KOÇ UNIVERSITY-TÜSİAD ECONOMIC RESEARCH FORUM
WORKING PAPER SERIES

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Working Paper 1313
June 2013

KOÇ UNIVERSITY-TÜSİAD ECONOMIC RESEARCH FORUM
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Parental Socialization Effort and the Intergenerational Transmission of Risk Preferences*

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April 2013

Abstract:

We study the transmission of risk attitudes in a unique survey of mothers and children in which both participated in an incentivized risk preference elicitation task. We document that risk preferences are correlated between mothers and children when the children are just 7 to 8 years old. This correlation is only present for daughters. We show that a measure of parental involvement is a strong moderator of the association between mothers' and daughters' risk tolerance. These findings support a role for socialization in the intergenerational transmission of preferences that predict economic behaviour.

JEL categories: C93, J16, D03.

Keywords: risk preferences, intergenerational transmission, children's economic decisions, field experiments.

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* We thank Berna Akcinar, Gozde Corekcioglu, Nagihan Imer and Semih Sezer for assistance with the data. We would like to thank participants at the Royal Economic Society 2013 Annual Meeting and seminar participants at the University of Cambridge and Koç University for helpful comments. The ECDET Survey was funded by The Scientific and Technological Research Council of Turkey (TUBITAK grants 106K347 and 109K525). Supplementary funds for the ECDET study were provided by College of Social Sciences and Humanities. The specific research reported here was made possible by additional support from the College of Administrative Sciences and Economics at Koç University. Boneva is supported by an ESRC Doctoral Fellowship (ES/J500033/1). Crossley also acknowledges support from the ESRC (reference RES-000-22-4264) and from the ESRC-funded Centre for Microeconomic Analysis of Public Policy (CPP, reference RES-544-28-5001).

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1. Introduction.

Preferences and attitudes such as risk tolerance, patience and the propensity to trust are important determinants of individual choices and outcomes across a range of domains (e.g. Cramer et al., 2002, Anderson and Mellor, 2008, Dohmen et al., 2011). There has been growing interest in understanding the development and determinants of these preferences. Moreover, many choices, such as occupation or education, and outcomes such as earnings, are highly persistent across generations within families (Black and Devereux, 2011). This draws attention to the family. While intergenerational persistence may partly reflect the intergenerational transmission of ability (Black, Devereux and Salvanes, 2009), recent theoretical models emphasize a key role for the intergenerational transmission of preferences and attitudes in the persistence of choices and outcomes (Bisin and Verdier, 2000, 2001; Doepke and Zilibotti, 2012; Dohmen et al., 2012). Thus, empirical evidence is needed on the extent to which and the mechanisms by which attitudes and preferences are transmitted across generations.

In this paper we study the transmission of risk preferences in a unique survey of mothers and children in which both participated in an incentivized risk preference elicitation task. This study builds on the previous literature in a number of ways. First, the children we study are just 7 to 8 years old. Second, the risk preferences of both mothers and children are measured in an incentivized risk task (rather than by survey measures that have been shown to be correlated with preferences elicited in an incentivized task). Third, and most importantly, the mothers and children we study are participants in an interdisciplinary longitudinal study of child development. Consequently, detailed information is available on children's characteristics and upbringing, the mothers' parenting behaviours and attitudes, as well as household and regional characteristics. This information is collected prospectively and contemporaneously (not retrospectively), and contains measures which capture the degree of effort which the parent exerts to raise and socialize the child. This is particularly interesting because recent theoretical models of preference transmission assume that the transmission is influenced by parental investment choices (see Bisin and Verdier. 2011. for a review of this literature).

We find that risk preferences are correlated between mothers and children when the children are just 7 to 8 years old. In our data, the correlation is driven entirely by mothers and

daughters. Moreover, for daughters, the degree of transmission is monotonically increasing in maternal involvement or effort. We show that this relationship is very robust and not driven by reverse causality from child attitudes to parental effort. These findings highlight the role of socialization in the development of risk preferences in children, and provide support for the idea that the transmission of attitudes from parents to children is responsive to parental effort.

This study contributes to the literature that studies preferences and economic decision-making of children and adolescents, such as attitudes toward risk and uncertainty (Harbaugh et al., 2002, Sutter et al., 2013), rational behaviour (Harbaugh et al., 2001), time preference (Bettinger and Slonim, 2007), and competitiveness (Gneezy and Rustichini, 2004). Our findings also relate to the role of nurture relative to nature in shaping preferences, which is a central question in both social and biological sciences. While some twin studies highlight the role of genetics in the development of risk preferences (e.g. Cesarini et al. (2009) and Zyphur et al. (2009)), studies that document cultural differences in the development of attitudes such as competitiveness suggest the importance of nurture (e.g., Andersen et al. (2012)). The latter group of studies highlight a role for socialization by showing that intergenerational transmission is moderated by aggregate or "macro" variables (for example, whether the family belongs to a matrilineal or patriarchal society). Our study goes a further step in studying whether intergenerational transmission of attitudes and preferences is moderated by family-level (or "micro") variables, such as the extent of parental investments in children. Thus, we explore whether families have access to a "socialization technology" that may account for the role of nurture in shaping risk preferences.

Section 2 describes our data and sample in greater detail, as well as the risk preference elicitation procedure. Section 3 presents the results, and Section 4 concludes.

2. Data and Summary Statistics.

2.1. The ECDET Survey

The children and mothers in our study are participants in the "Study of Early Childhood Developmental Ecologies in Turkey" (ECDET). ECDET is a longitudinal survey that has been developed by a team of social scientists to explore in depth the developmental environment of young children and its effects on the development of cognitive and non-cognitive skills, starting from the age of 3 (Baydar et al., 2010). The ECDET Survey follows a representative sample of just over one thousand mother–child pairs, drawn from 19 different

regions in Turkey.[1] Data are collected through home visits that last 2-3 hours. Participants have been surveyed annually since 2008.

The dataset contains an extraordinarily rich set of variables which are useful for our analysis. For example, we have detailed information on household characteristics, the socio-economic background of the family, and the cognitive ability of the child. These allow us to directly control for important determinants of risk behaviour. Importantly, we also have extensive information on parenting behaviours and the level of effort mothers and fathers exert to raise their child, and these provide an opportunity to investigate the preference transmission mechanism in greater detail.

We designed a risk module for mothers and children and fielded it in the course of the 5th wave of data collection in the ECDET study. Further details are given below. The analysis reported in this paper is based on data collected in the 5th wave of data collection although some measures are drawn from earlier waves (where noted).

2.2. Characteristics of the Children, Mothers and the Environment

In the Wave 5 data the households in our sample have on average 5.1 members, out of which 2.7 are children. The children are between 6.8 and 8.9 years old. The mothers are on average 34 years old and have 5.9 years of education. Only 17% report being engaged in gainful employment. Out of those women who are not working, 99% classify themselves as housewives. Almost all women are married (98%) and out of those who are married, 94% report having a husband who is working. The fathers of the children are on average more educated than the mothers and have an average of 7.4 years of education. The dataset contains several items concerning the degree to which the mother is involved in religious activities, which we use to construct a proxy for religiosity.

We use information on the household's monthly expenditure levels and the family's material belongings to construct a measure of the household's socio-economic status. First, we obtain a measure of material wealth by extracting a common factor from the single response items of a detailed material wealth questionnaire (Filmer and Scott, 2012). In a second step, we extract a common factor from both the per capita expenditure of the household and the material wealth

[1] The sample has been subject to some attrition over the five waves, which seems to have occurred predominantly among wealthy households.
[2] We used an actual bowl and actual tokens, and the mother physically placed the tokens into the bowl.
[3] Verbatim instructions are available upon request.
[4] These results are not reported and are available upon request.

measure obtained in the first step. This procedure allows us to effectively combine information from both sources.

2.3. The Incentivized Risk Preference Elicitation Task

We use an incentivized elicitation task for both mothers and children to measure risk preferences. The task is based on Gneezy and Potters (1997), whereby subjects receive a certain amount of money and are asked to divide this endowment *(W)* between a risky and a riskless option. In our task, the risky option has a 50% chance of generating a good outcome, in which case the amount invested is tripled. In the alternative case of a bad outcome, the money invested into the risky option is lost. Total earnings equal the payoff from the risky investment plus the amount kept in the safe option. The expected value of investing *(3*R*0.5+(W-R))* is increasing in the invested amount *(R)*. Therefore, a risk-neutral or risk-loving person should invest all the endowment, whereas a risk-averse person will invest a smaller amount. The amount invested into the risky option is a measure of risk tolerance. This elicitation task has been successfully used in a number of experimental studies both in the lab and in the field, and on different populations ranging from undergraduate students to financial investors and rural residents in different cultures (see Charness and Gneezy, 2012, for a review).

We use the same incentivized elicitation task for both mothers and children, with the main difference being that the mother's risk task involves monetary incentives, whereas the children's risk task uses toys to incentivize decisions. In the risk elicitation task of the mother, the mother is given an endowment of 10 tokens, each corresponding to 1 Turkish Lira (TL). She has the option of putting any number of tokens into a "risky bowl".[2] The earnings from the risky bowl are determined by the outcome of a draw from an opaque urn that has one yellow and one purple ball. If the yellow ball is drawn, the good outcome occurs and the tokens in the bowl are tripled. If the purple ball is drawn, the bad outcome occurs and the tokens in the bowl are lost.

We took great care to ensure that the procedures were transparent, in the sense that the mother could see that there were exactly two balls in the urn, that they were the same size etc. After making the decision of how many tokens to place in the risky bowl, the mother drew the ball herself, and was paid her earnings in cash immediately afterwards. In the mothers' risk game,

[2] We used an actual bowl and actual tokens, and the mother physically placed the tokens into the bowl.

participants could win up to 30 TL, which corresponds to about 17 US dollars. This constitutes about 15% of the median per capita monthly expenditure for participants in our study.

The risk elicitation of the child followed similar procedures but to ease the comprehension of the task and the calculation of potential payoffs the child was only given 4 tokens. Each of these tokens corresponded to a single "gift" of choice from a gift bag that had a variety of small items of value to children such as toys, stationery, beads, hair bands etc. Tokens placed in the risky bowl were either tripled or lost, and the outcome was again determined by the draw of the yellow or purple ball from the opaque urn. The child drew the ball himself/herself.

To ensure that both mothers and children understand the task, the interviewers carefully explained the rules. After demonstrating the potential outcomes of two hypothetical investment choices, the interviewers asked the participants to calculate what the potential outcomes would be for several other hypothetical investment choices. The interviewers were instructed to only proceed with the task if the participants were able to answer the questions correctly.[3]

To make sure that the child would not be affected by the mother's decision, the sequencing was such that the child went through the risk task first. The interviewers were instructed to ensure that the child decides autonomously, and the presence of or any interference by the mother was recorded. In actuality, the mother was present in the room in 56% of the cases while the child was playing the risk game.

To ensure that our estimation results are not confounded by the presence of the mother, we conduct robustness tests in which we directly control for the presence of the mother and the interaction of the presence of the mother with the mother's risk tolerance.[4] Neither do we find a direct effect of the mother's presence on the risk taking behaviour of the child nor does the mother's presence moderate the relationship between her risk taking behaviour and her child's risk taking behaviour. The inclusion of these variables does not materially alter any of the results we report below. This is perhaps not surprising, given that the interviewers reported that in only 1.6% of the cases the mother said something during the game that might have potentially affected the child's choice. Our results are also robust to the exclusion of these few cases.

[3] Verbatim instructions are available upon request.
[4] These results are not reported and are available upon request.

Our data contain the incentivized risk choices of 746 child - mother pairs. Out of their 4 tokens, the children choose to invest on average 2.14 tokens. In line with the prior literature on gender and risk-aversion, we find boys to be significantly more risk tolerant than girls (Borghans et al, 2009, Croson and Gneezy, 2009, Charness and Gneezy, 2012). In particular, the mean investment of boys is 2.2 tokens, while it is 2.1 for girls.[5] Figure 1 displays the distribution of choices by gender.

[Figure 1 about here.]

On average, the mothers choose to invest 4.5 tokens out of their 10 tokens. Figure 2 presents the distribution of the mothers' risk taking behaviour in the task.

[Figure 2 about here.]

Risk taking in the Gneezy-Potters task has shown considerable variation across different populations. A comparison suggests that the mothers in our population are not atypically risk averse or risk tolerant. Charness and Gneezy (2012) report investments for females ranging from about 40-60% of the endowment in populations of students and traders, and ranging from 4-50% of the endowment in rural populations. Ertac and Gurdal (2012a, 2012b) employ the task on Turkish undergraduates, and document risk taking among women to be around 45-54%.[6] Finally, Charness and Viceizsa (2011) use the task with the same parameterization as ours, and find the average investment level of a rural sample in Senegal to be 48.7%.

Previous studies have shown that behaviour in the incentivized risk task is predicted by answers to hypothetical questions concerning risk (Dohmen et al., 2011). Our study additionally includes a hypothetical large stake investment question. In this hypothetical task, mothers were asked how much they would invest into a risky business if they won 50,000 TL in a lottery. The investment into the risky option would be either doubled or lost, with equal probability. The mother's risk taking behaviour in the incentivized risk task, which involves fairly small stakes, correlates significantly with her responses to the large stake hypothetical investment question.[7]

2.4. Parenting measures

[5] This difference is significant at the 5% level.
[6] It should be noted that the treatments and procedures in these studies show some variation.
[7] The Spearman rank correlation coefficient between the mothers' choices on the incentivized task and the choices on the hypothetical investment question is 0.23 and the correlation is significant at the 1% level.

As noted above, a key assumption in recent theoretical models is that the degree to which a parent's preferences are transmitted to the child might crucially depend on the degree of effort that the parent exerts to raise and socialize the child. The information in our dataset allows us to construct different measures of such parental effort.

Our first measure of parental effort is based on detailed information about how involved each parent is in activities that are related to the child's school life. The mothers provide information on how often each parent engages in certain school-related activities. For example, questions include how often the parent helps the child with his/her homework and other school projects, to what extent the parent is interested in the child's problems at school, how often the parent shows interest in the child's activities by for example watching the child's performances, or how often the parent gets involved in the child's school life by attending teacher-parent meetings.[8] Responses are recorded in five categories ranging from never (1) to always (5). Overall, mothers score higher on this measure of parental effort than fathers. While the average response for mothers is 4.3, the average response for fathers is only 2.5. For both mothers and fathers there is considerable variation in the responses, which we will exploit in our analysis. Figure 3 shows the distribution of responses separately for mothers and fathers.

[Figure 3 about here]

Mothers exert slightly more effort when raising a daughter (average response of 4.39 compared to 4.30), while fathers' effort when raising a son or daughter is not statistically different. There is a small but statistically significant positive correlation between the mother's and the father's effort choices.[9]

Our second measure of effort additionally includes information about activities that are unrelated to schooling.[10] For example, the additional questions include whether the parent helps the child learn new skills such as swimming, whether the parent engages in different activities together with the child like playing indoors or outdoors, and whether the parent takes the child to children's theatres or other performances. Since the responses are coded in different ways, instead of calculating an average we extract a common factor from all item responses including the questions in the schooling questionnaire. Since the mothers were not

[8] The full list of questions used for the different measures of effort can be found in the appendix.
[9] The Spearman rank correlation is 0.13 and it is significant at the 1% level.
[10] See Appendix for the full set of questions.

asked these additional questions about the involvement of fathers but only themselves, we can construct this second measure of effort only for mothers. The extracted factor explains about 32% of all the variation in item responses. Figure 4 shows the distribution of this measure of effort.

[Figure 4 about here]

Finally, the rich nature of the dataset allows us to investigate the potential effect different parenting behaviours have on the risk taking behaviour of the child. In the ECDET survey parenting behaviours are measured by the Turkish adaptation of "*The Child Rearing Questionnaire*" (Paterson and Sanson, 1999; Yagmurlu and Sanson, 2009). From these items we extract four different subscales: (i) whether the mother is obedience demanding, (ii) whether the mother uses physical punishment, (iii) the degree of maternal warmth, and (iv) the degree of inductive reasoning. The inductive reasoning subscale score measures the degree to which the mother explains the rationale of the rules and the reasons for disciplining the child.

2.5. Cognitive Measures

Studies conducted with adult participants have found more cognitively able individuals to be more risk tolerant (Frederick, 2005, Burks et al., 2009, Dohmen et al., 2010). To control for cognitive ability and to assess whether this relationship also holds in our sample of young children we employ several measures of cognitive ability.

One cognitive measure we employ is The Turkish Receptive Language Test (TRLT) (Berument and Guven, 2010). Receptive language is widely known as a strong indicator of general cognitive abilities, and school achievement. In this test, children are presented with several pictures of objects and they need to point to the picture that displays the object announced by the interviewer. The scores that are used in the regression models are estimates of receptive language ability that are obtained by fitting a three-parameter logistic Item Response Theory model, standardized for the child's age (see Baydar et al., 2013).

The second cognitive measure that is used as a control is the Corsi (Corsi, 1972) visual-spatial memory score, which is obtained by a "game" of remembering sequences of locations. The test involves mimicking the interviewer as he/she taps sequences of spatially separated blocks. It is measured in Round 4 of the ECDET survey when the children were approximately 6 years old. The scores used in the present analyses are age-standardized.

Finally, in order to control for impulsivity of the children, we use a test of inhibitory control, referred to as the "head-to-toes" test. The task involves asking the child to touch his/her head when the interviewer says toe and vice versa, and recording response times. This test was given to the children when they were approximately 4 years old, in Round 2 of the ECDET study. A higher score indicates the higher ability of the child to use inhibition to suppress a prevailing response. Inhibitory control is one of a subset of cognitive abilities labelled executive function.

3. Results

The child's risk taking behaviour correlates positively and significantly with the mother's risk taking behaviour in the incentivized risk task.[11] This observation is consistent with the evidence presented in Dohmen et al. (2012), who find parents' risk preferences to be correlated with their adult children's risk preferences. Our data demonstrate that the positive correlation is already present at very young ages, which suggests that the preference transmission process starts very early in life. Figure 5 shows the proportion of girls and boys who put each possible number of tokens into the risky bowl, given the choices made by their mothers. To ease interpretation, mothers' choices are grouped into five categories. While there is a positive association between mothers' and their daughters' risk preferences, there is not a similar association for boys.

[Figure 5 about here]

We perform a number of regression analyses to investigate the relationship between mothers' and children's preferences in greater detail. To facilitate the interpretation of the coefficients we express mothers' and children's investment choices as fractions of the total numbers of tokens. The regression results confirm that the risk taking behaviour of the mother in the incentivized risk task significantly predicts the risk taking behaviour of the child. In particular, if the mother invests 10 percentage points more, the child's investment is on average 1.4 percentage points higher (Table 1, Column 1). This relationship is robust to the inclusion of region fixed effects (Column 2), and to the inclusion of the gender of the child as a control variable (Column 3). Regional fixed effects capture significant variation in children's choices (note the increase in R^2 from Column 1 to 2 of Table 1). As noted previously, boys are more risk tolerant than girls, and invest 5 percentage points more on average. Interestingly, while the mother's risk taking behaviour has substantial predictive

[11] The Spearman rank correlation coefficient is 0.16 and it is significant at the 1% level.

power for the behaviour of girls, this is not the case for boys (Column 4), although here the two coefficients do not differ statistically significantly.

[Table 1 about here]

In the following analyses, we allow all coefficients to differ for boys and girls by estimating two separate equations as a system. We add a number of control variables. In particular, we control for individual characteristics such as the child's cognitive ability test scores, age (in months), and height. Moreover, we control for household characteristics such as household size, religiosity of the family and the parents' education levels (in years), and we include dummies for the three lowest socio-economic status quartiles. The results reveal that an increase in the mother's investment by 10 percentage points increases her daughter's investment by 2.3 percentage points, controlling for these predictors. This effect is significant at the 1% level. At the same time, the mother's investment has no predictive power for the risk tolerance of her son. The difference in the transmission coefficients by gender is significant in this model at the 5% level.

[Table 2 about here]

The literature reports that risk-tolerance is significantly related to cognitive ability (Frederick, 2005, Burks et al., 2009, Dohmen et al., 2010). We find that neither working memory nor receptive language performance predicts risk-tolerance for either gender, but inhibitory control as measured by the head-to-toes task is associated with lower risk tolerance in boys. While the age of the child has no predictive power for girls, there seems to be a significant relationship for boys. A boy who is 1 year older invests on average 7.4 percentage points more. Note, however, that since all children in this sample are between 6.8 and 8.9 years old, this estimate is based on limited age variation. Among girls, household size is negatively related to risk tolerance. Girls in families with one additional household member invest on average 1.4 percentage points less.

While the socio-economic status of the family does not affect the risk tolerance of boys, it has large effects on girls. Compared to girls in the highest wealth quartile, girls in the lowest quartile invest on average 14.2 percentage points more. This result is interesting, given that most studies of adults find that wealthier individuals are more risk tolerant. The degree of religiosity and the mothers' and fathers' years of education are not associated with children's behaviour.

To investigate which characteristics of the regions may be relevant to risk tolerance, we estimate the same regressions excluding regional fixed effects but including average wealth, average religiosity and the percentage of right-wing votes in the region in the previous election. None of these variables are significant predictors of children's risk tolerance, therefore remaining results in this section are generated by models including regional fixed effects.

To shed more light on the transmission mechanism, we investigate whether the transmission of preferences is affected by the level of effort the mother exerts in raising her child. If the positive transmission coefficient we find for girls is due to a socialization process, we would expect the coefficient to be higher for those daughters whose mothers exert higher effort in their child's upbringing. To test this, we allow the mother's effort measure which is based on the questions that elicit maternal involvement in child's academic activities, to affect the degree to which preferences are transmitted. Consistently with a model in which socialization matters for the transmission of preferences, the risk tolerance of more involved mothers is more closely associated with the risk tolerance of their daughters (Table 3, Column 1). A similar interaction effect is not detected for sons (Table 3, Column 2).

In order to investigate the robustness of this relationship, we estimate several alternative specifications. First, to check for possible nonlinearities, we divide the mothers into three groups of equal size, depending on the degree of effort they exert when raising their child (Table 3, Columns 3 and 4). For a high-effort mother, an increase in her risk tolerance by 10 percentage points raises her daughter's risk tolerance by 3 percentage points. Again, no such effect can be found for boys. While the transmission coefficient of medium-effort mothers does not differ significantly from the transmission coefficient of high-effort mothers, the point estimate is smaller in magnitude, which suggests a monotonic association between the mother's level of effort and the degree to which her preferences are transmitted. Second, we conduct the analysis using the broader definition of effort, which includes responses to questions unrelated to academic involvement. The results obtained with this broader definition of effort are remarkably similar to the previous estimates (Table 3, Columns 5 and 6).

[Table 3 about here]

We next check whether our results are robust to the inclusion of other controls related to parenting. The regression results in Table 4 use the mother's effort measure based on academic involvement and additionally control for parenting behaviours (Columns 1 and 2).

The results reveal that girls whose mothers score high on a measure which captures the degree to which she promotes inductive reasoning are less risk tolerant, a finding that is similar to that found for inhibitory control among boys. More importantly, our results regarding the transmission of maternal preferences and the moderation of that transmission by maternal effort are robust to the inclusion of these parenting behaviours. Additionally, none of these parenting behaviours significantly interact with maternal risk tolerance, indicating that transmission is not influenced by the approach to parenting, but rather by involvement.

[Table 4 about here]

Finally, we investigate whether we would find a similar result if we used the employment status of the mother as a proxy for the degree of interaction between the mothers and their children. Maternal employment proxies time available for children, whereas the measures described above capture active involvement. Interestingly, whether the mother works does not have a significant effect on the degree to which her preferences are transmitted (Table 4, Columns 3 and 4). This observation is consistent with the finding in the literature that working mothers do not spend less quality time with their children (Carneiro et al., 2013). This suggests that it is the degree of involvement rather than mere presence that matters for preference transmission; however, the percentage of working mothers being small in our sample (17%) may limit the power of this test.

One concern with a causal interpretation of these results is that there may be reverse causality running from the child to the effort of the mother. For example, daughters who are more similar to their mother may induce their mother to be more engaged in parenting. To overcome this potential endogeneity problem, we investigate whether the transmission of preferences is also increasing in the mother's effort if we use a measure of effort which is unlikely to be responsive to the child's characteristics. In particular, we only use that part of the variation in maternal effort which can be predicted by variables that are predetermined or unlikely to be affected by the characteristics of the child.

In a first step we estimate a model that predicts the measure of mother's effort. We find that the mother's years of education and her score on a cognitive ability test are significant predictors of effort (Table 5, Column 1). Cognitively skilled and highly educated mothers exert a higher level of effort. In terms of parenting behaviours, the degree to which the mother uses inductive reasoning is positively related to her effort. To obtain a measure of effort which is not responsive to the child's characteristics, we predict effort based on a subset of the variables used in Column 1 of Table 5. In particular, we use quasi-stable variables that are

unlikely to respond to child characteristics, such as cognitive ability, education and socioeconomic status to obtain the predicted values (Table 5, Column 2). These variables explain 32% of the variation in actual effort.[12]

We use this predicted effort measure to redo the analysis from Columns 1 and 2 of Table 3, interacting the mother's risk tolerance with predicted, rather than measured, effort. The results are presented in columns 1 and 2 of Table 6 and reveal that just as in the benchmark model, mothers who have higher predicted values of effort are better able to transmit their preferences. This suggests that reverse causality is not the source of our finding. On the other hand, the high correlations between maternal effort and measures of maternal ability, education, and parenting behaviours highlight the possibility that it is not effort per se that moderates attitude transmission but some other variable in this highly correlated set of parental characteristics and behaviours. Given the degree of correlation between these variables, it is difficult to disentangle the attributes that underlie the interaction between maternal effort and maternal risk tolerance. What we can report, however, is that if we test the specification in columns 1 and 2 of Table 6 against more general specifications with multiple interaction effects, the restrictions implied by our preferred specification (with predicted effort as the only moderating variable) are never rejected.[13]

Finally, we investigate whether the degree to which the mother's preferences are transmitted depends on how involved the father is in the child's upbringing. For this purpose, we divide the children into three groups: children whose parents both exert high effort in their upbringing (6.3% of the sample), children whose mothers exert high effort but whose fathers exert little effort (42.1%), and children whose parents both exert low effort (50.4%).[14] We then repeat our regression analysis, but allow the transmission of preferences to differ across these three different groups.

Compared to mothers who exert little effort, mothers who are highly involved are found to be better able to transmit their preferences to their daughters, irrespective of how highly involved the father is (Columns 3 and 4 of Table 6). The point estimate of the transmission coefficient

[12] If we use the broader definition of maternal effort, which was used in columns 5 and 6 of Table 3, we can explain even more of the variation in effort, and socioeconomic status becomes a more significant predictor of maternal effort.

[13] Full results are available from the authors.

[14] We choose the cut-off for mothers such that we obtain two equally sized groups. We then apply the same cut-off value to categorize fathers. For the purpose of this analysis we exclude observations from the fourth group (mother exerts little effort, father exerts high effort) because there are very few observations in this category (1.2%).

is slightly lower if the father is also highly involved but there is no statistical difference between the two coefficients. Again we find no significant associations for boys.

4. Discussion

In this study we document the intergenerational transmission of risk attitudes in a unique survey of mothers and their children in Turkey. Both mother and child participated in an incentivized risk preference elicitation task.

We find that risk tolerance is associated with gender even among young children. This suggests either that risk tolerance is biologically dependent on sex, or that socialization processes that influence gender differences in risk tolerance act very early in life.

One of the key findings of the literature on risk tolerance in adults is a strong positive association with cognitive ability. In 7 to 8 year-old children we find no association of risk tolerance with cognitive measures including verbal and non-verbal abilities. However, in these children we find a *negative* association between a measure of inhibitory control and risk tolerance in boys. Thus, boys with better ability to regulate their reactions or responses were less risk tolerant, likely because they considered the consequences of losing alongside the possibility of winning. Inhibitory control is considered to be an important component of a set of cognitive abilities labelled executive function. Executive function is a key cognitive ability that allows individuals to coordinate thoughts and actions, facilitating capacities such as planning, prioritizing goals and orchestrating behaviour accordingly. These results suggest that the association between different aspects of cognitive ability and risk tolerance may change over individual lifetimes. It is likely that risk tolerance is closely associated with the abilities to analyze and synthesize, as well as regulatory abilities. A high level of regulatory abilities without analytic abilities (as in children) may result in risk aversion, while a low level of regulatory abilities may result in high risk tolerance regardless of analytic abilities. Nevertheless, the link between risk tolerance and cognitive abilities clearly requires further study from a developmental perspective.

Turning to intergenerational transmission, we find that risk preferences are correlated between mothers and children when the children are just 7 to 8 years old, a much younger cohort than studied in the literature on intergenerational transmission. In this sample only daughters' risk preferences are correlated with their mothers' risk preferences. Differential transmission of mothers' preferences to daughters and sons may support a role for socialization in the transmission of preferences, if girls are more likely to take mothers as role models than boys. However, differential transmission could also be genetic, or more specifically, sex-linked.

Our main finding is that the strength of intergenerational transmission of risk tolerance depends on socialization effort. We find a robust relationship between the mother's effort and the degree to which her preferences are transmitted to the daughter. We also rule out reverse causality as an explanation for this association. The moderation of mother-daughter correlation in risk preferences by parental effort also supports a key role for socialization in the intergenerational transmission of attitudes. Additionally, it specifically confirms the theoretical assumption that parents can influence the transmission of preferences through socialization effort.

After completing our analysis we became aware of unpublished work by Zumbuehl et al. (2012) which documents a similar relationship between parental involvement and preference transmission, but with very different data. The two papers complement each other in that we examine the relationship between maternal risk preferences and their children in childhood, whereas Zumbuehl et al. study the relationship between the risk preferences of parents and their adult children (the "children" are all 17 years of age or older). We show early transmission whereas Zumbuehl et al. show that the effects persist into adulthood. In addition, our data have a number of advantages. In particular, in the Zumbuehl study the degree of parental involvement during childhood is reported by the child, retrospectively, whereas in our work these measures are recorded prospectively as part of detailed child development study, and in Zumbuehl et al. risk preferences are elicited through self-assessments rather than an incentivized task. Together, the two papers offer substantial and robust empirical evidence of a role for socialization in the transmission of risk preferences.

This study contributes to the literature on the effects of socialization on formation of preferences that predict economic behaviour. Furthermore, the results on gender differences and the important role of maternal effort point to the likelihood that such socialization occurs very early in life. The importance of socialization in the transmission of risk preferences implies malleability, at least in childhood. This in turn suggests that attitudes towards risk can be shaped, not only in the home, but potentially also through schools and other educational interventions. Assessing this possibility directly is an important part of our ongoing research agenda.

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Table 1: Mothers' and Children's Risk Tolerance (0-1)

	(1)	(2)	(3)	(4)
Mother's risk (0-1) (β_1)	0.142**	0.124**	0.127**	
	(0.0568)	(0.0511)	(0.0512)	
Male (β_2)			0.0539***	0.114**
			(0.0184)	(0.0404)
Mother's risk*Male (β_3)				0.0600
				(0.0764)
Mother's risk*Female (β_4)				0.194***
				(0.0497)
N	746	746	746	746
Regional FE	no	yes	yes	yes
R^2	0.02	0.09	0.10	0.10
Test $\beta_3 = \beta_4$ (p-value)				0.11

Both mother's and child's risk tolerance is measured on a 0-1 scale.

Standard errors in parentheses (clustered at the region level).

* $p < .1$, ** $p < .05$, *** $p < .01$

Table 2: Predictors of Children's Risk Tolerance (0-1)

	(1) Girls	(2) Boys
Mother's risk (0-1) (β_1)	0.225***	0.0139
	(0.0632)	(0.0832)
Corsi test	0.00215	0.00186
	(0.00213)	(0.00212)
Turkish receptive language test	-0.0000321	0.00116
	(0.00143)	(0.00104)
Head-Toe task	-0.00210	-0.00659***
	(0.00158)	(0.00145)
Child age (months)	-0.000344	0.00739**
	(0.00483)	(0.00325)
Height	0.00267	0.00420
	(0.00204)	(0.00245)
Religiosity	0.000215	0.000299
	(0.000690)	(0.000580)
Household size	-0.0137*	-0.0149
	(0.00666)	(0.00984)
Mother's education (years)	0.00683	0.00117
	(0.00654)	(0.00433)
Father's education	-0.00447	0.00253
SES 1st quartile (low)	0.142**	0.0436
	(0.0641)	(0.0748)
SES 2nd quartile	0.190***	0.0391
	(0.0516)	(0.0694)
SES 3rd quartile	0.0448	0.0188
	(0.0396)	(0.0457)
N	311	375
Regional FE	yes	yes
R^2	0.19	0.17
Test $\beta_{1(girls)} = \beta_{1(boys)}$	0.03	

Both mother's and child's risk tolerance is measured on a 0-1 scale.
Standard errors in parentheses (clustered at the region level).
* $p < .1$, ** $p < .05$, *** $p < .01$

Table 3: Mother's Effort and Children's Risk Tolerance (0-1)

	Linear Specification		Dummy Variable Specification		Broader Effort Measure	
	(1) Girls	(2) Boys	(3) Girls	(4) Boys	(5) Girls	(6) Boys
Mother's risk (0-1)	-0.469**	-0.110	0.0391	0.0132	0.0176	0.0280
	(0.202)	(0.377)	(0.0675)	(0.133)	(0.0797)	(0.130)
Mother's effort	-0.0447	-0.0522				
	(0.0288)	(0.0425)				
Mother's effort*	0.158***	0.0276				
Mother's risk	(0.0482)	(0.0821)				
Medium effort			-0.0905	-0.0313	-0.0678	-0.0293
			(0.0578)	(0.0893)	(0.0548)	(0.0735)
High effort			-0.0989*	-0.0988	-0.124**	-0.0349
			(0.0494)	(0.0626)	(0.0560)	(0.0996)
Medium effort*			0.265*	-0.0559	0.267**	0.0320
Mother's risk			(0.128)	(0.144)	(0.115)	(0.127)
High effort*			0.301***	0.0345	0.355***	-0.0835
Mother's risk			(0.0855)	(0.173)	(0.117)	(0.224)
N	307	371	307	371	306	368
Regional FE	yes	yes	yes	yes	yes	yes
Household controls	yes	yes	yes	yes	yes	yes
Individual controls	yes	yes	yes	yes	yes	yes
R^2	0.21	0.18	0.22	0.18	0.22	0.18

Both mother's and child's risk tolerance is measured on a 0-1 scale.

Household and individual controls as in table 2.

Standard errors in parentheses (clustered at the region level).

* $p < .1$, ** $p < .05$, *** $p < .01$

Table 4: Robustness Tests (1)

	Additional Parenting Controls		Employment Status	
	(1) Girls	(2) Boys	(3) Girls	(4) Boys
Mother's risk (0-1)	0.0493	0.0158	0.239***	0.0219
	(0.0705)	(0.144)	(0.0722)	(0.0796)
Medium effort	-0.0721	-0.0200		
	(0.0575)	(0.0969)		
High effort	-0.0829	-0.0971		
	(0.0493)	(0.0727)		
Medium effort Mother's risk	0.257**	-0.0730		
	(0.116)	(0.155)		
High effort Mother's risk	0.301***	0.0463		
	(0.0847)	(0.180)		
Mother works			0.0408	0.0263
			(0.0633)	(0.105)
Mother works* Mother's risk			-0.00154	-0.0434
			(0.131)	(0.219)
Parenting behaviours:				
"obedience demanding"	0.000668	-0.0110	0.00616	-0.0117
	(0.0220)	(0.0184)	(0.0239)	(0.0191)
"punishment"	-0.0312	0.0245	-0.0359	0.0226
	(0.0338)	(0.0164)	(0.0341)	(0.0174)
"parental warmth"	0.0124	0.0207	0.0124	0.0191
	(0.0215)	(0.0219)	(0.0232)	(0.0192)
"inductive reasoning"	-0.0480***	-0.0245	-0.0444***	-0.0285
	(0.0137)	(0.0273)	(0.0138)	(0.0262)
N	307	371	310	375
Regional FE	yes	yes	yes	yes
Household controls	yes	yes	yes	yes
Individual controls	yes	yes	yes	yes
R^2	0.24	0.19	0.21	0.18

Both mother's and child's risk tolerance is measured on a 0-1 scale.

Household and individual controls as in table 2.

Standard errors in parentheses (clustered at the region level).

* $p < .1$, ** $p < .05$, *** $p < .01$

Table 5: Predictors of Mother's Effort

	(1)	(2)
Mother's education (years)	0.0277**	0.0316**
	(0.0113)	(0.0123)
Mother's Turkish test score	0.00183	0.00360
	(0.00723)	(0.00669)
Mother's memory test score	0.0211***	0.0230***
	(0.00680)	(0.00692)
Age	-0.00816	-0.00827
	(0.00567)	(0.00540)
Number of kids	-0.0706	-0.0835*
	(0.0476)	(0.0438)
SES 1st quartile (low)	-0.0339	-0.0872
	(0.122)	(0.115)
SES 2nd quartile	0.0736	0.0408
	(0.0517)	(0.0584)
SES 3rd quartile	0.112*	0.0929
	(0.0592)	(0.0617)
Male	-0.0595	
	(0.0423)	
Mother works	-0.117*	
	(0.0624)	
Parenting behaviours:		
"obedience demanding"	-0.0178	
	(0.0505)	
"punishment"	-0.00222	
	(0.0311)	
"parental warmth"	0.0631	
	(0.0419)	
"inductive reasoning"	0.130**	
	(0.0470)	
N	771	771
Regional FE	yes	yes
R^2	0.36	0.32

Standard errors in parentheses (clustered at the region level).
* $p < .1$, ** $p < .05$, *** $p < .01$

Table 6: Robustness Tests (2)

	Predicted Mother's Effort		Father's Effort	
	(1) Girls	(2) Boys	(3) Girls	(4) Boys
Mother's risk (0-1)	-1.246***	0.954	0.0542	0.0767
	(0.345)	(0.839)	(0.0569)	(0.0783)
Predicted mother's effort*	0.346***	-0.211		
Mother's risk	(0.0829)	(0.205)		
High mother's effort/			-0.0677	0.0754
High father's effort			(0.0818)	(0.250)
High mother's effort/			-0.139***	-0.0276
Low father's effort			(0.0454)	(0.0554)
High/High*			0.258*	-0.228
Mother's risk			(0.127)	(0.484)
High/Low*			0.346***	-0.0898
Mother's risk			(0.0743)	(0.132)
N	310	373	296	350
Regional FE	yes	yes	yes	yes
Household controls	yes	yes	yes	yes
Individual controls	yes	yes	yes	yes
R^2	0.22	0.20	0.23	0.21

Both mother's and child's risk tolerance is measured on a 0-1 scale.
Household and individual controls also include all additional variables used to predict the effort of the mother.
Standard errors in parentheses (clustered at the region level).
* $p < .1$, ** $p < .05$, *** $p < .01$

Figure 1: Children's Choices in Risk Task, by Gender

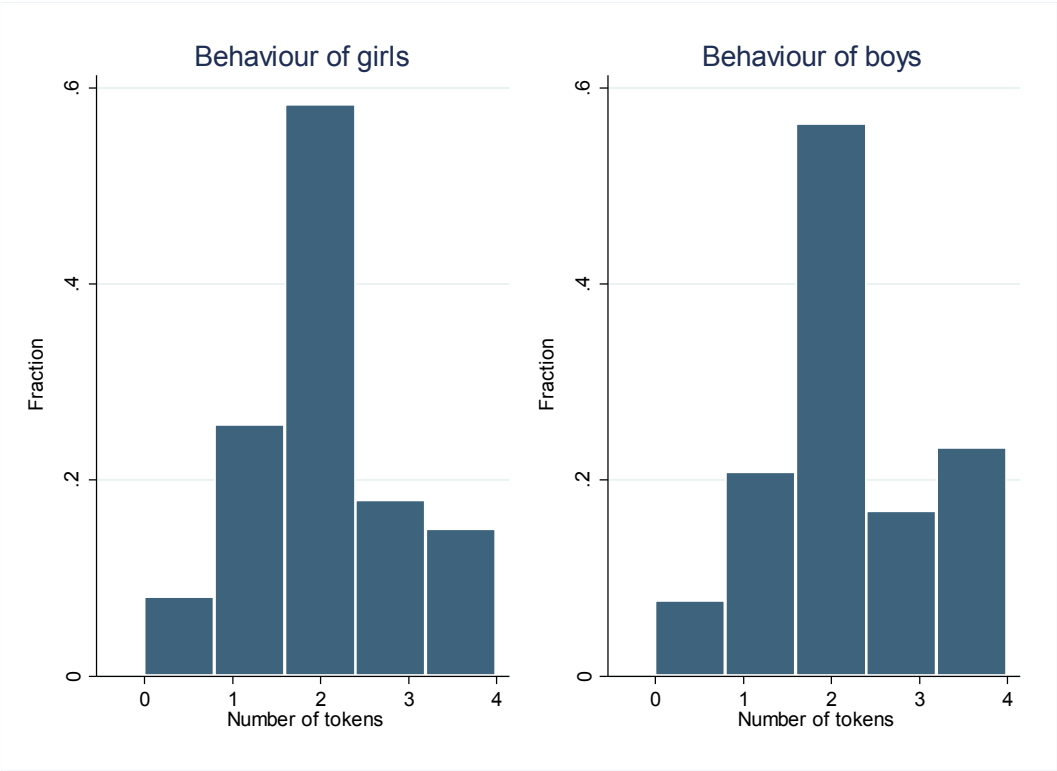


Figure 2: Mothers' Choices in the Risk Task

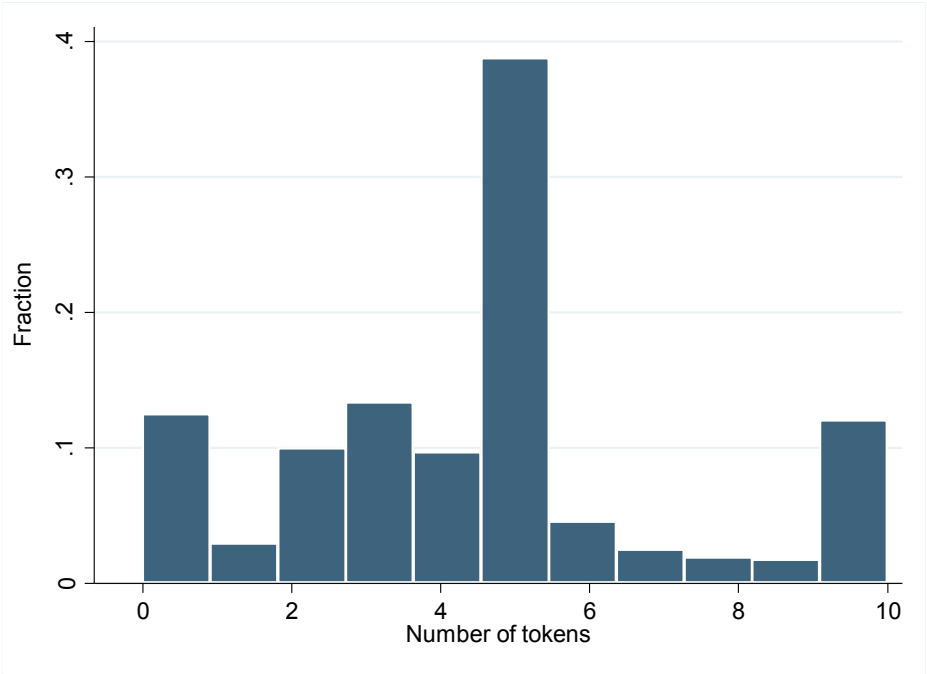


Figure 3: Distributions of Maternal and Paternal Effort

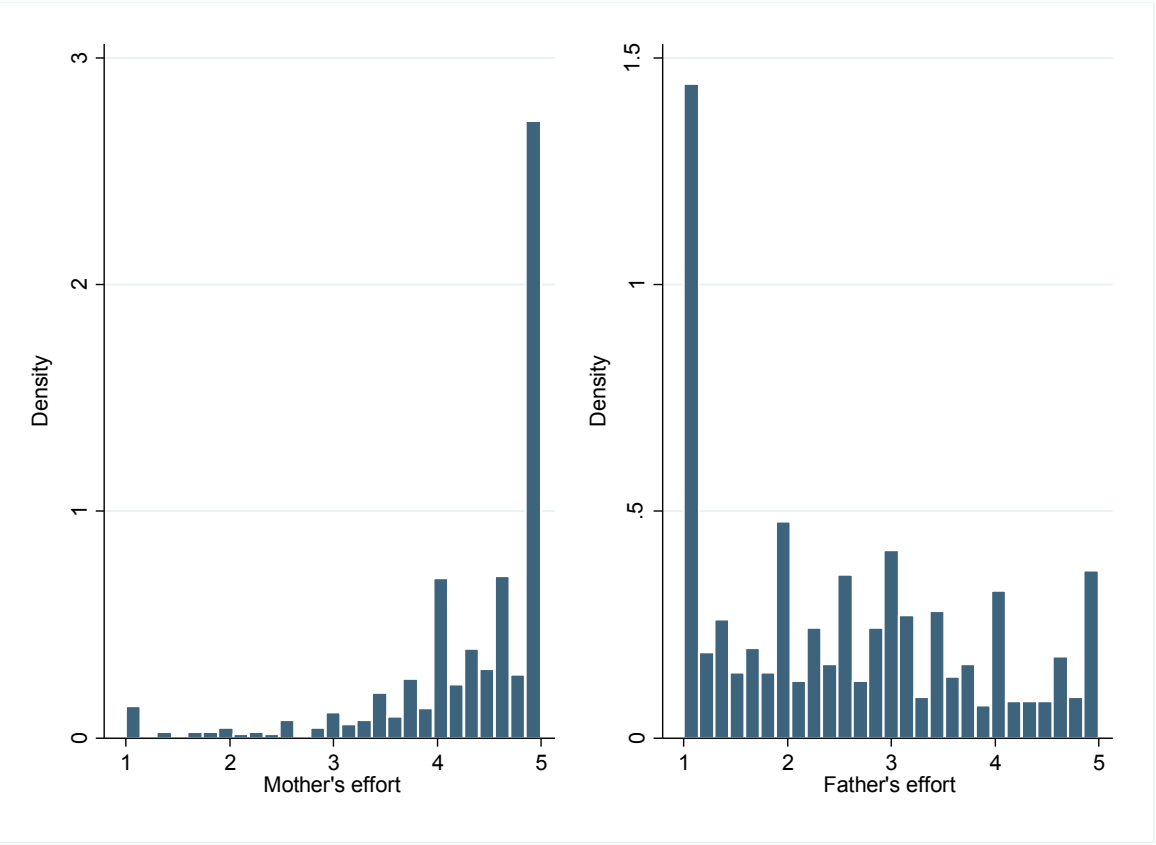


Figure 4: Distribution of Broader Measure of Maternal Effort

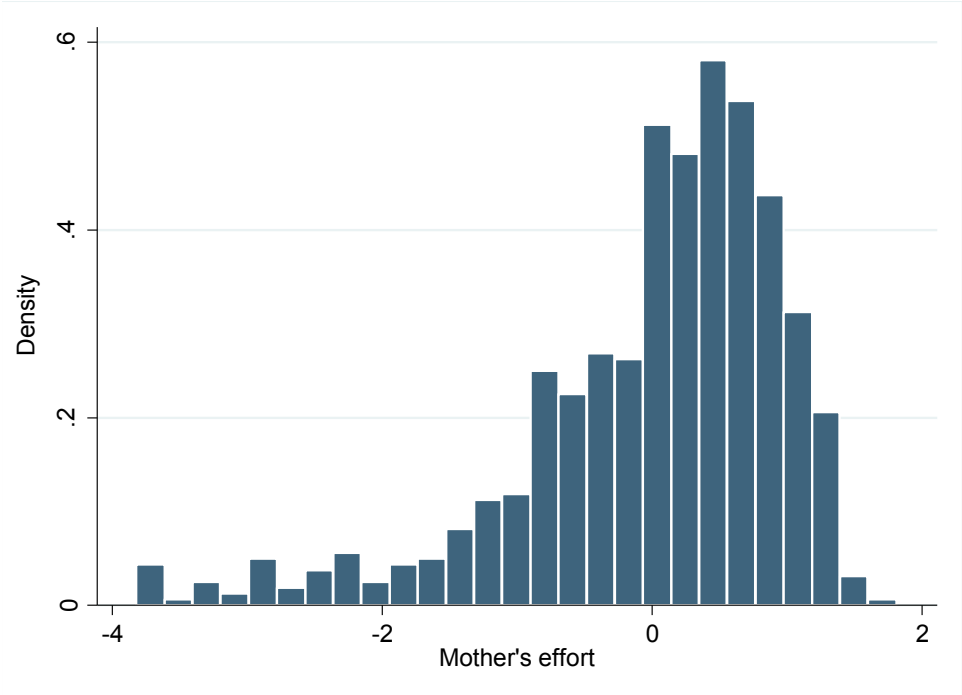
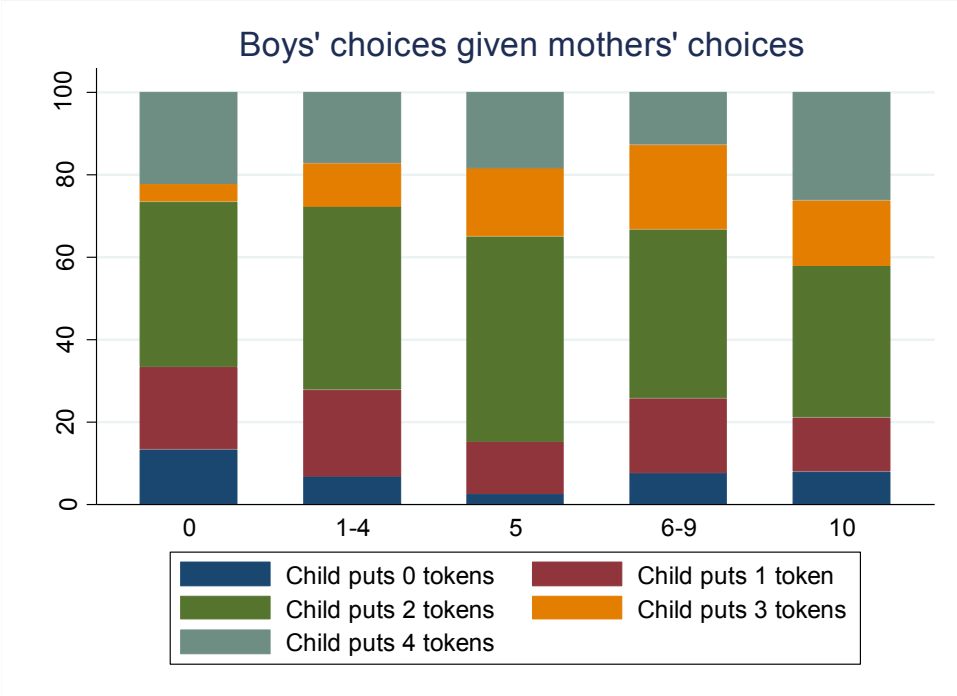
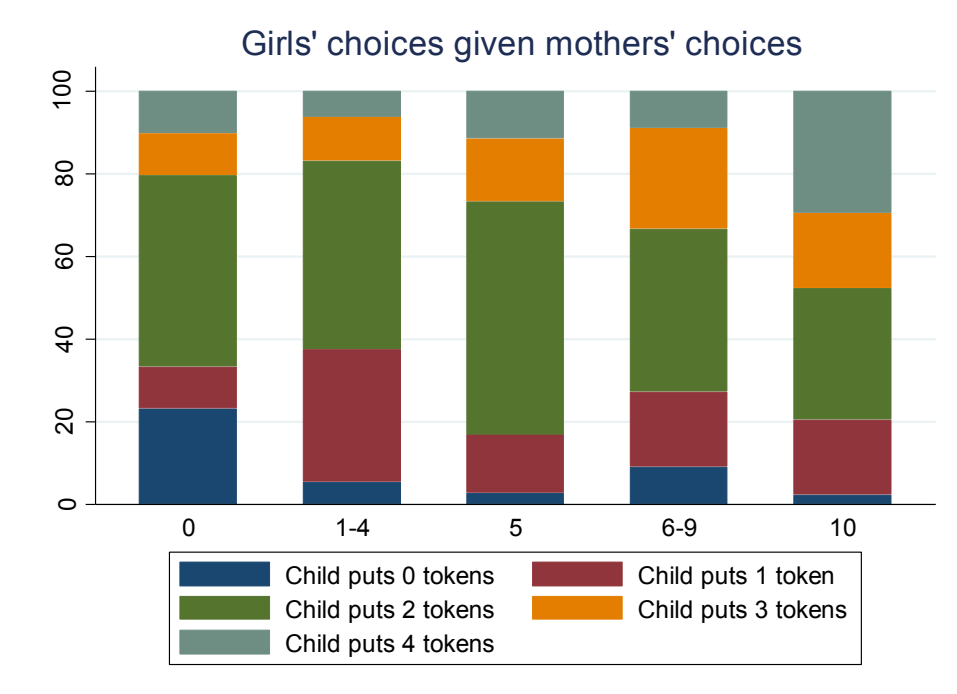


Figure 5: Children's Choices Conditional on Mother's Choice, by Gender





Appendix

A Questionnaire related to paternal effort

A.1 Parental involvement in the child's school life

Please state how frequently you and your husband are engaged in the following activities:
(1: never, 2: rarely, 3: sometimes, 4: often, 5: always)

1. Meet with the child's teachers.
2. Watch the child's performances at school.
3. Accompany the child to school on the first and last day of classes.
4. Help the child with his/her school projects.
5. Help the child with his/her Turkish writing/reading homework.
6. Help the child with his/her math homework.
7. Show interest/get involved if the child has problems with his/her teachers.
8. Inform the school when the child is sick.
9. Do the shopping for items which are necessary for school.
10. Follow the child's school work by checking workbooks etc.

A.2 Maternal involvement in other activities

1. Do you help your child gain skills, such as skipping rope or swimming? (1: always, 2: sometimes, 3: never)
2. How often did you engage in any family activity during the last week (like playing something indoors or doing some activity outdoors)? (1: a couple of times, 2: once, 3: never)
3. Did you take your child to any show, like a concert, a children's theatre, or a puppet show within the last year? (1: a couple of times, 2: once, 3: never)
4. Did you go on a bus, plane or train ride with your child within the last year? (1: a couple of times, 2: once, 3: never)

5. Did you visit a museum or art gallery with your child within the last year? (1: a couple of times, 2: once, 3: never)
6. Did you travel to any other place (village, another town etc.) with your child for leisure, within the last year? (1: a couple of times, 2: once, 3: never)
7. Within the past month, how many times did you take your child somewhere just because your child enjoys going there? (provide number of times)
8. Within last year, did your child accompany you or your husband to your/his workplace? (1: a couple of times, 2: once, 3: never)
9. Do you, as a family, meet with your friends and relatives at least two times every month? (1: yes, 2: no)
10. Do you encourage your child to get/keep a hobby, such as sports or music? (1: always, 2: sometimes, 3: rarely)
11. Do you encourage your child to read? (1: always, 2: sometimes, 3: rarely)
12. Do you make your child participate in activities which improve his/her skills? (1 yes, 2 no)
13. Do you comfort your child when he/she is worried? (1: always, 2: sometimes, 3: never)