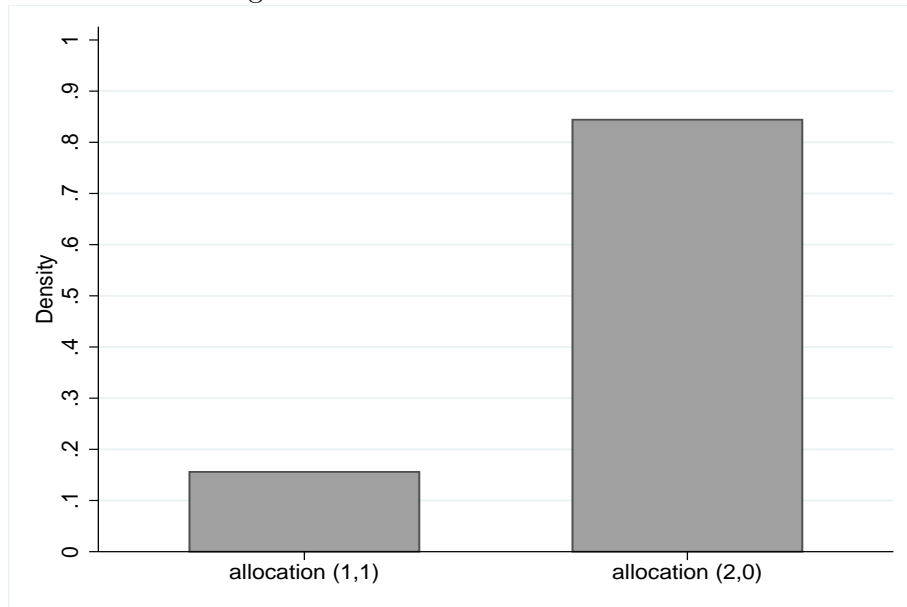


Figure 3 shows that about 15.6% of children behave altruistically, i.e., share the two stars equally, while 84.4% keep both stars for themselves.

### 2.2.4 IQ

We elicited two separate measures for crystallized and fluid IQ. Following the work of Cattell (1971), these two basic components form general intelligence or simply IQ. Fluid IQ measures the

more hereditary part of the overall IQ that refers to general logical reasoning in new situations, intellectual capacity, or processing speed. Crystallized IQ is the part of overall IQ that broadly refers to knowledge that has been acquired in life, e.g., the vocabulary. Crystallized IQ is generally assumed to be the component of the overall IQ that is more malleable.

Figure 4: Distribution of Fluid IQ Scores (Histogram)

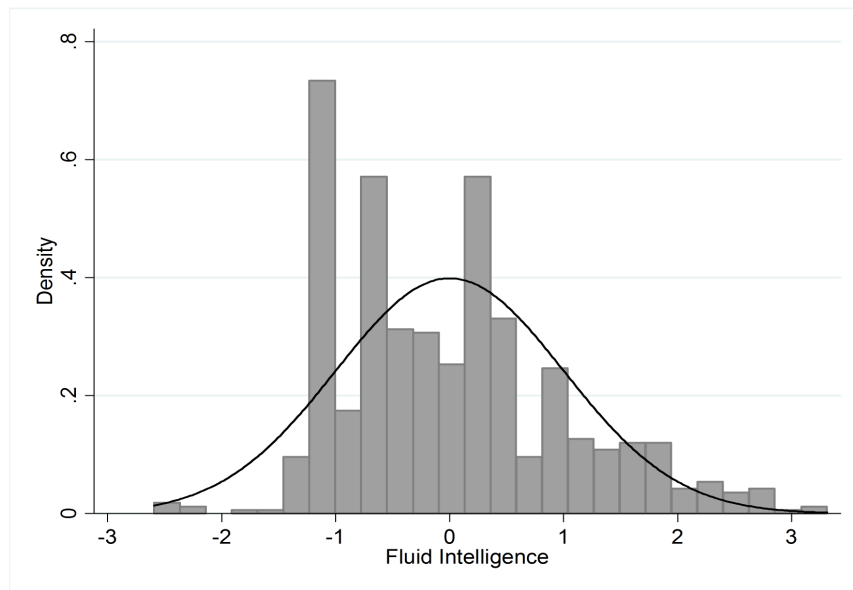
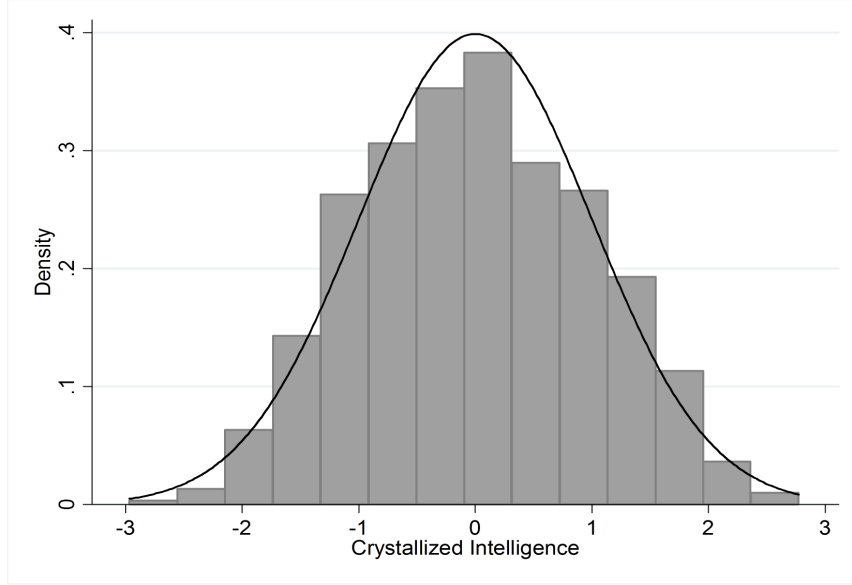


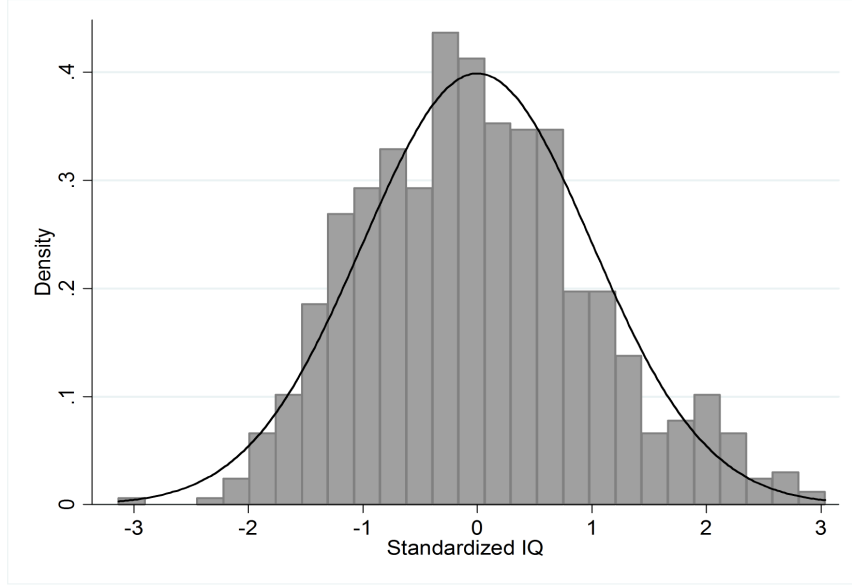
Figure 5: Distribution of Crystallized IQ Scores (Histogram)



We measured fluid IQ with the matrix test of the HAWIK IV, which is the German version of the well-established Wechsler IQ test for children (Petermann and Petermann, 2010). Children were presented up to 35 blocks or rows of pictures featuring different colors and forms. In each block or row one cell was missing. Each time, children had to choose which of five pictures fitted best into the missing cell. The test contains a stopping rule which ends the test in case children produce four wrong answers in a row or in case four out of five answers in a row are wrong. The number of correct answers is our proxy for fluid IQ. Crystallized IQ was measured using 14 items of the German translation of the commonly used Peabody Picture Vocabulary Test Revised (PPVT-R) (Dunn and Dunn, 2007).<sup>7</sup> Here, the interviewer read out a word and showed the child four pictures. Children had to decide which picture fitted the word best. The number of correct answers is our measure for crystallized IQ.

<sup>7</sup>Due to time constraints, we had to restrict the test to 14 items. We have chosen those 14 items that had the largest discriminatory power in the SOEP pretest data of the mother and child questionnaires “MukIIIb” and “MukIIIC” that were based on a 61 item version of the PPVT-R test.

Figure 6: Distribution of IQ Scores (Histogram)



We standardize both, the measure for fluid and the one for crystallized IQ. The distribution of fluid and crystallized IQ scores, which are positively correlated (correlation coefficient of 0.28), is shown in Figures 4 and 5. In each picture, the width of each bar is chosen such that each bar corresponds to one (discrete) value of the obtained IQ score. For comparison purposes, we also plot a standard normal distribution in the histograms. Moreover, we calculate the overall IQ as the sum of the two standardized variables which is then again standardized. The overall IQ scores, which are shown in Figure 6, lie in an interval of three standard deviations around the mean. Expressed on the typical IQ scale with mean 100 and standard deviation of 15 IQ points, we observe IQ's ranging from about 55 to 145. This shows that our IQ tests sensitively differentiate between a wide range of possible IQ scores.

### 3 Estimation strategy

Our aim is to investigate how children's personality is influenced by the SES of their parents. For that purpose, we use measures of two crucial dimensions of parental SES: household income

and parental education.<sup>8</sup> More precisely, we use average years of education of the parents and the logarithm of monthly disposable household income (in net equivalence terms) as explanatory variables. Using the logarithm allows for a decreasing marginal effect of income on our measures of personality traits.<sup>9</sup>

We provide three different sets of results. First, for each facet of personality under study, we document whether there is a significant relationship between parental SES and a child’s personality. For that purpose, we regress the different personality traits on parental education and the logarithm of household income only (baseline specifications). In a next step, we add the child’s age in months and a gender dummy as explanatory variables since previous research has documented their predictive power for a child’s personality. Age and gender are clearly orthogonal to parental SES.

An obvious question that arises is how differences in SES affect a child’s environment and how these environmental differences shape the formation of preferences. Are the documented differences in a child’s personality only due to differences in household income and parental education, i.e., differences in the monetary and cognitive resources that parents have available for educating their child? Or are they also due to other dimensions of a child’s everyday environment that differ by parental SES? The available information covers differences in family structure, initial conditions at birth, the personality profile of the child’s mother, and different aspects of parental behavior such as parenting style, the time parents spent with their children, and the quality of time spent together. In the second part of the results section, we document that these variables differ significantly by parental SES. In the last part of the results section, we add these variables as explanatory variables to our baseline specifications (full specifications).

The remainder of this section motivates and describes the variables that we use to characterize a child’s environment, that could differ by parental SES and affect a child’s personality. First,

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<sup>8</sup>There exist no universal consensus about how to measure SES. It is usually measured by some combination of income, education, and occupation. Bradley and Corwyn (2002) provide a brief discussion of the history and definition of the term SES. Our data also contain information on parental occupation (in 20 categories such as being self-employed, a blue-collar worker, a white collar-worker, or a civil servant). Still, we prefer focusing on parental income and education as measures of parental SES, because they are quantifiable in natural units and thus well apt for our empirical analysis. Furthermore, taken together, variation in educational attainment and income, largely captures variation in occupational status.

<sup>9</sup>In terms of significance, results for all dependent variables are robust to using a linear income term instead of the logarithm of income.

the work of Heckman and coauthors (Cunha and Heckman, 2007; Heckman, 2008) stresses the importance of parental investments in their children as well as children’s initial conditions for the development of a child’s personality. It seems plausible that parental investments and initial conditions differ by parental SES. For example, having a mother who works will increase household income and, at the same time, is likely to reduce the amount of time a mother spends with her child. To add information on some of the most important parental investments we include separate variables that capture the amount of time (in hours per week) that mothers spend with their children as the main carer and the quality of time spent together. The quality of time spent together is derived in a principal component analysis on questionnaire measures that ask for the kind and frequency of joint activities of mothers and their children (for details see Appendix “Additional Information on Explanatory Variables”). The principal component analysis results in four components that we include as additional regressors. The components capture the intensity of (i) everyday interaction with the child such as having joint meals, talking, or doing homework assignments together, (ii) highly interactive activities such as reading to a child, going in for sports or playing music with the child, (iii) low interaction activities that provide inputs to the child, but imply lower levels of interaction between parents and children such as meeting other families, shopping, going to theater, a museum, or the movies and (iv) joint media consumption, e.g., watching TV or playing computer games together. Furthermore, we control for initial conditions by including information on a child’s weight at birth, the week of gestation in which a child was born, and the child’s number of siblings at birth.

Second, we control for different parenting styles using six variables that reflect to which extent parenting styles are characterized by emotional warmth, negative communication, inconsistent parenting practices, monitoring, strict control, and psychological control (for details see Appendix “Additional Information on Explanatory Variables”). Doepke and Zilibotti (2012) present a theoretical model in which they argue that parenting style depends on the socio-economic environment a family lives in and that parenting style may affect children’s preferences.

Third, we use information on the mother’s IQ and economic preferences.<sup>10</sup> For adults, previous studies document intergenerational transmission of economic preferences (Dohmen *et al.*,

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<sup>10</sup>Unfortunately, we do not have information on the father’s economic preferences and IQ. However, Anger and Heineck (2010) show that mothers play a more important role in the transmission of cognitive abilities than fathers. Furthermore, Dohmen *et al.* (2012) document a strong positive correlation of preferences within married couples that is consistent with positive assortative mating, a prediction of the models of Bisin and Verdier (2000) and Bisin and Verdier (2001) on the cultural transmission of preferences.



2012; Kosse and Pfeiffer, 2012). For example, grown-up children whose parents are risk averse display a higher likelihood of being risk averse as well. Therefore, we include questionnaire measures of the mother’s risk preferences, time preferences, and altruism as further control variables. These measures have been validated using incentivized experiments by Falk *et al.* (2012). Moreover, evidence for the transmission of cognitive ability from parents to their children is abundant. Besides measuring children’s fluid and crystallized IQ, we have also elicited mothers’ fluid IQ. Whenever an IQ score of the child is the dependent variable, we control for the mother’s IQ. Whenever a child’s economic preference is the dependent variable, we control for both the child’s overall IQ score and the mother’s IQ.

Finally, we include information on the family structure: a dummy for whether a child lives with a single parent, the mother’s age at birth that could have affected the mother’s level of education, and how many siblings currently live in the household.

Appendix “Additional Information on Explanatory Variables” documents how the additional control variables were elicited and Table B.1 in the Appendix contains basic summary statistics of all explanatory variables.

## 4 Results

### 4.1 The relationship between parental socio-economic status and a child’s personality

Tables 2 and 3 present the main results of our analysis. Columns (1.1), (2.1), (2.3), and (3.1) in both tables display the results of the baseline specifications. They suggest that all facets of a child’s personality under study vary systematically with parental SES. The only exception is altruism. More precisely, we find that children of higher educated parents are significantly more patient ( $p\text{-value} < 0.01$ ) and significantly less likely to make risk seeking choices ( $p\text{-value} < 0.01$ ). Furthermore, crystallized and overall IQ are significantly higher for higher levels of household income and parental education (all  $p\text{-values} < 0.01$ ). The same is true for fluid IQ (for income,  $p < 0.05$ , for parental education,  $p < 0.1$ ).

Table 2: Baseline Specifications - Economic Preferences

Variables	(1.1) Time Preferences (Coins in Piggybank)	(1.2) Time Preferences (Coins in Piggybank)	(2.1) Risk Neutrality (Coin 3-3 vs. 7-0)	(2.2) Risk Neutrality (Coin 3-3 vs. 7-0)	(2.3) Risk Seeking (Coin 4-4 vs. 7-0)	(2.4) Risk Seeking (Coin 4-4 vs. 7-0)	(3.1) Altruism (Dictator Game)	(3.2) Altruism (Dictator Game)
Ln(income)	0.132 (0.186)	0.049 (0.182)	-0.013 (0.047)	-0.018 (0.047)	0.005 (0.041)	0.004 (0.041)	-0.019 (0.032)	-0.016 (0.032)
Education	0.134*** (0.033)	0.152*** (0.032)	-0.003 (0.008)	-0.001 (0.008)	-0.021*** (0.007)	-0.020*** (0.007)	0.002 (0.006)	0.001 (0.006)
Age child		0.050*** (0.012)		-0.001 (0.003)		-0.006** (0.003)		0.005** (0.002)
Male		0.572*** (0.152)		0.099*** (0.038)		0.067** (0.033)		-0.096*** (0.027)
Constant	2.760*** (0.415)	-2.410** (1.193)	0.177 (0.274)	0.341 (0.791)	0.006 (0.289)	1.629* (0.868)	-1.110*** (0.309)	-2.757*** (0.955)
Obs.	721	721	648	648	648	648	724	724
R-squared	0.035	0.072	0.005	0.013	0.030	0.042	0.001	0.029
Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1								

We estimate the correlates of time preferences using OLS and the correlates of risk preferences and altruism with a probit model and display coefficients for OLS and average marginal effects for probit. The dependent variable for time preferences is the number of coins put into the piggybank. The binary variable risk neutrality equals 1 if a child chooses the coin with 7 stars on one and zero stars on the other side and 0 if a child chooses the coin with three stars on each side (risk aversion). The binary variable risk seeking equals 1 if a child chooses the coin with 7 stars on one and zero stars on the other side and 0 if a child chooses the coin with four stars on each side (risk aversion or risk neutrality). We exclude all inconsistent risk choices. In columns (2.1) to (2.4), we include one additional explanatory variable, a binary indicator of which coin toss decision was presented first. The binary variables altruism equals 1 if the child shares two stars equally and 0 if it keeps both stars. Income denotes monthly net household equivalence income in thousand Euro, years of education measures the mother's and father's average years of education. Children's age is measured in months, male is binary indicator that equals 1 for boys and zero for girls. R-squared displays Adjusted R-squared in OLS regressions and Pseudo R-squared in probit regressions.

Table 3: Baseline Specifications - IQ

	(1.1)	(1.2)	(2.1)	(2.2)	(3.1)	(3.2)
Variables	Overall IQ score		Crystallized IQ score		Fluid IQ score	
Ln(income)	0.348*** (0.084)	0.309*** (0.080)	0.390*** (0.082)	0.351*** (0.079)	0.168** (0.085)	0.143* (0.083)
Education	0.071*** (0.015)	0.080*** (0.014)	0.084*** (0.015)	0.093*** (0.015)	0.029* (0.015)	0.035** (0.015)
Age child		0.045*** (0.005)		0.038*** (0.005)		0.034*** (0.006)
Male		0.081 (0.067)		0.133** (0.066)		-0.003 (0.072)
Constant	-0.944*** (0.188)	-5.277*** (0.534)	-1.120*** (0.189)	-4.844*** (0.521)	-0.392** (0.189)	-3.602*** (0.592)
Observations	731	731	731	731	731	731
R-squared	0.105	0.185	0.140	0.201	0.021	0.065
Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1						

We estimate the correlates of overall, crystallized, and fluid IQ scores using OLS. Crystallized IQ is the standardized outcome (mean 0, a standard deviation of 1) of the short version of the Peabody Picture Vocabulary Test Revised (PPVT-R). Fluid IQ is the standardized outcome (mean 0, a standard deviation of 1) of the matrix test of the HAWIK IV. Overall IQ is the standardized sum (mean 0, a standard deviation of 1) of our measures of crystallized and fluid IQ. Income denotes monthly net household equivalence income in thousand Euro, years of education measures the mother's and father's average years of education, children's age is measured in months, male is binary indicator that equals 1 for boys and zero for girls.

Columns (1.2), (2.2), (2.4), and (3.2) in Table 2 show that there is a statistically significant gender effect for each of the three key economic preferences. Boys are more patient and less altruistic than girls. They are more likely to be risk neutral instead of risk averse and more likely to be risk seeking than girls. The fact that boys are more likely to take risks is well-established in the literature (Moreira *et al.*, 2010; Cárdenas *et al.*, 2011; Sutter *et al.*, 2010). The influence of gender on patience is less clear. While we find that boys are more patient than girls, Bettinger and Slonim (2007) and Castillo *et al.* (2011) find the opposite. Concerning altruism, our findings corroborate the results of Fehr *et al.* (2011) that are based on the same sharing game that we use. In line with our results, in the sharing game, girls of age 8 or 9 are significantly more likely than boys to choose the (1,1) option and hence are more altruistic.

Moreover, we find that older children are more patient, less likely to make risk seeking choices, and score higher in both crystallized and fluid IQ tests. The effects of age on preferences are well in line with the literature. Mischel and Metzner (1962) and Bettinger and Slonim (2007) also find

that older children are more patient and, e.g., Slovic (1966) documents that older children are less willing to take risks. Also in line with our results in column (2.2) of Table 3, e.g., Horn and Cattell (1967) document that crystallized IQ increases with age.

## 4.2 How does a child's environment differ by parental socio-economic status?

Table 4 displays pairwise correlation coefficients and the corresponding significance levels between the logarithm of household income and parental education, our key measures of parental SES, and further variables that characterize a child's everyday environment. Most of the correlations are highly significant revealing that the environment of children from families with different SES differs significantly.

Table 4: Differences in a child's environment by parental SES

	Ln(income)		Education	
	Correlation	Significance	Correlation	Significance
Week of gestation	0.12	***	0.14	***
Weight at birth	0.11	***	0.13	***
N older siblings	-0.16	***	-0.16	***
Time child care	-0.13	***	-0.03	
Low interaction	-0.15	***	-0.18	***
High interaction	0.18	***	0.23	***
Media	-0.19	***	-0.25	***
Everyday	0.07	*	0.05	
Style warmth	0.12	***	0.02	
Style neg. comm.	-0.05		0.04	
Style inconsistent	-0.07	*	-0.12	***
Style strict	-0.10	**	-0.06	
Style monitor	0.08	*	0.06	
Style psycho	-0.20	***	-0.22	***
IQ child	0.28	***	0.29	***
IQ mother	0.34	***	0.37	***
Time preferences mother	0.04		0.13	***
Risk preferences mother	0.08	**	0.08	**
Altruism mother	-0.02		-0.02	
N siblings	-0.22	***	-0.10	**
Single parent	-0.03		0.03	
Age mother	0.29	***	0.32	***

Results from Table 4 show that initial conditions at birth differ significantly for children from families with different parental SES. Children from parents with higher income and higher educational attainment typically have a higher weight at birth and are born in a later week of gestation, two indicators that represent favorable initial conditions. Furthermore, children with

high SES background typically have fewer older siblings and, thus, are likely to receive more parental attention.

Also for quality of time, Table 4 documents strong differences according to parental SES. While parents with higher SES more often engage in highly interactive activities with their children such as reading to them, low SES parents more often engage in joint activities that involve lower levels of interaction such as meeting other families or shopping and spend more of the joint time with media consumption. Only in terms of joint everyday activities such as talking or having meals together differences are small. As one would expect, the correlation between household income and the time parents spend with child care is negative and significant. This correlation is likely to be due to working mothers who contribute to higher levels of household income and spend less time with their children as main care giver. In contrast, the correlation between parental education and time spent with child care is not significant.

With respect to parenting style, parents with higher SES are less likely to use inconsistent parenting practices and a parenting style that is characterized by psychological control. Inconsistent parenting practices consist of, e.g., threatening a child with a punishment without actually implementing it or the absence of consistent rules of behavior for a child. An example of a parent who is exerting psychological control is a parent who does not talk to his child for while because the child did something wrong. Moreover, in families with higher income, parenting styles that are less strict (e.g., rely less on punishment) and characterized by emotional warmth (e.g., praising a child or showing a child that parents love it) are significantly more likely to prevail.

Table 4 also documents significant correlations between SES and maternal personality. As their children, high SES mothers tend to have a higher fluid IQ score and to be more patient. Furthermore, high SES mothers tend to be less risk averse. The correlation between maternal altruism and SES, however, is not significant.

Finally, families with different SES also differ in family structure. On average, high SES families consist of significantly older mothers with fewer children. The correlation between parental SES and living in a single parent family is not significant. However, the single parent dummy is the only variable for which the correlation coefficient changes substantially when looking at the mother's years of education only instead of the average parental years of education. The correlation between maternal years of education and the single parent dummy is 0.19 and highly significant ( $p < 0.01$ ), i.e., children of higher educated mothers, but not children of higher educated parents in general, are more likely to live in a single parent family.

In sum, the correlations in Table 4 document that the childhood environment differs significantly between high and low SES households. This is true for almost all dimensions we have elicited. Building on these findings we now incorporate these environmental factors in the baseline specifications described in Tables 2 and 3.

### **4.3 Which differences in a child’s environment translate into differences in a child’s personality?**

Table 5 displays results of the full specifications in which, for each facet of personality under study, we add information on the mother’s IQ and economic preferences, maternal time investments, the quality of time mothers and children spend together, parenting style, initial conditions at birth, and family structure as explanatory variables. Except for the time the mother spends as the main carer of her children, all types of additional variables add explanatory power. Furthermore, in the full specifications, parental income and years of education remain significant predictors of many facets of a child’s personality, in particular a child’s patience, overall IQ, and crystallized IQ. However, the size of the coefficients of household income and average parental years of education is about 20 to 40% smaller than in the baseline specifications.

Table 5: Full specifications

Variables	Time Preferences	Risk Neutral	Risk Seeking	Altruism	Overall IQ	Crystal. IQ	Fluid IQ
Ln(income)	-0.176	0.014	0.012	-0.022	0.216**	0.224**	0.122
Education	0.099**	0.000	-0.012	0.000	0.057***	0.063***	0.028
Age child	0.038***	-0.002	-0.008***	0.002	0.040***	0.037***	0.028***
Male	0.530***	0.111***	0.047	-0.118***	0.082	0.137*	-0.006
IQ child	0.291***	0.031	0.032	0.010			
Dummy wave 2	0.853	0.241	0.342	-0.070	0.774	0.993	0.246
IQ mother	0.035	-0.037	-0.031	-0.008	0.077*	0.092**	0.031
Time pref. mother	-0.036	-0.003	0.008	-0.007	-0.014	-0.008	-0.015
Risk pref. mother	0.062*	0.018**	0.001	-0.002	-0.017	-0.004	-0.023
Altruism mother	0.087**	0.005	0.000	-0.003	-0.000	0.025	-0.025
Week gestation	0.006	0.005	0.004	-0.000	-0.001	-0.006	0.005
Weight at birth	0.004	0.004	-0.004	-0.004	0.017**	0.010	0.018**
# older siblings	-0.195*	0.042	0.048**	-0.029	-0.065	-0.094*	-0.010
Dummy time	-0.475	-0.021	0.060	-0.029	-0.040	-0.085	0.021
Time child care	0.001	0.001	0.000	-0.000	0.000	0.001	-0.001
Dummy quality	0.363	0.131**	0.002	0.046	-0.175*	-0.174*	-0.106
Low interaction	-0.021	0.025	0.023	-0.022	-0.033	-0.036	-0.017
Everyday	0.030	-0.015	-0.002	-0.017	0.067**	0.069***	0.038
Media	-0.018	-0.007	0.013	0.029**	-0.023	-0.063*	0.027
High interaction	-0.055	-0.034*	-0.044**	-0.003	-0.014	0.020	-0.042
Style warmth	-0.064	-0.038	-0.031	0.030	-0.055	-0.046	-0.042
Style neg. comm.	-0.237	-0.016	0.012	-0.027	-0.020	0.013	-0.044
Style inconsistent	0.193	0.051*	0.027	0.030	-0.089*	-0.017	-0.126**
Style strict	-0.024	0.002	0.020	-0.004	0.022	0.013	0.022
Style monitor	-0.037	-0.024	-0.053	0.014	0.019	-0.066	0.097
Style psycho	0.025	-0.008	-0.005	-0.044	-0.063	-0.169**	0.068
# siblings	0.014	0.020	-0.005	-0.013	-0.022	-0.011	-0.024
Single parent	-0.331*	0.051	-0.001	-0.012	0.199**	0.095	0.224**
Age mother	0.013	-0.001	-0.003	-0.004	0.002	0.008	-0.005
Lottery 4-4 first		0.082*	0.109***				
Constant	-1.757	-1.288	1.420	-0.139	-5.037***	-4.724***	-3.338***
Observations	629	563	563	631	638	638	638
R-squared	0.074	0.069	0.096	0.097	0.208	0.219	0.075

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

We estimate the correlates of time preferences, overall, crystallized, and fluid IQ scores using OLS and the correlates of altruism and risk preferences with a probit model. We display average marginal effects for probit. The dependent variables are exactly the same as in Tables 2 and 3. In columns (2.1) to (2.4), we additionally include a binary variable that equals 1 if the first lottery decision was 4-4 versus 7-0 and 0 otherwise. Income denotes monthly net household equivalence income in thousand Euro, years of education measures the mother's and father's average years of education, children's age is measured in months, male is binary indicator that equals 1 for boys and 0 for girls. All other explanatory variables are described in the Appendix. R-squared displays Adjusted R-squared in OLS regressions and Pseudo R-squared in probit regressions.

In the following, we discuss the results of the full specifications in more detail. Children of higher educated parents are significantly more patient ( $p < 0.01$ ). The child’s overall IQ score is a highly significant predictor of a child’s patience ( $p < 0.01$ ). Our results on the relationship between IQ and time preferences corroborate the results by Shamosh and Gray (2008). In a meta-study they find that cognitive skills and patience are positively correlated. Mischel and Metzner (1962) find a positive correlation of delayed gratification and IQ, while Bartling *et al.* (2010) find a positive correlation of patience with crystallized IQ only. Furthermore, children with (more) older siblings or a single parent are predicted to be less patient (both  $p < 0.1$ ). Finally, more altruistic mothers have more patient children ( $p < 0.05$ ). These latter three findings suggest that patience is a trait that needs to be trained under the guidance of an adult that dedicates all attention exclusively to the child.

The shape of the mother’s risk preferences, the number of older siblings, and the quality of time parents and children spend together have explanatory power for a child’s risk preferences. Our results provide evidence for a direct intergenerational transmission of risk preferences already in childhood. A child is more likely to be risk neutral instead of risk averse if its mother is less risk averse ( $p < 0.05$ ). If mothers spend more high quality time with their children, their children are both less likely to be risk averse ( $p < 0.1$ ) and less likely to be risk-seeking ( $p < 0.05$ ), which, taken together, results in a higher likelihood that children are risk neutral. Finally, children who have (more) older siblings are more likely to be risk seeking ( $p < 0.05$ ). For risk seeking, the coefficient of parental years of education is no longer significant ( $p = 0.12$ ) in the full specification.

Both the baseline and the full specifications underline that a child’s degree of altruism does not differ by parental SES. Despite the comprehensive set of control variables, it is actually hard to project a child’s altruistic behavior at all. In the full specification, a child’s gender remains the only variable with predictive power. As an aside, when adding children’s amount of pocket money (i.e., children’s “own income”) as explanatory variable to the full specification, we find that higher amounts of pocket money are associated with lower levels of altruism ( $p < 0.05$ ).<sup>11</sup>

The mother’s IQ, the initial conditions at birth, the quality of parental time, parenting style, and family structure are all significant predictors of a child’s IQ. On average, mothers with a higher fluid IQ have children with a higher overall and crystallized IQ ( $p < 0.1$  and  $p < 0.05$ , respectively). More favorable initial conditions are positively correlated with IQ: children with a

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<sup>11</sup>For all other personality traits under study, the amount of pocket money is not significant when added as explanatory variable.



higher weight at birth are predicted to have a higher overall and fluid IQ score ( $p < 0.05$ ). On average, children with (more) older siblings have lower crystallized IQ scores ( $p < 0.1$ ). Spending more time with talking to the child or having joint meals (i.e., in “everyday interactions”) increases the child’s crystallized and overall IQ ( $p < 0.05$ ). In contrast, spending more time with joint media consumption is associated with a lower crystallized IQ ( $p < 0.1$ ). Inconsistent parenting practices are predicted to lower overall and fluid IQ ( $p < 0.1$  and  $p < 0.05$ , respectively), a parenting style that aims at psychological control is associated with a lower crystallized IQ ( $p < 0.05$ ). Finally, children of single parents who, on average, have significantly better educated mothers score higher on overall and fluid IQ ( $p < 0.05$ ). Despite the strong explanatory power of the control variables, children from high SES families are still predicted to have significantly higher overall and crystallized IQ scores (for income, p-values  $< 0.05$ , for parental education, p-values  $< 0.01$ ). For fluid IQ, the coefficients of household income ( $p = 0.22$ ) and parental education ( $p = 0.15$ ) that were (marginally) significant in the baseline specification are no longer significant.

The effect of parental SES on a child’s personality is not only statistically significant, but also relevant in terms of effect size. For example, in the full specifications, the patience of a child whose parents have four more years of education, e.g., a university degree as opposed to a standard apprenticeship, is as high as if the child was about one year older. On average, having parents who have one more year of education is associated with an increase in a child’s patience to the level of a child who has a mother with a 5 point higher IQ score. The effect of having parents with one more year of education is predicted to increase a child’s overall and crystallized IQ by about 0.06 standard deviations (i.e., about 1 point). A 10% increase in household income is predicted to increase both a child’s overall and crystallized IQ by about 0.3 points.

#### 4.4 Related literature

The literature on the relationship between a child’s economic preferences and parental SES is basically nonexistent. We are not aware of any other study that investigates the effect of parental SES on children’s time preferences. Delaney and Doyle (2012) is the study that comes closest to analyzing this relationship. They use parental answers to questions concerning psychological concepts such as hyperactivity, impulsivity, and persistence of three year old children and show that children from families with higher SES (measured by household income and parental education) are less impulsive.

Concerning risk preferences, Alan *et al.* (2013) study the intergenerational transmission of risk attitudes and use maternal and paternal years of education as control variables that turn out not to be significant. With an average of 5.9 years of education for mothers and 7.4 years for fathers their sample seems to be largely restricted to low SES families. Furthermore, they use information on a family’s belongings and monthly expenditures to construct four dummies that split their sample in SES quartiles. These dummies do not have predictive power for boys’ risk attitudes, but girls from low SES families are less risk averse. In their data, mother’s and child’s risk attitudes are measured in a similar, incentivized task. However, their measure of risk attitudes cannot distinguish between risk neutrality and risk seeking, i.e., the range in which we document a significant relation between parental education and risk preferences in the baseline specification. For adults, there is evidence that parental education enhances the willingness to take risk (Dohmen *et al.*, 2011). At first sight, this finding seems to contradict our finding that higher parental education reduces the probability of being risk seeking as opposed to being risk neutral or risk averse. However, only a small fraction of adults is risk seeking (e.g., 9% in Dohmen *et al.* (2011)), while 24% of the children in our study are risk seeking. Hence, an increased willingness to take risks for adults essentially means going from risk aversion in the direction of risk neutrality. That corresponds to what we find for children: On average, children of higher educated parents have risk preferences which are closer to risk neutrality. The only difference is that they move in the direction of risk neutrality from risk seeking instead of risk aversion.

In the domain of social preferences, Bauer *et al.* (2011) is the only closely related study.<sup>12</sup> They assess children’s social preferences in a series of choice tasks as in Fehr *et al.* (2008) and Fehr *et al.* (2011) and find that children from higher educated parents are more likely to share two tokens equally with another child instead of keeping both for themselves in the binary sharing game. The educational attainment of the parents is proxied by a dummy variable indicating low education, i.e., that neither mother nor father has completed secondary school education with a leaving exam. In contrast to their study, we do not find an effect of parental SES on children’s altruism. We can only speculate why results differ. Notable differences between both studies comprise sample size, the way parental SES is measured, and the kind of controls that are used.<sup>13</sup>

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<sup>12</sup>Benenson *et al.* (2007) also present evidence that higher SES leads to higher levels of altruism. In their study, however, SES is only measured at school level using the fraction of children who receive a free lunch.

<sup>13</sup>We use more detailed, continuous measures of parental SES capturing income and education, while Bauer *et al.* (2011) focus on a binary indicator variable for education. As control variables, Bauer *et al.* (2011) use a child’s age, gender, and dummies indicating whether parents are separated and whether the mother is working full time.

While research on the relation of parental SES and children’s economic preferences is still in its infancy, the effect of parental SES on children’s overall IQ is well established. Neff (1938) documented the positive correlation of IQ and parental SES. In a study on adopted children, Capron and Duyme (1989) use information on parental SES of both foster and biological parents of the same children to illustrate that parental SES is positively correlated with children’s IQ even if the effect cannot work through genetic transmission. Rindermann *et al.* (2010) and Turkheimer *et al.* (2003) are examples of studies that separately analyze the role of parental SES for crystallized and fluid IQ. Again, they document a significant and positive effect of higher parental SES on both components of IQ. Anger and Heineck (2010) and Rindermann *et al.* (2010) point to a larger parental influence on crystallized IQ as opposed to fluid IQ that is supposed to have a stronger hereditary component than crystallized IQ. Similarly, Hackman and Farah (2009) provide evidence that the effect of poverty is especially strong for certain neurocognitive systems, including language ability that is reflected in crystallized IQ scores. Our findings are in line with all results on the relationship between parental SES and IQ that are described above.

## 5 Discussion

Our results show that parental SES is a systematic predictor of a child’s personality. Children from families with higher SES are more patient, less likely to be risk seeking, and score higher on tests of crystallized, fluid, and overall IQ. In a first, purely correlational analysis, we have focused on how two core dimensions of parental SES, i.e., household income and parental education, relate to a child’s personality. As a second step, we have documented that the family environment that children from families with different SES live in differs not only with respect to parental education and household income, but also in many other dimensions. In the final step of analysis, we included a broad set of further explanatory variables that characterize a child’s environment and reflect systematic differences between families with different SES such as quantity and quality of time parents spend with their children, parenting style, the mother’s IQ score and economic preferences, initial conditions at birth, and family structure. While these additional variables have explanatory power for the shape of a child’s personality, our results document an effect of parental education and income on top of these variables.

Our results enhance the understanding of the origins of heterogeneity in personality. In the following, we discuss further implications of our finding that children from families with different

SES have different personality profiles.

First, we discuss our results in the light of the literature that relates preferences and cognitive ability to many important outcomes in life. For patience and IQ, the claim that higher levels tend to be more favorable for many life outcomes is largely uncontroversial. For example, higher levels of IQ are associated with higher levels of education (Heckman and Vytlačil, 2001) and income (Hanushek and Woessmann, 2008). Also higher levels of patience predict a wide range of positive outcomes in later life such as higher educational attainment (Shoda *et al.*, 1990), substantially higher earnings, less use of welfare and fewer days of unemployment (Golsteyn *et al.*, 2013), and better health outcomes (Chabris *et al.*, 2008; Sutter *et al.*, 2010; Golsteyn *et al.*, 2013; Shoda *et al.*, 1990). In that sense, our results suggest that, on average, children from families with lower SES are disadvantaged already when they are about seven to nine years old. Of course, this line of reasoning assumes that disparities in personality of children from different socio-economic backgrounds persist or even increase as children grow older. The literature on the formation of cognitive and non-cognitive skills does indeed provide evidence for growing disparities that are due to the self-reinforcing and cross-fertilizing character of skills (Cunha and Heckman, 2007).

In contrast to patience and IQ, there is no obvious optimal degree of risk aversion that is independent from the environment an individual lives in. Doepke and Zilibotti (2012) introduce the distinction between endogenous and exogenous risk that individuals are exposed to. While exogenous risks cannot be avoided, taking an endogenous risk is a deliberate decision that depends on the individual risk attitude. If families with low SES are more strongly exposed to exogenous risks such as, for example, street crime in their neighborhood or the risk of becoming unemployed, low SES parents have lower incentives to intervene their children's risk seeking behavior. Being less risk averse might be helpful to successfully cope in a relatively high risk environment. Coping to environments with different degrees of exposure to exogenous risks could explain the pattern that we observe in our data that children from families with lower SES are more likely to be risk seeking. Also with respect to endogenous risks, it is hard to claim that there is a unique optimal level of risk attitude. For example, Dohmen *et al.* (2011) document that a higher willingness to take risks is both associated with outcomes that are typically thought of as detrimental (e.g., smoking) or supportive to good health (e.g., taking exercises).

Second, our results provide insights when it comes to explaining social immobility, i.e., the fact that, as adults, children from high (low) SES families tend to have higher (lower) SES themselves. One possible explanation is that, for children in high SES families, there are more

resources available, which can be invested into forming personality traits that are promising for obtaining a higher educational attainment and a higher income. For the case of time preferences, this idea is, for example, formulated by Becker and Mulligan (1997). Our findings support their hypothesis: Children from families with higher SES have lower discount rates. Hence, their time preferences will induce them to make decisions which are more forward looking and therefore more profitable in the long-run. Available resources also significantly influence a child’s ability as measured by IQ. Together, the effects of parental SES on a child’s personality result in a tendency to favor a similar outcome in terms of SES, i.e., in social immobility.

Finally, our results also deliver new insights for studies that focus on explaining life outcomes by different preference profiles in childhood. Consider, for example, the seminal work by Mischel and co-authors (Mischel *et al.*, 1988, 1989; Shoda *et al.*, 1990). In a series of experiments, they measure children’s patience at the age of four in the so-called Marshmallow task. In this task, children were presented two marshmallows. If they were able to abstain from eating the first marshmallow for about 15 minutes, they also received the second marshmallow. The amount of “self-imposed delay of gratification” at the age of four is significantly related to, e.g., academic and social competence, verbal fluency, and the skill level ten years later (Mischel *et al.*, 1989). The results of Mischel *et al.* (1989) are obtained without controlling for parental SES. We show that children from low SES families exhibit lower levels of patience, the economic concept that is most closely related to delay of gratification. Hence, studies that investigate the effect of time preferences on outcomes without controlling for parental SES are likely to overestimate the effect of time preferences due to omitted variable bias. Sutter *et al.* (2010) investigate the role of time and risk preferences of adolescents for their behavior. Controlling for age, gender, the number of siblings, the amount of pocket money and the German and math grades, they find that more impatient adolescents are more likely to spend money on alcohol and cigarettes, have a higher BMI, and are less likely to save money. In contrast, risk preferences are only a weak predictor of behavior. Since Sutter *et al.* (2010) do not control for parental SES, the coefficient of time preferences could potentially pick up the influence of parental SES on behavior. While the work of Mischel *et al.* (1989) and Sutter *et al.* (2010) is highly relevant, our results highlight the need for future research estimating the relationship between economic preferences and life outcomes or behavior using a rich set of control variables, among them parental SES. For example, advocating childhood interventions aimed at increasing children’s patience may be a useful policy advice if the effects documented in Mischel *et al.* (1989) and Sutter *et al.* (2010) are indeed driven by

preferences. If, however, less favorable health outcomes and behaviors are due to lower levels of parental monetary or cognitive resources instead of lower levels of patience addressing patience would not lead to a change health outcomes and behaviors.

For future research, it is interesting to investigate how the personality profiles of children from families with different SES develop over time. Do the differences in personality stay constant, do they tend to converge during adolescence or do they further diverge? Is it true that, e.g., low levels of patience in childhood imply low levels of patience in adulthood or is the rank order of preferences not that stable? With a test-retest reliability of about 0.7, IQ is known to be quite rank-order stable already after age 6-10 (Hopkins and Bracht, 1975; Schuerger and Witt, 1989). In contrast, we are not aware of any study that presents evidence on the stability of economic preferences that is based on longitudinal data. Moreover, it seems important to analyze how the childhood environment beyond the family influences the development of personality in childhood. For example, interventions in the childhood environment might be able to loosen the link between parental SES and a child's personality.

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## Appendix Additional Figures

Figure A.1: Arrangement of Presents



## Appendix Additional Tables

Table B.1: Summary statistics

Variables	Observations	Mean	Standard Deviation	Minimum	Maximum
Ln(income)	731	1.27	0.67	0.19	7.14
Education	732	12.81	2.79	7	18
Male	732	0.52	0.50	0	1
Age child	732	93.39	6.29	84	113
# siblings	732	1.18	1.05	0	7
Single parent	732	0.36	0.48	0	1
Age mother	701	30.78	6.04	14.67	49.25
Dummy wave 2	732	0.83	0.38	0	1
IQ mother	590	-3.18e-09	1	-3.25	2.65
Time pref. mother	711	7.57	2.15	0	10
Risk pref. mother	713	4.93	2.66	0	10
Altruism mother	715	7.85	1.92	0	10
Style warmth	595	4.38	0.52	2	5
Style neg. comm.	595	2.06	0.68	1	4.5
Style inconsistent	595	2.30	0.80	1	5
Style strict	593	2.69	0.77	1	5
Style monitor	595	4.74	0.43	2	5
Style psycho	594	1.44	0.58	1	4.5
Dummy time	732	0.87	0.33	0	1
Time child care	640	59.81	39.12	0	168
Dummy quality	732	0.83	0.37	0	1
Low interaction	610	-2.20e-09	1.42	-3.22	5.89
Everyday	610	-1.36e-10	1.33	-10.22	2.47
Media	610	9.50e-10	1.34	-2.88	4.47
High interaction	610	2.13e-10	1.38	-3.75	5.42
Week gestation	712	38.64	2.73	23	47
Weight at birth	710	33.11	6.39	11	53.5
# older siblings	724	1.80	1.08	1	11

## Appendix Additional Information on Explanatory Variables

All additional control variables are based on mothers' answers to questions of the mother questionnaire.

*Single parent* – dummy variable that equals 1 if a parent is living together with a child only (and not with a husband, wife, or partner) and 0 otherwise

*Age mother* – age of the mother at birth of the child (in years)

*Dummy wave 2* – dummy variable indicating whether information from wave 2 is available for a particular individual. The dummy is also used in an interaction with mothers' IQ scores and information on parenting styles (all other variables stem from the first wave of data collection).

*IQ mother* – IQ score of the mother is based on a 10 item subset of the Standard Progressive Matrices

Plus (SPM Plus) test. We have chosen the 10 item subset to obtain maximal discriminatory power across individuals according to own pretests. The variable corresponds to the standardized number of right answers. In the full specifications, we use the interaction of the variable "IQ mother" and "Dummy wave 2".

All information on parenting style was elicited in the questionnaire of wave 2. Consequently, in the full specifications, we use six interaction terms of the parenting style variables listed below and the "Dummy wave 2" as control variables. Each of the six parenting style variables is based on two (out of originally three) items of the parental questionnaire for seven to eight year old children in the SOEP (Bioage08a and Bioage08b). For each dimension of parenting style, we have chosen those two items that had the highest corrected-item-total-correlation in the SOEP waves from 2010 and 2011. All items have a common scale ranging from 1 (never) to 5 (always). To assign a single value to each style, we sum the scores of the two items and divide the sum by two if both items are available. If information on one item is missing, we use the available information from the other item as the value of the style. The introductory question was "How often do the following things happen?". Below, we report the wording of the two items used for each style.

*Style warmth* – I show my child with words and gestures that I like him/her. I praise my child.

*Style neg. comm.* – I yell at my child because he/she did something wrong. I scold my child because I am angry at him/her.

*Style inconsistent* – I threat my child with a punishment but do not actually follow through. I find it hard to set and keep consistent rules for my child.

*Style strict* – If my child does something against my will, I punish him/her. I make it clear to my child that he/she is not to break the rules or question my decisions.

*Style monitor* – When my child goes out, I know exactly where he/she is. When my child goes out, I ask what he/she did and experienced.

*Style psycho* – I think my child is ungrateful when he/she does not obey me. I do not talk to my child for a while because he/she did something wrong.

*Time pref. mother* – Standardized answer to the question: How would you describe yourself: Are you generally an impatient person, or someone who always shows great patience? Please tick a box on the scale, where the value 0 means "very impatient" and the value 10 means "very patient" (source: SOEP).

*Risk pref. mother* – Standardized answer to the question: How do you see yourself: Are you generally willing to take risks (risk-prone), or do you try to avoid risks (risk-averse)? Please answer on a scale from 0 to 10, where 0 means risk-averse and 10 means risk-prone (source: SOEP).

*Altruism mother* – Standardized answer to the question: How would you assess your willingness to share with others without expecting anything in return, for example your willingness to give to charity? Please

use a scale from 0 to 10, where 0 means you are "completely unwilling to share" and a 10 means you are "very willing to share". You can also use the values in-between to indicate where you fall on the scale.

*Dummy time* – dummy variable that equals 1 if information on the variable "time child care" is available and 0 otherwise; the dummy is used in an interaction with the information on time spent with child care.

*Time child care* – answer to the question: "Please consider a typical week: How many hours per week are you the main care giver of your children?". In the full specifications, we use the interaction of the variable "time child care" and "Dummy time".

*Dummy quality* – dummy variable that equals 1 if information on all four variables "Low interaction", "Everyday", "Media", and "High interaction" is available and 0 otherwise.

*Low interaction, Everyday, Media, High interaction* – The four variables containing information on the quality of time mothers and children spent together are derived in a rotated Principal Component Analysis on the following 16 items that results in four principal components. Most of the items are taken from the German version of the child questionnaire 5-6 years old from the SOEP wave 2008. The introductory question was: "How many times during the last 14 days did you or the main care giver engage in the following activities with your child?". Answers were given on a four item scale: daily – several times per week – at least once per week – never. List of items: (1) Do homework assignments with the child, (2) talk to each other, (3) have a joint meal (lunch / dinner), (4) have a joint snack (e.g., eat cake), (5) outdoor activities (take a walk etc.), (6) go shopping with the child, (7) visit other families with children, (8) painting or doing arts and crafts, (9) playing cards/game of dice, (10) watching television or videos with the child, (11) playing PC or internet games together, (12) going to theater for children, circus, museum etc., (13) reading/telling German stories, (14) go in for sports with the child, (15) go to music lessons or play music together, (16) go to the movies.

Roughly speaking, the variable "Low interaction" loads high on the factors (6), (7), (12), and (16), the variable "high interaction" on (13), (14), and (15), the variable "media" on (10) and (11), and the variable "everyday" on (3), (4), (1), (2), and (5).

*Week gestation* – indicates the week of gestation in which the child was born

*Weight at birth* – indicates the weight of the child at birth (in 10 grams)

*# older siblings at birth* – indicates the number of siblings at birth