Understanding Gender Differences in Leadership *

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Abstract

We study the evolution of gender differences in the willingness to assume the decision-maker role in a group, which is a major component of leadership. Using data from a large-scale field experiment, we show that while there is no gender difference in the willingness to make risky decisions on behalf of a group in a sample of children, a large gap emerges in a sample of adolescents. In particular, the proportion of girls who exhibit leadership willingness drops by 39% going from childhood to adolescence. We explore the possible causes of this drop and find that a significant part of it can be explained by a dramatic decline in "social confidence", measured by the willingness to perform a real effort task in public. We show that it is possible to capture the observed link between public performance and leadership by estimating a structural model that incorporates costs related to social concerns. These findings are important in addressing the lower propensity of females to self-select into high-level positions, which are typically subject to greater public scrutiny.

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1 Introduction

It is well-documented that women occupy top executive positions in politics and industry much less frequently than men. Leadership is an important component of many such careers. Rising in the hierarchy of corporations or in politics, one needs to increasingly take on leader roles, assuming the responsibility of making executive decisions. The stark scarcity of females in leadership positions persists despite much improvement in societal norms and institutional barriers in the recent years. For example, in the 2014 G20 summit, only 5 out of 58 leaders were female. Around the world, only 17% of government ministers, and only 4.6% of S&P 500 CEOs are female.[1] While explanations such as discrimination have also been put forward, self-selection, that is, differences in leadership ambition are likely a major factor behind these gender gaps. Indeed, there is evidence that women are less likely than men to *seek* to be elected into political leadership positions, and that female students are less likely to run for student government in college (Lawless and Fox (2008), New (2014), Kanthak and Woon (2015)). Consistently with this, many corporations, NGOs and colleges now implement leadership training programs targeted towards females, designed to both build women's leadership skills and get them interested in leadership in the first place.

A major component of a leader's job is to hold the power and responsibility of making decisions on behalf of others. These decisions (such as investment, financing and recruitment decisions in a corporation or campaign decisions in a political party) are often risky in nature and determine how the team, firm or party/electorate fares. In particular, they are consequential for the people who delegate the decision-making responsibility to the leader. Building decision-making skills and learning how to handle responsibility and accountability for others' outcomes are in fact major focus points of most leadership training programs (Wood and Winston (2005), Blenko et al. (2010)). Attitudes toward responsibility in social contexts can be an important factor behind observed gender differences in leadership. The recent "leader emergence" literature in psychology shows that women have lower motivation to lead and may be more concerned about whether they will harm others with the decisions they will need to make as a leader (Elprana et al. (2015), Aycan and Shelia (2016)). Women have been found to be less willing than men to make decisions on behalf of others in risky contexts (Ertac and Gurdal (2012), Ertac and Gurdal (2016), Ertac et al. (2016)) and less willing to assume a position of coercive power in groups (Banerjee et al. (2015)). It is this component of leadership, taking on

[1] Inter-Parliamentary Union and UN Women (2015), Catalyst (2016).

the responsibility of decision-making, that we focus on in this paper.[2] Over and above differences in other traits relevant to leadership, such as risk tolerance or competitiveness, differences in attitudes toward decision-making responsibility may play a distinct role in why women are less likely than men to volunteer for (and rise to) leadership roles. The implication, which is of concern not only in economic but also in social and political domains of decision-making, is that critical decisions would be mainly left to men, potentially causing inefficiencies and an over-representation of the preferences of a particular subgroup of the population (see Kleinjans (2009), Kanthak and Krause (2010)).

In this paper, we study the evolution of the willingness to assume the decision-maker role in a group, a major component of leadership, from childhood to adolescence. Using unique data from a large field experiment that involves a sample of children with the average age of 10 and a sample of adolescents of average age 13, we explore factors that are associated with leadership willingness and the gender gaps therein. The rich dataset allows us to measure and study a number of factors potentially associated with the willingness to take decision making responsibility: risk attitudes, self-confidence, gender role attitudes, and a novel measure of "social confidence". Although not longitudinal, our dataset is well-suited to study the evolution of these factors from childhood to adolescence as our samples of adolescents and children represent the same narrowly defined socio-economic segment in our study site.

To measure self-selection into a decision-making role, we use a task where subjects are placed in three-person groups, and are asked whether they would like to be the one that makes a risky decision on behalf of the group, determining everyone's payoffs. Abstracting from any pecuniary concerns (rewards or punishment) potentially associated with being a leader, the task captures pure preferences towards taking on decision-making responsibility and being accountable for other people's payoffs, a fundamental aspect of executive decision-making and leadership .[3] We therefore refer to the choice of whether or not to take on the decision-maker role in the group as the "leadership choice". Using this measure, we first document that while there is no gender gap in the willingness to make a decision for the group in childhood, a large gender gap (18.5 percentage points) emerges among adolescents. We then set out to understand the factors associated with the emergent gender gap in leadership,

[2]Leadership may also involve other components, such as acting first and leading by example. Voluntary leadership by example has been studied in, for example, public good contribution contexts (Arbak and Villeval (2013), Rivas and Sutter (2011), Cappelen et al. (2015)).

[3]Responsibility has been identified as an important component of decision-making related to allocation of payoffs as well as risk-taking on behalf of others (Charness (2000), Charness and Jackson (2009), Trautmann and Vieider (2012), Füllbrunn and Luhan (2015)). It has also been documented that payoff commonality in groups affects individual behavior in both strategic and non-strategic contexts (Charness et al. (2007), Sutter (2009)). As related concepts, Bartling et al. (2014), Ertac et al. (2016) and Neri and Rommeswinkel (2016) study preferences for decision rights, autonomy and power.

in particular, the major potential contributors such as risk tolerance, self- and social-confidence, and gender role attitudes.

Self-confidence is believed to be one of the most fundamental factors determining selection into ambitious paths in educational and occupational settings. There is a large literature that has documented gender differences in self-confidence, with women holding a less positive view of their abilities than men (see Kling et al. (1999) and Croson and Gneezy (2009) for reviews). Lack of self-confidence has also been put forward as an explanation for women's dislike of negotiation (e.g. Babcock and Laschever (2009)) and their lower willingness to self-select into competition, leading to a major source of inefficiency if such negative beliefs occur despite truly high ability. Self-confidence is also likely to be associated with who rises to leadership positions in groups (see Reuben et al. (2012), who show that women are less likely to be selected as leaders of groups in a real effort context due to lack of confidence). However, voluntary leadership usually requires a type of self-confidence that goes beyond the individual belief that one can do well, and interacts with social concerns. The decisions a leader has to make on behalf of others typically face scrutiny from the people she represents. Especially in the case of a bad outcome due to a wrong decision or bad performance, the leader may be faced with expressed disappointment or disapproval from other group members and/or may feel guilt, regret or embarrassment because of having negatively affected others' payoffs.[4] The willingness and ability to withstand public pressure (for example, being able to generate convincing arguments against dissent, being able to overrule opposition or facing the aftermath of a dismal public performance) are likely to be necessary traits to possess for a leader. Someone without such confidence may therefore not want to assume the decision-maker role in the first place.

In order to study the role of self-confidence in leadership, we develop two incentivized measures. These involve a mathematical real effort task where the subject is allowed to opt for a more difficult-higher reward or an easier-lower reward version of the same task. We use the difficulty choice as a measure of (private) self-confidence, with the conjecture that it proxies the subject's assessment of her own ability.[5] We then measure subjects' willingness to face social scrutiny. This measure involves eliciting subjects' willingness to perform the same mathematical task in public, i.e., in front of peers and experimenters. We conjecture that this measure, which we refer to as "social confidence", captures a unique aspect of self-confidence that is relevant for leadership decisions over and above

[4] In fact, this may be behind women's relative reluctance to act first and lead by example as well (Arbak and Villeval (2013)).

[5] Niederle and Yestrumskas (2008) show that women are less likely to seek challenges and may do so because they are less certain of their ability to succeed in a difficult task.

what is captured by the private, individual choice of task difficulty. We document that there is about an 8 percentage-point gender gap in social confidence in childhood already, and this gap becomes very large (about 24 percentage points) in adolescence. Even after controlling for ability, risk tolerance and private self-confidence, girls are 18 percentage points less likely to accept to perform the mathematical task on the board, in front of their peers.

We find that social confidence is the single most important predictor of willingness to make decisions on behalf of others in both childhood and adolescence. The predictive power of this measure is a lot more prominent for girls and it increases significantly going from childhood to adolescence: while girls' willingness to perform under public scrutiny increases the propensity of leadership willingness by 16 percentage points in childhood, the effect doubles (becomes 32 percentage points) in adolescence. Our results suggest that the dramatic gender gap that emerges in social confidence in favor of boys may largely be responsible for the concurrent gender gap in leadership willingness in adolescence. While factors such as private self-confidence, risk tolerance and self-reported grit are also correlated with the leadership choice, they do not come close to the predictive power of social confidence. We get additional insights from a supplementary experiment conducted on a fresh sample of students: in addition to confirming the positive association between leadership willingness and social confidence in adolescence, these data show that girls have lower social confidence in spite of the fact that they can succeed in public, that is, confidence differences are not because girls cannot do as well as boys in front of others, highlighting the inefficient nature of the gap.

We offer a theoretical mechanism which helps us understand the relationship between leadership choice and social confidence that we observe in the data. To do this, we first set up a simple expected utility model augmented with psychological costs related to social concerns. We then perform a structural estimation exercise where we estimate the cross-sectional distribution of the coefficient of relative risk aversion and the joint distribution of psychological costs of acting under public scrutiny, using an indirect estimator. With this exercise, we show that a simple expected utility model that incorporates social concerns into decision-making can successfully generate the predictive power of social confidence on leadership choice and justifies the gender gap among adolescents we observe in the data.

Gender differences in risk aversion, competitiveness and self-confidence are well-documented in individualistic performance and decision settings (see, for example, Charness and Gneezy (2012), Croson and Gneezy (2009), Gneezy and Rustichini (2005), Eckel and Grossman (2008), Niederle and

Vesterlund (2007)). Social performance contexts (performing in front of or on behalf of others) and group decision-making settings that involve accountability for others include an extra layer over and above individual decisions that may be particularly conducive to gender gaps favoring men. This paper is the first to study how girls' and boys' attitudes related to leadership evolve from childhood to adolescence. The paper puts forward a novel measure of "social confidence", a previously overlooked aspect of confidence, and identifies its role as a primary factor behind an individual's reluctance to rise to a decision-making position in a group, over and above private beliefs about ability (self-confidence) and risk attitudes. The results point to adolescence as a period where social confidence declines more dramatically in girls, and a concurrent gender gap emerges in leadership willingness in decision-making, with boys more likely to volunteer to make decisions on behalf of others. The correlation between social confidence and willingness to make decisions for others indicates that similar mechanisms might be at work both in ability-related contexts that require task performance in the presence of others and in group contexts where decisions are to be made under uncertainty with common payoffs and public scrutiny. Given that any leadership position involves elements of either context and usually both, psychological costs associated with public scrutiny likely lead women to decline taking on a prominent decision-maker or performer role in groups, that is, shy away from leadership. The results offer new insight into why so few women are in decision-making positions in politics and in the business world, and implications for designing interventions to prevent these gaps from emerging in the first place.

The rest of the paper is organized as follows: Section 2 provides the background and experimental design, Section 3 presents the data and discusses the results, Section 4 concludes.

2 Background and Experimental Design

For our main analyses, we use data from two cohorts of students in a number of state-run schools in Istanbul. Our sample consists of elementary school students (children sample) who were in 4th grade, and middle school students (adolescent sample) who were in 8th grade at the time of the data collection.[6]

The elementary school data are collected as part of a large-scale field study implemented with the aim of evaluating a series of randomized educational interventions. The experiments we conducted for the purpose of this paper were carried out in the baseline of this study. Examining this sample, we

[6] According to the Turkish education system, grade 4 is the last year of elementary school and grade 8 is the last year of middle school, after which students spend 4 years in high school.

first establish that there is no gender gap in the willingness to decide on behalf of a group in children. As this result is at odds with recent evidence that points to a large gender gap in leadership willingness among adults, we set out to study the evolution of this attitude from childhood to adolescence. For this, we launched another field study that involves adolescents in middle schools, with the conjecture that social pressures that reinforce traditional gender roles may kick in around puberty when physical changes manifest, and may lead to gender gaps in behavior (as documented in Andersen et al. (2013) in the context of competitiveness). Adolescence may thus be crucial for pinpointing the timing and reasons for gender differences in leadership, which is in turn important for understanding which ages policies aiming to mitigate such differences should target. The average ages of the students are 10 and 13 for the children sample and the adolescent sample, respectively.[7]

The comparability of our children sample with the adolescent sample is facilitated by a unique feature of the Turkish education system. Turkey has a two-tier education system where most middle and high income families choose to send their children to private schools which have better resources. Those who remain in the public system typically represent a lower socioeconomic group (our target group) and these families tend to send their children to schools in their catchment areas. In some districts elementary and middle schools share the same ground, where middle school students attend school in the morning and elementary school students in the afternoon or in some cases, vice versa. Due to this locational convenience, a significant proportion of elementary school students spend their middle school years in the same school ground. We chose our sample of middle schools from among the elementary schools in our sample. Because 12 years of education is now compulsory in Turkey (with 4 years of elementary, 4 years of middle and 4 years of high school), there is no attrition at the middle school level based on gender.[8] In addition, although students may self-select into (again state-run) schools that selectively admit based on performance at the high school level (the last 4 years of compulsory schooling), there are no such schools and no such selection going from elementary to middle school. That is, students whose families sent them to state-run elementary schools stay in the state school system for the middle school as well, and stay in the same school if it has a middle school in the same ground. Therefore, we are confident that our sample of children is fully comparable to our sample of adolescents.

It is well known that gender differences such as those in competitiveness and risk taking are observed

[7]The average age of menstruation in a sample of Turkish girls in a recent study was found to be 12.2 (Bundak et al. (2008)), which is a major stage marker for girls in puberty.

[8]Children are allotted to classrooms randomly based on a near 50-50 gender ratio in 1st grade and there is no significant difference between the number of girls and boys in either our elementary or middle school samples.

in societies with more equal gender roles such as Norway, Sweden and Austria as well as less equal ones (Sutter et al. (2013), Cárdenas et al. (2012), Almås et al. (2012)). In terms of existing gender roles of the society, Turkey can be regarded as fairly patriarchal, but diverse in the extent of perceived gender roles and stereotypes, which we measure individually through a questionnaire in our sample. In this sense, the country provides an ideal setting to analyze how gender differences in behavior evolve, since we expect a difference in adults due to patriarchy (as we would expect in other countries), and studying whether differences are always there or materialize with adolescence can provide important insight into the effect of social norms and other factors in producing the observed gaps in adulthood.

2.1 The Leadership Task

Our outcome variable, leadership willingness, is elicited using an incentivized experiment, based on Ertac and Gurdal (2012). The goal of the task is to construct a setting where one person's decision determines everyone's payoffs, thereby capturing the responsibility that is oftentimes attached to leadership. Since the decision involves risk, the outcome may turn out to be good or bad, depending on chance. In this context, we elicit individuals' willingness to make the decision on behalf of the group.

The experiment consists of three parts. In the first, subjects make an individual decision under risk. In the second, they state whether they would like to be the decision-maker for the group, and in the third, one individual makes the decision that determines the payoffs for the whole group. The risky decision task, which forms the backbone of the experiment, is based on Gneezy and Potters (1997). Students have 5 tokens corresponding to gifts from a gift basket, which they can allocate between a risky and a riskless option. Tokens placed in the risky option, which is conveyed to the children as putting the tokens in a particular bowl, are either tripled or lost, with 50% chance. Tokens that are not put in the bowl are safe. Uncertainty is resolved through a draw from an opaque urn that contains one yellow and one purple ball. If the yellow ball is drawn, the good outcome occurs. If the purple ball is drawn, the tokens placed in the risky bowl are lost.

In the group decision task, children are told that they will be placed into randomly-determined groups of 3 people. The decision task is the same allocation task as in the individual case. However, everyone in the same group gets the same payoff, based on a single group member's decision. Being the decision-maker in such a context is related to a major component of leadership, which is that decisions made by leaders oftentimes have payoff consequences for others and involve responsibility. Investing most of the tokens into the risky option, for example, may lead to everyone getting a low payoff in

the case of a bad draw. Similarly, keeping all in the safe option may turn out to be a bad decision for everyone ex-post. Given that different people have different preferences as to how much risk to take and these preferences are not known, taking the responsibility of the decision inherently involves "social risk" coming from the imposition of one's own preferences. This captures a primary aspect of a leader's job, i.e., decision-making authority and responsibility for the resulting payoffs. We therefore call the decision-maker in the task the "leader" in what follows.

Who among the three people will make the actual group decision is determined based on self-selection. Specifically, each individual states whether she would like to be the one making the decision on behalf of the group. The actual decision-maker is then randomly selected from among volunteers. If there are no volunteers, one individual is selected randomly from among the three. The decision made on behalf of the group by the leader is implemented, and everyone in the group gets the same payoff based on the leader's decision.[9] Knowing this mechanism, individuals make two decisions: (1) Whether they would like to be the group decision-maker, (2) In case they are selected as the decision-maker, what their idecision would be.[10] We interpret saying yes to the question of whether one would like to be the decision-maker as leadership willingness. Notice that in this task, there is no payoff-related reason to say no to being the group decision-maker. Since leaders do not get monetarily punished for decisions that lead to low payoffs, someone who cares only about their own monetary payoff should always take the opportunity to implement her own preference. An individual who declines the opportunity to be a leader may be unwilling to impose her own preferences on the group or may not want to take the risk of causing a bad outcome that may not be liked by other group members.[11]

2.2 The Self- and Social Confidence Tasks

It is quite plausible that self-selection into a leadership position, which typically comes along with a great deal of responsibility, is likely to be related to self-confidence. The decisions a leader makes on behalf of the people she represents usually face scrutiny by those people. The outcome of a leader's

[9] How the uncertainty is resolved was a treatment variable in the elementary school sample. Specifically, in one treatment the decision-maker was also responsible for drawing the ball that determines what happens to tokens invested into the risky option. In another treatment, an assistant would be asked to draw the ball rather than the decision-maker, to test whether potential effects come from perceptions of individual bad luck. We do not find any differences in any behavioral measure (p-value=0.42 for leadership choices and p-value=0.78 for allocation decisions) with respect to this treatment variable, and therefore pool the data. In the adolescent sample, the decision-maker also had the responsibility of drawing the ball.

[10] This allows us to collect decisions from all subjects regardless of leadership willingness.

[11] Ertac and Gurdal (2012) and Ertac et al. (2016) show that (adult) women are much less likely than men to give an affirmative answer to the question of whether they would like to be the decision-maker for their group in this task. Aycan and Shelia (2016) show that volunteering to make the decision in this task correlates significantly with broader leader emergence constructs in psychology such as the psychometric scale of "motivation to lead".

decision may turn out to be bad for payoffs, and may result in disappointment and disapproval on the part of the affected, making the leader feel regret, guilt or embarrassment. Someone who is averse to such feelings may decline the leadership position in the first place.[12] Similarly, leadership requires the individual to potentially face socially difficult situations, after a failed decision or a dismal performance in a task. Therefore, being able to withstand public dissent (for example, being able to overrule or generate convincing arguments against opposition) is likely a necessary trait to possess for a leader.

We propose an incentivized measure that aims to elicit this type of strength in the context of a real effort task, which we refer to as "social confidence". We conjecture that this measure will capture an important aspect of self-confidence that should be especially relevant for predicting leadership willingness. We use this measure along with a measure of "private" self-confidence in own performance that will not be subject to public scrutiny. To elicit both types of confidence we use a real effort task. Specifically, students are presented with a task where the goal is to find pairs of numbers in a grid that add up to 100 in elementary schools and 1000 in middle schools. The task has two versions. The 4-token task brings 4 gift tokens whereas the 1-token task brings 1 gift token in the case of success, with both types of task giving zero payoff in the case of failure. In both tasks, the goal is to find at least 3 pairs adding up to 100 (or 1000), within 1.5 minutes. However, the number grid in the 4-token task is larger, which is why this task is more difficult.[13]

For the private self-confidence measure, we ask the students whether they would like to do the difficult or the easy task, in case they will do the task by themselves, anonymously. The idea here is that individuals who are more confident in their ability to do well will be more likely to choose the more difficult task.[14] To elicit "social confidence", we elicit students' willingness to perform this task in public, that is, on the board, in front of their classmates. Students are asked to decide which task they would like to perform, in case they are selected to do the task in front of the class. They also have the option to refrain from doing the task altogether. After everyone makes their decision, one student is selected at random, and her choice is implemented. If she chose to opt out, another student is randomly selected to do the task. In what follows, our measure of social confidence is a binary variable that takes the value of 1 if the student was willing to perform at the board and zero otherwise. The

[12] A related concept, regret aversion, has been identified as an important motive in decision contexts such as auctions (e.g. Filiz-Ozbay and Ozbay (2007)).

[13] Mathematical tasks have been widely used in the literature documenting gender differences in competitiveness and self-confidence, and are useful for measuring differences that may have implications for educational choices such as selection into STEM majors. In our particular context, we use the task to capture a setting where differences in self-confidence are expected, and to study whether social confidence in such a setting has further explanatory power in leadership willingness, over and above self-confidence.

[14] In addition to self-confidence, risk aversion is also a potential factor in this choice (as well as in the social confidence measure). We control for risk tolerance in all of our regressions.

reason why we use the decision to refrain from doing the task altogether is that this is a self-preserving strategy that absolves the individual of any social pressure or potential embarrassment.[15] Although the probability of success is higher, doing the easy task on the board still involves (even stronger) social risk. This is because failure in the easy task can lead to social ridicule, and having chosen the easy task may not be appreciated by others even in the case of success. Refraining from doing the task altogether protects the individual from such risks, albeit at the cost of forgoing gifts.[16] Note also that we refer to the individual self-confidence measure as "private self-confidence" and occasionally refer to the social confidence measure as the "board task" throughout the text.

In order to both familiarize students with the general task and have a measure of mathematical ability, before making the private difficulty choice and whether to perform on the board, students are given 2 minutes to find as many pairs as possible that add up to 100 (1000 for the adolescent sample) in a large number grid.[17]

2.3 Experimental Procedures

All experiments were conducted in-class, with pencil and paper, during the allotted class time for extracurricular projects.[18] Rewards were in the form of gifts for the elementary school children—each token that was earned in the selected tasks corresponded to one gift item that children could take from a gift basket that included attractive toys and stationary items. We took care to ensure that the gifts were of value to the children, and that the basket included adequate numbers of each type of gift. In the adolescent sample, tokens corresponded to coupons worth 1TL (about \$0.5 at the time).[19] We implemented both the individual and the group decision tasks in a single class hour, and one task was selected at random for payment at the end of the session.

Children first made a decision in the individual investment task, and then proceeded to the group task. To collect decisions, children were (randomly) distributed choice sheets that had their group's ID number. At the time of decision, children did not know with whom they were in a group. After the

[15] Ludwig and Thoma (2012) show that women tend to downgrade their self-assessments if these assessments will be observed, that is, they are averse to overestimating themselves and others seeing this.

[16] In unreported regressions we find that using difficult task-board, easy task-board, and refraining as three separate categories does not change the results, in the sense that once the subject chooses to do the task on the board, it does not matter whether she chose the easy or difficult version, for predicting leadership (p-value=0.43). This confirms that refraining from doing the task altogether captures the social aspect of the task better than the version chosen once the individual accepts to perform in public.

[17] We incentivized this part of the experiment as well by offering a small gift per correct answer. These small gifts (e.g. a regular pencil, single hairpin etc.) were significantly lower in value than the gifts used as rewards in the actual task (that brings 4 gifts or 1 gift in the case of success), and the children were aware of this.

[18] Sample instructions are provided in the Appendix.

[19] It is common in the literature examining the evolution of economic behavior and related gender gaps over age to use gifts for younger children and money for adolescents (e.g. Sutter and Glätzle-Rützler (2014), Kosse et al. (2016)).

leadership decision and the group investment decision were made, we collected the sheets and sorted them according to group ID. At the end of the session, either the individual part or the group part was randomly selected for payment. If the individual decision was selected, each child received gifts based on her individual risk allocation decision and the outcome of the random draw. If the group decision was randomly selected for payment, we determined the group decision-makers according to the mechanism of random selection among volunteers.[20] At this stage, the identity of the group decision-maker and his/her decision was revealed to everyone in the group, which amplifies the social risks associated with being the group decision-maker. Based on the decision-maker's choice of tokens invested and the random draw, everyone in the group received the same number of gifts.

In the elementary school sample, the self-confidence tasks and the individual-group decision tasks were conducted on two separate days because of logistical constraints, while in the middle school sample all were done on the same day. The individual and group decision tasks came before the self-confidence task in both children and adolescents. In addition to the main experiments, we report results from an additional (smaller) field study conducted on a fresh sample of children and adolescents, in Section 3.4.[21]

3 Data and Results

In addition to our incentivized social and private self-confidence measures, our data contain a number of other variables, which we utilize as potential predictors of leadership choice. One such predictor is risk attitude. We elicit risk attitudes using the Gneezy-Potters investment task in the context of the individual decision-making part of the leadership task, with a lower number of tokens invested into the risky option indicating higher risk aversion.[22] As a measure of mathematical skill, we use the number of pairs found in the initial piece-rate number task that was conducted before choices were made .

We also use a battery of survey questions with which we construct a summary score that measures grit, a non-cognitive skill that has been shown to correlate with academic achievement as well as competitiveness (see Duckworth et al. (2007), Duckworth and Quinn (2009), Alan et al. (2016), Alan and Ertac (2016)).[23] We conjecture that in this context grit may play a role as one might expect that

[20] Each choice sheet had a letter in small print (A, B or C). In case of ties (more than one person or no one willing to decide), letters earlier in the alphabet took precedence. This procedure achieves randomness, since choice sheets were distributed randomly.

[21] Procedures in this study were such that both the elementary and middle school sample did all tasks on the same day. The same data patterns as in the main data are also observed in this sample.

[22] See Charness et al. (2013) for a review of the uses of this task for eliciting risk preferences.

[23] Alan et al. (2016) use this survey in an independent sample of Turkish children and document strong correlations

gritty individuals, i.e., those who set challenging goals and are perseverant, are more likely to self-select into leadership positions. Finally, using a large number of survey questions, we construct a summary score that measures how traditional students' beliefs on gender roles are, with the conjecture that these beliefs may play a role in volunteering to become the group leader. We provide the translation of all survey questions used to construct the grit and gender stereotype scores in the appendix. All survey data were collected after experimental measures, in order to prevent potential priming effects on behavior.

While all data on adolescents were collected in a single visit to participating middle schools, data on children were collected in different sessions (days) as this effort was part of a bigger field study with a much larger sample. This created a moderate missing data problem for our elementary school sample because on a given day, about 20% of the students do not attend school for various reasons such as common viral infections. Revisiting the classroom to collect data from these particular students is logistically very difficult, especially given the group decision-making focus of our study. Instead, we impute missing values of our covariates using a multiple imputation technique and also provide results without imputation in the appendix (see Tables A.3 and A.4).[24]

Our main sample consists of 769 children and 625 adolescents who participated in the leadership task. These data come from a total of 18 schools (25 classrooms in elementary schools and 21 in middle schools). All data were collected using pencil and paper by physically visiting the classrooms. In all analyses, we cluster standard errors over classroom to account for intra-cluster correlations.

3.1 Descriptive Statistics

Table 1 provides the means of all variables used in our analyses for boys and girls separately, in the children and adolescent samples. The very first row documents the statistics that motivate the paper: the proportion of students who state their willingness to be the decision-maker for the group. Here, we note two observations: First, the willingness to decide on behalf of a group is much higher in the elementary school sample (75% in the whole sample with both girls and boys) than in the adolescent sample (56% in the whole sample). Second, while leadership willingness declines going from childhood to adolescence for both girls and boys, a large gender gap of 18.5 percentage points emerges in favor of boys. Specifically, while boys' willingness to lead declines too as they become teens (by 10 percentage

with grades and test scores.

[24] We use the built-in multiple imputation routine in Stata. We do not impute our outcome of interest, leadership choice.

points), the proportion of girls who exhibit leadership willingness drops by 30 percentage points (39%) going from childhood to teen years, resulting in a significant gender gap in leadership willingness.

Table 1 also shows the differences between boys and girls in each age group with respect to a number of other attitudes and outcomes, which are potential factors associated with leadership willingness. It is clear from this table that some stark differences between genders are present even in childhood, and most of these differences persist into adolescence. A notable gap is in mathematical ability, as measured by initial performance in our real effort task. It appears that boys perform better in this context, both in childhood and in adolescence (see Feingold (1988), Fryer and Levitt (2010), Golsteyn and Schils (2014), Hyde et al. (1990a), Hyde et al. (1990b)). Consistently with some of the previous findings in the literature, girls appear to be more risk averse than boys, although this gender difference seems to disappear in adolescence in our sample.[25] They also exhibit higher self-reported grit and more progressive beliefs regarding gender roles.

An important finding in this table is the gender difference in self-confidence measures. Note first that while there is no gender difference in private self-confidence in childhood, a significant gap emerges in adolescence. In terms of social confidence, a significant gender gap in favor of boys is already present in childhood and this gap significantly widens in adolescence. While girls are 8 percentage points less likely to state a willingness to perform the real-effort task on the board than boys in childhood (which is statistically significant), the gap becomes 25 percentage points in adolescence. In what follows, we will show that self-confidence in general and social confidence in particular is the major predictor of leadership decisions, and the change in social confidence favoring boys largely explains the emerging gender gap in leadership willingness going from childhood to adolescence.

3.2 Leadership Willingness and its Determinants

Figure 1 shows the percentage of children and adolescents who exhibit leadership willingness. The two panels present the finding in the first row of Table 1 in visual clarity. The willingness to lead a group is quite high among children, with no statistically significant gender gap. Specifically, about 76% percent of girls and 75% of boys state that they want to be the leader. The picture changes dramatically when we look at our adolescent sample (Panel 2). Here, we see that the willingness to

[25] It is well-documented in adults that women are more risk-averse than men (Croson and Gneezy (2009)). In children and adolescents, the evidence seems to be more mixed. While Cárdenas et al. (2012) and Sutter et al. (2013) document that girls are more risk averse than boys, Harbaugh et al. (2002) do not find a significant difference in the US and Khachatryan et al. (2015) do not find a significant gender difference in Armenia in children. Almås et al. (2015) do not find a gender difference in risk tolerance among Norwegian adolescents.

lead declines significantly and that a significant (18.5 percent) gender gap emerges going from childhood to adolescence.

The first analysis we carry out aims to pin down the factors associated with leadership willingness. Table 2 presents the predictive power of the variables in Table 1 in determining leadership willingness in childhood and adolescence. Our measure of social confidence (board task) appears as the major predictor of leadership willingness in both childhood and adolescence: While children who elect to perform a mathematical task in front of their peers are about 13 percentage points more likely to exhibit willingness to make a risky decision on behalf of a group, the predictive power of the social confidence measure almost doubles in size in adolescence (about 25 percentage points). Note also that self-reported grit appears as a significant predictor of leadership willingness in both cohorts. Specifically, a one standard deviation increase in the grit score is associated with about a 5 (6) percentage point increase in leadership willingness in childhood (adolescence). Interestingly, risk tolerance and private self-confidence emerge as significant predictors only in adolescence.

Given that we are interested in understanding the factors behind the gender gap in the leadership decision, it would be informative to analyze the predictive power of these covariates separately for boys and girls. Table 3 presents this analysis for our full specification (columns 2 and 4 in Table 2). A number of interesting findings should be noted here. First, social confidence is the strongest predictor for both boys and girls, especially in adolescence, but the predictive power is quantitatively higher for girls than boys within both age groups. In particular, going from childhood to adolescence, the predictive power of this measure doubles for girls although we cannot reject the equality of coefficients for either cohort (p-values of 0.44 and 0.16 for the children and adolescent samples, respectively). Second, risk tolerance is an important predictor for girls in childhood and boys in adolescence. Third, grit seems to be an important predictive factor for the leadership choice for both genders. Finally, private self-confidence has a positive effect for both genders in adolescence, albeit lacking statistical significance when we look at subgroups, possibly due to the smaller sample size.

So far, our findings highlight an emergent gender gap in leadership willingness going from childhood to puberty and a number of important factors that seem to determine this attitude, whose predictive powers are different across gender and age groups. Can changes in these underlying predictive factors explain the gap that emerges in adolescence? In the next section, we attempt to identify the changes in these predictive factors and explore how these changes contribute to the gap in leadership willingness going from childhood to adolescence.

3.3 Explaining the Emerging Gender Gap in Leadership Willingness

In this section, we explore the relative contributions of the "change" in the aforementioned predictive factors to the "change" in the gender gap in leadership willingness between childhood to adolescence. Figure 2 depicts the changes in the gender gap in leadership and the predictive factors we examine in earlier sections. The figure presents difference-in-difference estimates of the gender gap in leadership willingness and all relevant predictive factors with 95% confidence bands.[26] The top line shows the "change" in the gender gap in leadership choice, that is, the gap we observe in adolescence minus the gap we observe in childhood (approximately 19% with p-value=0.00). Coefficients plotted on the right hand side of the zero line represent the change in gap estimates in favor of boys, while the left hand side depicts those in favor of girls. This figure clearly shows that the only factors for which the gender gap goes in the same direction as that in leadership willingness are self-confidence and social confidence. Interestingly, the gender gaps in risk tolerance and progressive beliefs on gender roles seem to shift in favor of girls, while we do not observe any significant change in gender differences in math ability or grit.

Figure 2 suggests that the dramatic decline in self-confidence and in particular, social confidence, may explain a significant portion of the emergent gap in leadership willingness. However, a couple of caveats are in order here. First, even after controlling for social confidence and other factors, a large gender gap of about 12 percentage points remains (see the last column of Table 2). While this may suggest that pure preference change may be a major reason for the observed gap, it may also point to omitted factors. Second, we acknowledge that without exogenous variation in social confidence, the documented relationship cannot be given a causal interpretation. In what follows, we will try to understand this relationship further with the help of some supplementary data and a simple theoretical model. In particular, we will seek answers to the questions of, i) why girls shy away from decision-making roles and tasks to be performed under public scrutiny using some qualitative supplementary evidence, ii) whether this behavior is rational in a payoff-maximizing sense, and iii) whether the strong relationship between leadership willingness and social confidence as well as the emergent gender gap in leadership willingness can be justified within a simple expected utility model augmented with heterogeneous social concerns.

[26] The coefficients plotted are obtained from the empirical model: $y_i = \alpha + \beta_1 Male + \beta_2 Elementary + \beta_3 Male X Elementary + \varepsilon_i$. The plotted coefficient is β_3, which shows the change in the gender gap going from childhood to adolescence. Formally, it is $\{E(y|Male = 1, Elementary = 0) - E(y|Male = 0, Elementary = 0)\} - \{E(y|Male = 1, Elementary = 1) - E(y|Male = 0, Elementary = 1)\}$.

3.4 Discussion

The above analysis establishes that social confidence, as measured by the willingness to perform a mathematical task in front of peers, is the major predictor of the willingness to assume a decision-making role, over and above private self-confidence. A significantly higher portion of female students refrain from this task. As shown in Table 4, even controlling for mathematical ability and risk tolerance, girls are significantly more likely to avoid performing the board task. Not surprisingly, private self-confidence is the major predictor of this behavior: willingness to attempt the difficult version of the task privately is associated with a 10.6 (12.6) percentage point increase in the willingness to do the task on the board in childhood (adolescence). It is also interesting that risk tolerance is positively associated with the board task choice only in adolescence, which may suggest that the social risk involved in performing the task on the board may come into play especially in this period.

Why is it the case that girls shy away from this task? It may be that even if they are equally able, girls may be less likely than boys to succeed when they perform the task under public pressure, and they are aware of this issue. Put differently, if girls were asked to do the board task regardless of their willingness, perhaps they would not perform as well as boys of the same ability level. This may be particularly relevant given the mathematical task, in which girls may experience stereotype threat (Spencer et al. (1999)).[27] One cannot test this idea by simply comparing the performance of girls who performed the task on the board with that of boys due to the obvious selection problem. Understanding whether social concerns have any direct impact on one's actual performance or whether such concerns are limited to beliefs and choices is important for mitigating gender-achievement gaps.

In order to compare performances in front of peers purged of selection, we organized an additional field study and supplemented our main data with a small fresh sample of students, a significant proportion of which were asked to perform the board task regardless of their initial choices. Contrary to the procedures followed in the collection of main data, we informed the students at the outset that they would make a choice, and while this choice would count with some chance, with some chance they would be asked to perform the task on the board regardless of what they chose.[28] In each class, after everyone made their decision, a random set of students were picked one by one and they were asked to do the (difficult) task on the board (or with very low probability, their own choice was implemented).

[27] However, we should note that even if this is true, we would expect one to at least choose the easy task on the board and get the one gift, since the probability of success is almost 100% in the easy task.

[28] The probability that the students would be asked to do the task was set to 90%. This ensures that while the decision to perform or not perform on the board is incentivized, a large majority of students would actually be imposed the board task.

We continued this procedure until we reached the end of the allotted time for our experiment. This gives us a sample of board performances that is largely free of self-selection. Children also did the leadership in decision-making task, which allows us to observe whether the data patterns regarding leadership replicate in this sample.

These supplementary data consist of 300 students. Among these, 155 constitute our supplementary elementary school sample (children), and 145 our middle school sample (adolescents).[29] A total of 139 students performed the task on the board; 60 children and 79 adolescents. In this sample, a total of 106 students had chosen not to perform the task on the board (35% of the whole supplementary sample), similar in proportion to our main data (39%). Consistently with the results from the main data, we find that there is a significant gender gap in the willingness to perform on the board, with girls exhibiting lower willingness both in childhood and adolescence (13pp and 16pp differences in childhood and adolescence, respectively).

Table 5 presents marginal effects from a logit model of the probability of success in the board task. Looking at the unconditional proportions (columns 1 and 3), we see that there is no gender difference in performance, either in childhood or in adolescence. These results do not change when we control for private self-confidence, social confidence, risk tolerance, and math ability for the children sample but a 19 percentage point gender gap in favor of girls appears in the adolescent sample. This result makes the observed gender gap in the willingness to perform the board task all the more concerning from an efficiency perspective. It provides strong evidence that despite the fact that they would do well if they are asked to attempt, females shy away from rewarding tasks that are to be performed under public pressure. Interestingly, social confidence has no predictive power on actual success on the board.[30]

In this supplementary fieldwork, in order to better understand the role of social concerns in jointly determining leadership and board task choices, we conducted a survey in addition to the incentivized experiments. This survey involves a battery of questions that aim to elicit fear of embarrassment, assertiveness, anxiousness and fear of disappointing others, behaviors and attitudes which are likely to drive both leadership willingness and willingness to do the board task.[31] Using these questions, we construct standardized summary scores.

[29] These students were recruited from one elementary and one middle school, about 2 years after the initial field experiment. These schools were new schools (not in our original sample) but students were the same grades and ages as in the original sample. The elementary and middle school were in the same school ground.

[30] In our main data, we find that adolescents were worse in their ability-measuring task than elementary schoolers. However, in the supplementary sample, children find the same number of pairs on average as the adolescents in the main data, in their respective ability-measuring tasks (p-value=0.75). This suggests that potential differences among elementary and middle school students in terms of the perceived difficulty of the task do not drive results.

[31] All questions are provided in the appendix.

Table 6 shows how these summary scores correlate with leadership and board task choices. The signs of these correlations are quite intuitive. We find that leadership choice is strongly positively associated with assertiveness and negatively correlated with anxiousness: a one standard deviation increase in the assertiveness score increases the probability of leadership choice by 5 percentage points. Similar intuitive correlations are present in the board task choice as well: while a one standard deviation increase in the anxiousness score lowers the probability of leadership choice by about 9 percentage points, it lowers the probability of willingness to perform the board task by 13 percentage points. What is important in this table is that similar social concerns appear to influence both choices in the same direction, an observation we will exploit when we discuss our proposed mechanism that might help in interpreting our results.

On a final note, our results on the determinants of leadership willingness are largely replicated in these supplementary data. In Figure 3, we again see an emerging gender gap in leadership willingness going from childhood to adolescence, although naturally, the statistical power is lower (p-value=0.09). We also replicate the strong relationship between leadership willingness and the willingness to perform the board task for adolescents: the willingness to do the board task is associated with a 38 percentage point increase in the willingness to decide on behalf of a group (the point estimates are remarkably similar for boys and girls). While we find a sizable correlation between willingness for leadership and that for public performance among elementary school girls, albeit lacking statistical significance, we cannot capture the correlation for boys because a very small number (18) of them said no to the board task and none of those opted out of leadership.

3.4.1 A Qualitative Analysis of Leadership Willingness and Social Confidence

In the supplementary fieldwork, we also asked students direct questions regarding their choices. Specifically, we asked those who declined to decide on behalf of a group and those who opted out of the board task to give us the reason(s) for these decisions. For this, we gave students a large number of options to choose from, as well as an opportunity to write down their own specific reason if it was not in the option list.[32]

Figure 4 presents the distribution of the answers to the question "why did you not want to be the decision-maker for your group?" for the sample that said no to leadership, in children and adolescents.

[32]Students were allowed to state multiple reasons for both questions. Among the 26 (61) students who decline to be a leader in elementary schools (middle schools), none (1) wrote down their own reason. We do not include these students in this analysis.

In general, 42% of children and 53% of adolescents express at least one "social concern" such as the fear of letting others down and not wanting to take the responsibility for a bad outcome as reasons for their unwillingness to be a leader.

Figure 5 presents the distribution of reasons given by students who chose not to perform the board task. Here, in the children sample, social anxiety is the major reason stated. In adolescents, believing one is not good at math emerges as an important predictor as well as a dislike of performing in public. Overall, the analysis in this section gives us qualitative evidence on the importance of social concerns that are likely to influence both leadership willingness and board task choice. Next, we show how a simple expected utility model augmented with social concerns can justify the choices, and in particular, the strong association between leadership willingness and board task choice we observe in the data.

3.4.2 Leadership Choice and Social Confidence: A Simple Model

Suppose that subjects have a concave utility function that is defined over experimental rewards, separable from other consumption bundles. The expected payoff (π) of subject i who wants to invest x tokens into the risky option is:

$$E(\pi_i) = p(W + \alpha x_i) + (1 - p)(W - x_i)$$

where α is the gross return from investment, W is the initial endowment given to the subjects, x is the amount bet and p is the probability of winning. Assuming expected utility and a CRRA utility function, the solution for the optimal amount of investment in the risky option x^* for subject i is proportional to her endowment:

$$x_i^* = \left(\frac{1 - \Gamma_i}{1 + \alpha\Gamma_i}\right) W$$

with

$$\Gamma_i = \left(\frac{1 - p}{\alpha p}\right)^{1/\rho_i}$$

where ρ_i is the coefficient of relative risk aversion of subject i. Because the endowment and the return offered are the same for all subjects, what determines the differences in x across subjects is their risk aversion, which is captured by the coefficient of relative risk aversion ρ in this specification.

In the standard model, a rational individual i maximizes her expected utility so we would not

expect her to prefer a suboptimal allocation of x_j^*, since

$$U(x_i^*) > U(x_j^*)$$

as long as $i \neq j$.

However, if one departs from the standard model and considers the fact that individuals also concern themselves with what others think and incorporate these social concerns into their decisions (as we document above using our supplementary data), the above relationship may take a more complicated form. These concerns may come into play in contexts where the individual's decision is consequential for others, as in our leadership task. These concerns may be modeled as psychological costs of self-image damage or fear of peer backlash in the case of a bad outcome.[33] Such costs can justify why a rational subject may choose to delegate decision making in our context by essentially waiving the opportunity to implement her optimal allocation. In such a model a subject will choose to decide for the group if she thinks that such costs are worth bearing:

$$U(x_i^*) - V(s_i) > U(x_j^*)$$

where $V(s_i)$ can be modeled as the psychic cost of imposing one's will on others (or any other concerns mentioned in section 3.4.1). The argument s itself can depend on ρ, plausibly with $\frac{\partial s}{\partial \rho} > 0$, on p with $\frac{\partial s}{\partial p} < 0$, and certainly on age, with $\frac{\partial s}{\partial Age} > 0$.

Given the empirical results we document using our supplementary data, it is plausible that these psychological costs also influence decision making in other contexts, such as the context we utilize to measure self-confidence. In our board task, the expected payoff for subject i is straightforward:

$$E(Payoff_i) = q_i(success)(R) + (1 - q_i(success))(0) \geq 0$$

where $q(.)$ is the subjective probability of finding three pairs within the allotted time on the board and R is the payoff in case of success, which is 4 gifts in our context. From this expression, a rational, payoff-maximizing subject who attaches a positive probability to her success is expected to exhibit a willingness to do this task. However, similar psychic costs may be at work in this context as well. In

[33] Ertac and Gurdal (2016) show that other-regarding preferences are correlated with an unwillingness to take on decision-making responsibility in group contexts with common payoffs.

particular, the subject may decide to do the board task if

$$E(U(\bar{x} + Payoff)) - c_i > E(U(\bar{x}))$$

where $\bar{x}$ is the subject's expected payoff from the risk game and c is the cost of performing on the board. Here, the argument c can be the level of psychic cost of social pressure when performing the task (anxiousness, fear of embarrassment/being the center of attention etc., as also highlighted in the post-experiment questionnaire) and can very well be related to the subjective probability of success q, and age. All else equal, the psychic cost might be lower for a subject whose subjective probability of success is high.[34]

The idea is that similar psychological costs can drive different behaviors and choices, as documented empirically in Table 6. Equally plausibly, different types of costs may govern different behaviors and choices but these costs may be correlated, generating a correlation between choices ex-post. For example, in our context, subjects' unwillingness to face their friends in the case of a bad outcome may primarily govern the decision of not becoming a leader. Alternatively, fear of being ridiculed by peers may govern the decision of not performing the board task. As long as these two concerns are correlated within individuals, the above model would yield a positive correlation between the two choices. As it is plausible to think that the importance of these concerns increases with age (e.g. Simmons et al. (1973), Essau et al. (1999)), the correlation may also become stronger in older ages.

In order to show that the above simple model can justify our empirical results, we perform a structural estimation exercise using its most stripped-down, fully parameterized form. Note here that the purpose of this exercise is not to promote a particular model but rather show that even a very restricted parametric model of expected utility, when augmented with social concerns, can justify the choices and associations we observe in the data.

In order to set up the estimation procedure, we make parametric assumptions regarding the cross-sectional distribution of the coefficient of relative risk aversion (ρ_i) and the joint distribution of s_i and c_i. We then estimate their moments by matching the key statistics obtained from the data with their simulated counterparts. After fitting the model (estimating the structural parameters via a simulated minimum distance estimator), we check whether the fitted model is able to generate the statistics we do not use for matching (a goodness of fit exercise), notably the correlation between leadership

[34] An alternative would be to assume that the psychological costs come in only in the case of failure. Changing the model to reflect this does not change our results significantly.

willingness and willingness to do the board task. Details of the estimation method are provided in the appendix.

We perform the matching exercise separately for boys and girls in the children and adolescent samples. The estimated structural parameters, which are not of direct interest, are presented in Table A.1. Table A.2 presents the statistic of interest that we do not use in the matching algorithm: the correlation coefficient between leadership and board task choice. The fit for this statistic is very good, i.e., this simple and very restricted model is able to generate the positive correlation between the two experimental choices quite well. Specifically, as the presented p-values suggest, the simulated correlation coefficients at the estimated structural parameters are statistically no different from the correlation coefficients obtained from the actual data. Combined with the empirical evidence, the results of this exercise suggest that incorporating social concerns into decision making is important for understanding choices that subjects perceive as consequential for others and those related to performance in public contexts.

4 Conclusion

Understanding the forces behind self-selection into leadership positions is an important step toward designing effective policies that can mitigate inefficient gender gaps in labor markets as well as in corporate or political decision-making. This paper focuses on decision-making responsibility in groups and social performance, which are central aspects of a leader's job. The results highlight aversion to social scrutiny as a novel factor behind why women are less frequently observed in leadership positions. In particular, we find that shying away from contexts that involve social pressure and/or scrutiny by others can explain why women often do not seek to rise to decision-making positions in groups, which require accountability for outcomes. Our results show that in a task performance context as well as a context where ability/effort is irrelevant and only preferences matter, sensitivity to social scrutiny arises as an important common thread that affects girls' behavior, i.e. leads them to refrain from situations that expose them to others' scrutiny. Differences across girls' and boys' leadership willingness are particularly strong in adolescence, when gender may become more salient and sex-typed behavior may be more likely to manifest (Hill and Lynch (1983)).

Given that many positions of leadership require social decision-making or social performance, the results suggest that being comfortable with potential public failure as a result of decisions or performance can be seen as a non-cognitive skill that may be conducive to rising to top positions and earning

high rewards. Policies and interventions such as exposure to female role models in leadership positions or in occupations subject to public scrutiny (as in Beaman et al. (2012)) may be especially effective for girls in adolescence, which is when social fears seem to arise and contribute to gender gaps in choices. It may be especially important to target early puberty to ensure that worries about public self-image do not culminate in permanent damage in self-confidence and prevent girls from seeking and assuming decision-making roles in groups, committees or organizations.

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Tables

Table 1: Gender Differences in Characteristics

	Children (N=769)			Adolescents (N=625)		
	Girls	Boys	p-value	Girls	Boys	p-value
Leadership	**0.76**	**0.75**	**0.87**	**0.46**	**0.65**	**0.00**
Math Ability	4.46	5.21	0.01	1.94	2.33	0.02
Risk Tolerance	2.50	2.70	0.02	2.83	2.67	0.21
Private Self-Confidence	0.71	0.74	0.52	0.67	0.80	0.01
Social Confidence	0.71	0.79	0.01	0.33	0.58	0.00
Self Reported Grit	0.05	-0.189	0.00	0.12	-0.09	0.02
Self Reported Gender Roles	0.25	-0.38	0.00	0.47	-0.40	0.00

Presented variables are constructed as follows: Leadership: a binary outcome variable that indicates whether the student chose to decide on behalf of the group (leadership choice). Math ability: Number of pairs found in the number task implemented prior to choice of task difficulty and choice of performing the task at the board. Risk tolerance: Gneezy-Potters task allocation of 5 tokens (privately made, prior to the leadership task). Private self-confidence: Binary choice of task difficulty. Social confidence: Binary choice of performing the task at the board. Self reported grit: Standardized summary score constructed using survey questions adapted from the Duckworth grit scale. Self reported gender roles: Standardized summary score constructed using survey questions targeting gender stereotypes.

Table 2: Gender Gap in Leadership Decision

	Children		Adolescents	
	(1)	(2)	(3)	(4)
	Leader	Leader	Leader	Leader
Male	-0.006	-0.026	0.185***	0.119**
	(0.04)	(0.04)	(0.05)	(0.05)
Math Ability		-0.005		0.007
		(0.02)		(0.02)
Risk Tolerance		0.027		0.039**
		(0.02)		(0.01)
Private Self-Confidence		0.002		0.097*
		(0.04)		(0.05)
Social Confidence		0.132**		0.250***
		(0.05)		(0.04)
Self Reported Grit		0.054**		0.061***
		(0.02)		(0.02)
Self Reported Gender Roles		-0.033*		-0.009
		(0.02)		(0.03)
Class Size		-0.001		-0.005
		(0.00)		(0.01)
Observations	769	769	625	625

Reported estimates are average marginal effects from logit regressions where the dependent variable is the binary leadership choice. The standard errors are clustered at the classroom level. * p<0.10, ** p<0.05, *** p<0.01.

Table 3: Gender Gap in Leadership Decision

	Children		Adolescents	
	(1) Girls	(2) Boys	(3) Girls	(4) Boys
Math Ability	-0.005	-0.003	-0.030	0.032*
	(0.03)	(0.02)	(0.04)	(0.02)
Risk Tolerance	0.034*	0.020	0.023	0.051**
	(0.02)	(0.03)	(0.02)	(0.02)
Private Self-Confidence	0.020	-0.012	0.110	0.088
	(0.06)	(0.05)	(0.07)	(0.06)
Social Confidence	0.160***	0.096	0.316***	0.200***
	(0.05)	(0.07)	(0.06)	(0.06)
Self Reported Grit	0.065**	0.043	0.065*	0.056**
	(0.03)	(0.03)	(0.03)	(0.03)
Self Reported Gender Roles	-0.057*	-0.013	-0.051	0.024
	(0.03)	(0.03)	(0.04)	(0.02)
Class Size	-0.002	-0.001	-0.003	-0.007
	(0.00)	(0.00)	(0.01)	(0.01)
Observations	367	402	279	346

Reported estimates are average marginal effects from logit regressions where the dependent variable is the binary leadership choice. The standard errors are clustered at the classroom level. * p<0.10, ** p<0.05, *** p<0.01.

Table 4: Gender Gap in Public Confidence (Board Choice)

	Children		Adolescents	
	(1)	(2)	(3)	(4)
	Board	Board	Board	Board
Male	0.082**	0.072*	0.244***	0.183***
	(0.03)	(0.03)	(0.05)	(0.06)
Math Ability		0.054**		0.072***
		(0.02)		(0.02)
Risk Tolerance		0.023		0.043**
		(0.02)		(0.02)
Private Self-Confidence		0.106**		0.126**
		(0.05)		(0.05)
Self Reported Grit		0.003		0.036
		(0.03)		(0.03)
Self Reported Gender Roles		0.017		-0.051*
		(0.02)		(0.03)
Class Size		-0.001		0.006
		(0.00)		(0.01)
Observations	769	769	625	625

Reported estimates are average marginal effects from logit regressions where the dependent variable is the binary leadership choice. The standard errors are clustered at the classroom level. * p<0.10, ** p<0.05, *** p<0.01.

Table 5: Gender Gap in Board Success

	Children		Adolescents	
	(1) Board Success	(2) Board Success	(3)	(4) Board Success
Male	0.116	0.007	-0.101	-0.193*
	(0.11)	(0.10)	(0.13)	(0.09)
Math Ability		0.176**		0.059
		(0.06)		(0.04)
Risk Tolerance		-0.071		0.072**
		(0.04)		(0.02)
Private Self-Confidence		0.181		0.170**
		(0.18)		(0.06)
Social Confidence		0.038		0.109
		(0.06)		(0.09)
Observations	59	56	79	75

Reported estimates are average marginal effects from logit regressions where the dependent variable is the binary success at the board (supplementary data). The standard errors are clustered at the classroom level. * p<0.10, ** p<0.05, *** p<0.01.

Table 6: Correlations

	Leadership Choice				Board Task Choice			
	(1) Leader	(2) Leader	(3) Leader	(4) Leader	(5) Board	(6) Board	(7) Board	(8) Board
Fear of Embarrassment	-0.047				-0.092***			
	(0.03)				(0.03)			
Assertiveness		0.050***				0.026		
		(0.02)				(0.02)		
Anxiousness			-0.087**				-0.131***	
			(0.03)				(0.03)	
Fear of Disappointment				0.010				0.064*
				(0.02)				(0.03)
Observations	286	293	292	288	285	292	291	287

Coefficients presented are OLS coefficients obtained by running regressions of leadership and board task choices on the respective summary score. Presented standard errors are clustered at the classroom level. * p<0.10, ** p<0.05, *** p<0.01.

Figures

Figure 1: Gender Gap in Leadership Decision

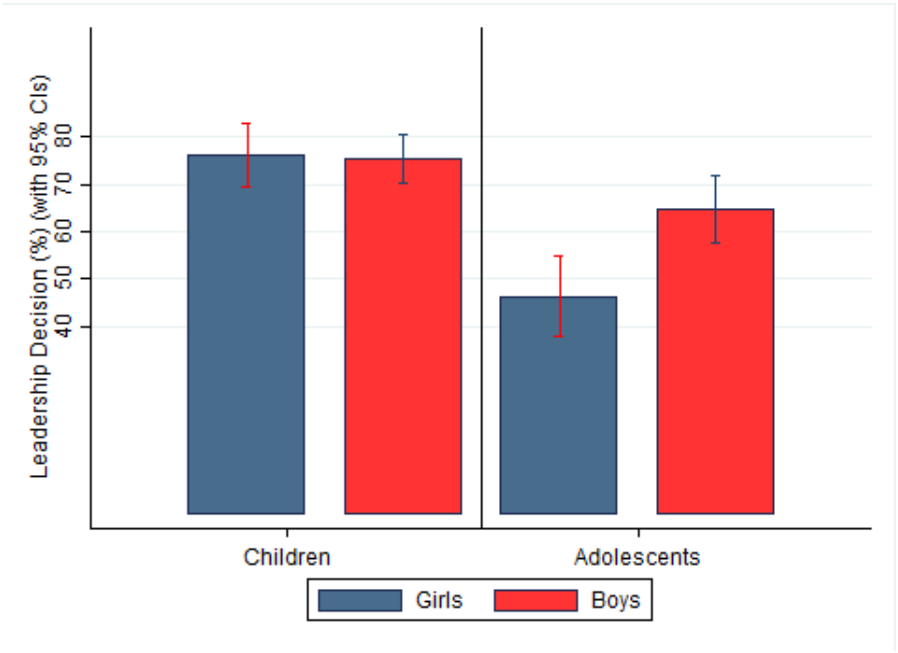


Figure 2: Change in the Willingness to Lead and Its Determinants from Childhood to Adolescence

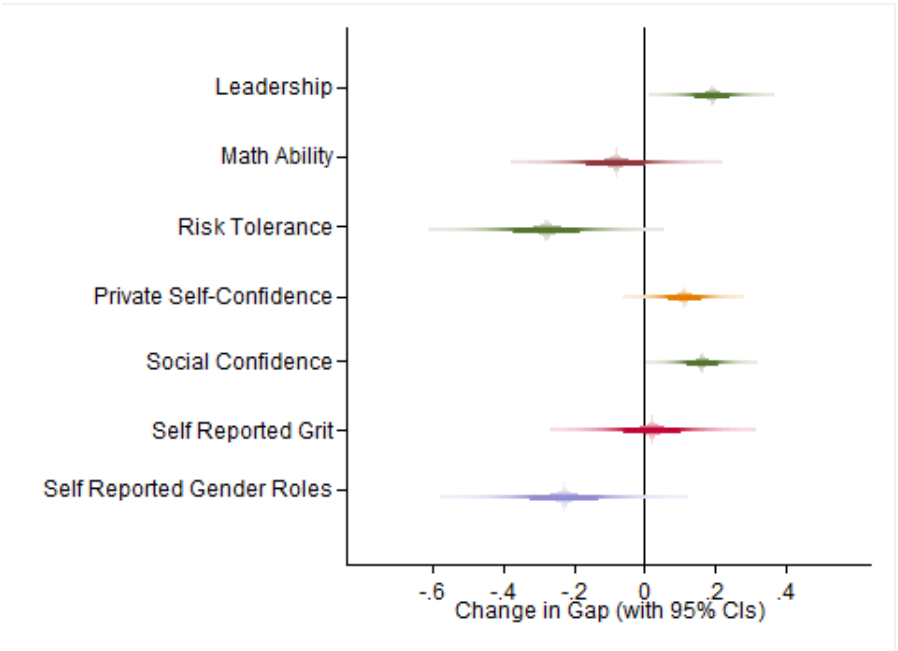


Figure 3: Gender Gap in the Willingness to Lead: Supplementary Data

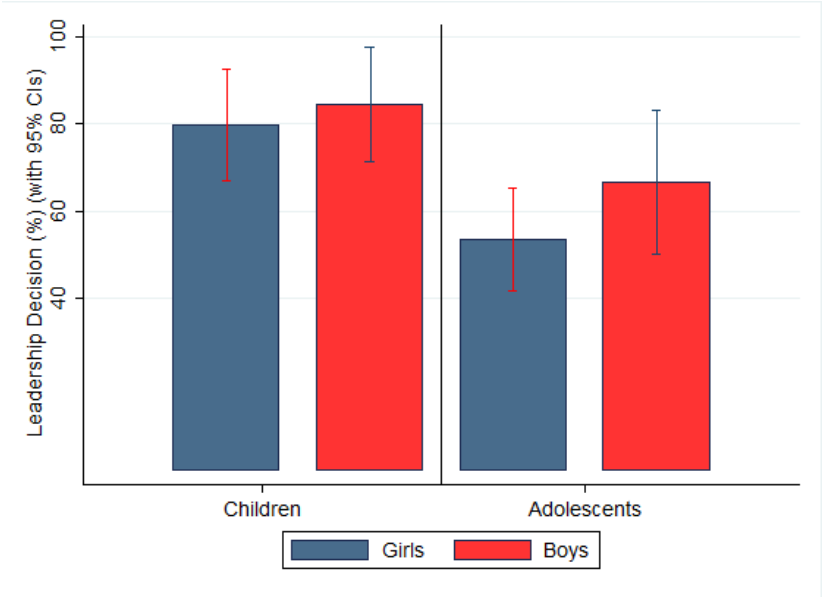


Figure 4: Frequency of Stated Reasons for Avoiding Leadership

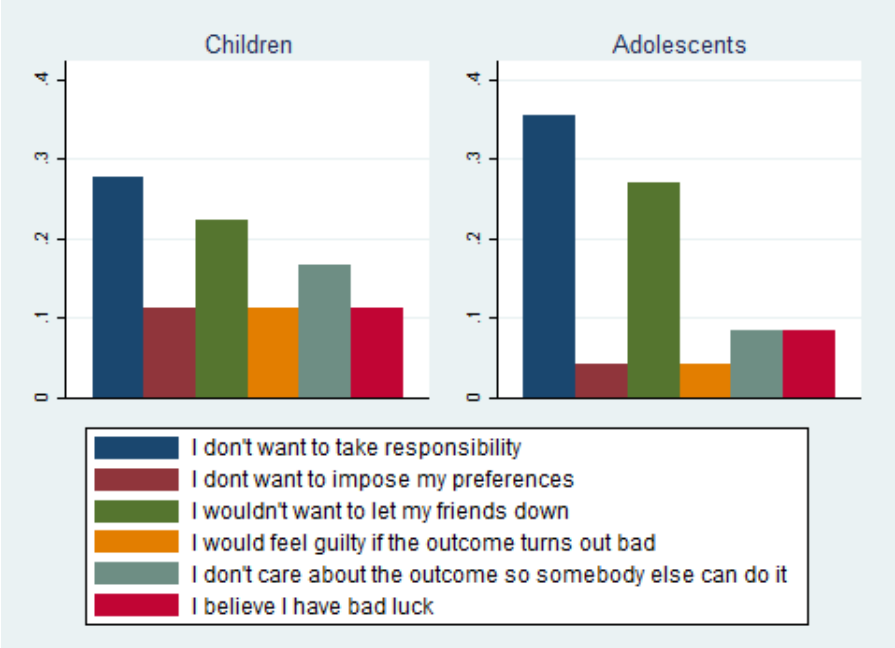
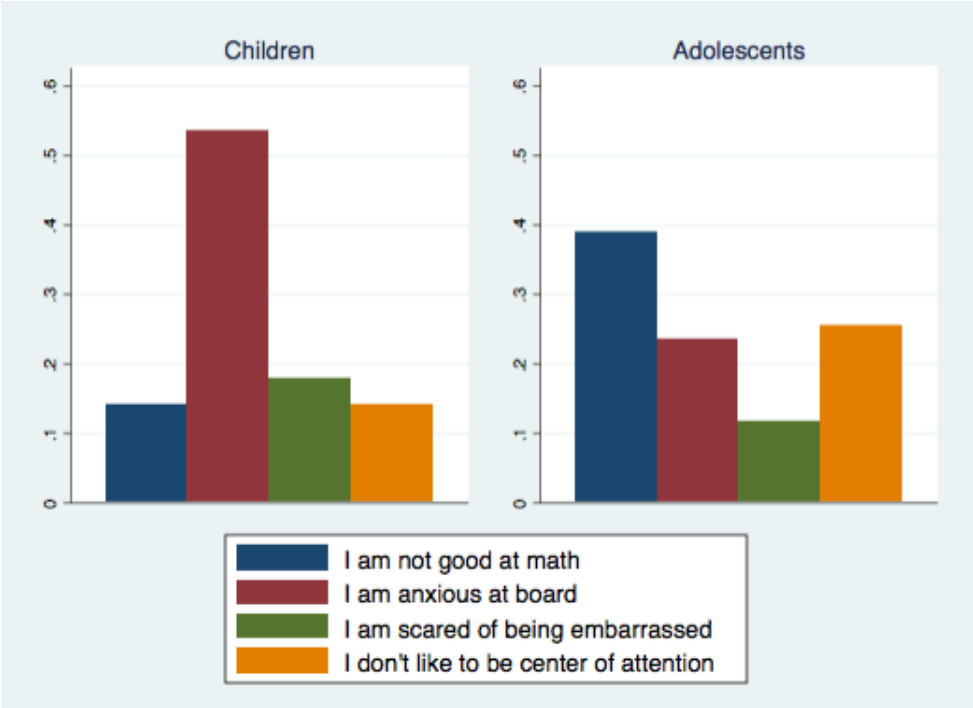


Figure 5: Frequency of Stated Reasons for Avoiding the Board Task



Appendix

Survey Questions

Survey Questions for Grit Score

4-point item scale: completely agree, agree, disagree, completely disagree

1. I don't like it when people (my teacher, parents, friends) make comments and suggestions about how to improve my performance in a class, game or task that I am not very good at.
2. When I receive a bad result on a test it is because the test was unfairly hard.
3. I like school work best which makes me think hard, even if I make a lot of mistakes.
4. When I receive a bad result on a test I work harder.
5. Setbacks discourage me.
6. If I think I will lose in a game, I do not want to continue playing.
7. If I set a goal and see that it's harder than I thought I easily lose interest.
8. When I receive a bad result on a test I spend less time on this subject and focus on other subjects that I'm actually good at.
9. I work hard in tasks.
10. I prefer easy homework where I can easily answer all questions correctly.
11. If I'm having difficulty in a task, it is a waste of time to keep trying. I move on to things which I am better at doing.

Survey Questions for Gender Stereotypes

4-point item scale: completely agree, agree, disagree, completely disagree

1. Boys are more talented in math than girls.
2. Boys have a better understanding of monetary/financial matters than girls.
3. It is natural for boys to be better at school than girls.
4. In a family, it is the father's responsibility to make money and the mother's responsibility to take care of the children.
5. It is natural for boys to be the leaders in a group rather than girls.
6. It is natural for girls to help with household chores more than boys.
7. Being an astronomer or an astronaut is not a proper occupation for a woman.
8. [Girls only] I prefer being a housewife to working outside of the home.

9. Being a nurse is not a proper occupation for a man.

10. Girls are as intelligent as boys.

11. If there are no financial difficulties in a family, it is more appropriate for the wife to stay home and raise the children rather than have a job outside.

12. My mother would prefer me to be a housewife rather than work outside of the home.

13. My father would prefer me to be a housewife rather than work outside of the home.

Supplementary Survey

4-point item scale: absolutely true for me, true for me, not true for me, absolutely not true for me

1. I shy away from talking in public because I am afraid of embarrassing myself.

2. During class hours I refrain from raising my hand and speaking because I don't want to embarrass myself in front of my teacher and my friends.

3. I don't feel uncomfortable when people criticize me.

4. It is never hard for me to read a poem or solve a problem on the blackboard while everyone is looking at me.

5. I don't shy away from expressing to others what I want.

6. Since I don't know the class material well, I refrain from raising my hand and talking in class.

7. It is important for me to decide on my own, I don't like others interfering with my decisions.

8. I don't get nervous when I talk to my teachers or other adults, and I never shy away from talking to them.

9. I get sad when the game that I prefer is not played in a group.

10. Sometimes I get nervous and forget what I know when I am on the board.

11. I am scared of not being able to do what my friends, family and teachers expect me to do, and of letting them down.

12. I don't care about what others think about me, I do things as I like.

13. When my teacher asks a question, I refrain from raising my hand or coming up to the board even if I know the answer.

14. I am scared of making others sad (as a result of my behavior).

15. I frequently feel guilty.

16. I refrained from becoming a leader, because:

a. I did not want to take the responsibility for a bad outcome.

b. I did not want to impose my decision since I did not know what others want.

c. I was afraid that the outcome would be bad and I'd have let my friends down.

d. I was afraid that the outcome would be bad and my friends would be angry with me.

e. If the outcome is bad, I would feel guilty.

f. I do not care about the result so I let someone else do it.

g. I am unlucky, so I thought we would lose.

h. Other:_____

17. I did not want to play the number game on the board, because:

a. I am not good at math.

b. I am good at math but I was scared of getting anxious and forgetting what I know.

c. I was scared of losing and making a fool of myself in front of my friends.

d. I am good at math but I do not like performing in public.

e. Other:_____

Instructions for the Individual Risk Task[35]

We are going to play different games with you today. Depending on your decisions in these games, you will earn different amounts of "coupons" [show coupons]. These coupons, as you know, can be used for buying items in many different stores (e.g. restaurants, grocery stores, stationary shops etc.), that is, they have monetary value. The rewards in our games will correspond to coupons. There will be tokens, where each token corresponds to 1 TL worth of coupons.

Now, in this lecture hour, we will have three different games. At the end of the lecture, we will select one randomly (by drawing the number 1, 2 or 3 out of a bag). Whichever game is selected, you will earn rewards according to the decisions you made in that game and only that game. That is, your rewards from different games do not accumulate. For example, suppose someone earned 8 tokens in Game 1, 5 in Game 2 and 6 in Game 3. If Game 2 is drawn, what does that person get at the end? Only 5. So please consider the games in isolation and make all your decisions very carefully.

Now we will explain the rules of the first game. Your rewards will be based on the decisions you make in this game, if this game is randomly selected at the end of the lecture. Please be very quiet while the rules are being explained. If you have a question, please raise your hand. Also note that there are no right or wrong decisions in the games we will play today. In this game, each one of you will have 5 tokens. Each token corresponds to 1 TL (worth of coupons). For example, one token corresponds to 1 TL, two tokens correspond to 2 TL, three tokens to 3 TL etc. How many tokens you have will determine how many coupons you will get at the end of the game.

Now here is a bowl [draw a bowl on the board]. You can put as many tokens as you want in this bowl. The tokens you do not put in the bowl are yours to keep. What will happen to the tokens you put in the bowl depends on chance. These tokens will either multiply or they will be lost. How? Here is a bag with two balls in it, one of them is yellow and the other one is purple [show bag and balls]. If this game is selected, you will draw a ball without looking. The yellow ball is the good ball: If you draw this ball, the tokens you put in the bowl will triple. The purple ball is the bad ball: If you draw this ball, all of the tokens you put in the bowl will be lost. That is, depending on the color of the ball you draw, you have a 50-50 chance of losing or winning. If this game is selected at the end, you will draw the ball and the color of the ball along with how many tokens you put in the bowl will determine how many coupons you will get. Now we will go over some examples to make sure that

[35]For brevity, the instructions provided are the ones used for adolescents. As explained in the text, the children's procedures differed in terms of reward medium (gifts rather than coupons) and in the overall difficulty level of the number task (adding up to 100 rather than 1000).

everyone understood the rules:

Assume that you did not put any tokens in the bowl [Draw all 5 tokens outside of the bowl, on the board]. Then, since you kept all of your five tokens you get 5 TL for sure. Assume that you put one token in the cup and kept 4 [Draw one token in the bowl on the board, draw the remaining ones outside]. Assume that you draw the purple ball. You lose all of your tokens in the bowl. Since you had kept 4 of your tokens, you get 4 TL. Now assume that you draw the yellow ball, then the one token in the cup triples and becomes three tokens [Draw two more tokens in the cup]. You had already kept 4 tokens, so in total you have 7 tokens. Therefore, you will get 7 TL.

Assume that you put 4 tokens in the bowl and kept one of them [Draw on the board]. Assume that you draw the purple ball. You lose all of your tokens in the bowl. Since you had kept one of your tokens, you get 1 TL. Now assume that you draw the yellow ball. The 4 tokens in the bowl triple and become 12 tokens. You had kept one token, so in total you have 13 tokens which correspond to 13 TL.

Assume that you put all of your tokens in the bowl [Draw on the board]. Assume that you draw the purple ball. Then you lose all the tokens in the bowl and since you did not keep any, you get 0 TL. Now, assume that you draw the yellow ball. Then your tokens in the bowl triple and you get 15 tokens in total, which correspond to 15 TL.

Did you understand the rules of the game? Any questions? [The decision-making will not start until the students answer the following questions correctly]

Assume that you put two tokens in the bowl and keep three tokens. Assume that you draw the yellow ball. How many TLs would you get? [Correct answer is 9]. Assume that you draw the purple ball; how many TLs would you get? [Correct answer is 3].

Assume that you put three tokens in the bowl and you keep two tokens. Assume that you draw the yellow ball. How many TLs would you get? [Correct answer is 11]. Assume that you draw the purple ball; how many TLs would you get? [Correct answer is 2].

Now, each one of you will get a decision sheet. You will mark the number of tokens that you want to put in the bowl on your decision sheet. If this game is selected, the rewards you will get will be determined based on this decision and the color of the ball that you draw. Make your decision quietly and do not show your decision sheet to anyone. [Decision sheets are distributed, students write their names and make their decisions, sheets are collected]

Instructions for the Leadership Task

Now we will play our second game. If this game is selected at the end of the lecture, you will earn rewards based on the rules we will explain now. This game is similar to the one you just played, but there are some differences. In this game, everyone will be assigned to a 3-person group. We determined your groups randomly, before coming here. For now, you will not know who is in your group. The decision to be made in this game, again, is to decide how many of the 5 tokens to put in the risky bowl, and how many to keep. However, this time, a single person will make a decision for all 3 people in the same group. How many gifts each person gets will be determined according to the decision made by this person. Everyone in the same group will get the same number of gifts. For example, suppose that the person making the decision on behalf of the group put 2 tokens in the bowl (and kept 3). If the yellow ball is drawn, each person in the group gets 9 gifts. If the purple ball is drawn, each person in the group gets 3 gifts. Notice that individuals in a group do not share the gifts. Each person in the same group individually and separately receives the same amount of gifts. Another example: Suppose the person making the decision on behalf of the group put 5 tokens in the bowl. If the yellow ball is drawn, everyone in the group individually gets 15 gifts. If the purple ball is drawn, noone in the group gets any gifts. Is this clear? Any questions?

Now, who will be the person deciding on behalf of the 3 people in the group? First off, each of you will individually answer the question of "Would you like to be the one making the decision on behalf of your group?". If you want to be the decision-maker, you will mark YES on your decision sheets. If you do not want to be the decision-maker, you will mark NO. Each of the three people in the same group will have said either YES or NO. If only one person in the group said "Yes, I'd like to be the decision-maker", that person will make the decision for the group [Write on the board as an example, NO, YES, NO. Ask the students: who decides? Person 1, 2 or 3?]. Now, if more than one person in the group said yes, we will randomly select one of the people who said yes. That person will make the group decision [Write on the board as an example: YES, NO, YES. Who decides? Either Person 1 or Person 3 will make the decision, based on a random draw]. Now, suppose nobody wanted to make the decision in the group. In that case, we will randomly select one person among the three. That person will make the decision on behalf of the group [Write on the board as an example: NO, NO, NO. Person 1, 2 or 3 will make the decision, based on a random draw]. Is this clear? Any questions?

Now, how many gifts will the group members get? This depends on how many tokens the decision-maker puts in the bowl. For example, suppose the person who makes the group decision put 3 tokens

in the bowl and the yellow ball is drawn. In that case, everyone in the group gets 11 gifts each. If the purple ball was drawn, then everyone in the group gets 2 gifts. [Ask children] If the group decision-maker put 2 tokens and the yellow ball is drawn, how many gifts does each person in the group get? 9. If the purple ball is drawn? 3.

The group decision-maker will also draw the ball on behalf of the group. Based on the group decision-maker's decision and the ball he/she draws, the payoffs of everyone in the group will be determined. If he/she draws the purple ball, everyone in the group loses the tokens put in the bowl. If he/she draws the yellow ball, the tokens in the bowl are tripled for everyone. You do not know who you are in a group with now, but after decisions are made and when rewards are being determined, everyone will end up knowing whom they were in a group with, who was the decision-maker and what decision he/she made as well as the outcome.

[Distribute decision sheets] Now, everyone please write your name on your decision sheets and mark whether you would like to be the person making the decision on behalf of your group. OK? Did everyone make their selection?

OK. Now remember, in fact it is possible for anyone to be selected as the decision-maker. Why? Because even if someone said no, if nobody in their group wanted to make the decision, he/she may need to do it. This is why each person, regardless of whether they said YES or NO, will answer the question of "if you become the decision-maker for the group, how many tokens will you put in the bowl?". Now please turn your decision sheets over. There you will again see choices from 0 to 5. Mark your answer. Don't forget: if you are selected as the decision-maker, the decision you are making now will determine the rewards for everyone in your group! [36]

Instructions for the Private and Social Confidence Tasks

Now, in this lecture we are going to play a different game, a number puzzle. In this game the goal is to find numbers that add up to 1000 [Give examples on the below number grid, using different markers for different number pairs adding up to 1000]. Now, before we start the main game, we will have an initial task. In this task the goal is to find as many number pairs as possible in a large grid (within 2 minutes). For this part of the game, you will be rewarded 0.5 TL for each pair of numbers you find, adding up to 1000 [Sheets are distributed and collected when time is up].

[36] After this game, there was a 3rd and final game, which included group decision-making with communication (implemented for another research question). Since that part always came after the leadership task, we do not expect it influence any behaviors we report on in this paper.

300	523	420	807
215	578	477	355
645	193	700	785

Now, in the main part of the game you will again find numbers. However, we have two types of number task here. We have the 4-TL task, in which the reward is 4 TL if you are successful. If you fail, you get 0 TL [Write on board]. We have another type of number task too. In the 1-TL task, the reward is 1 TL if you are successful. If you fail you get 0 TL [Write on board]. But why does one task pay more than the other in the case of success? Because that task is more difficult than the other. In both type of task, the goal is to find at least 3 numbers that add up to 1000, within 1 minute 45 seconds. However, in the 4-TL task the grid is larger and there are less pairings [show], while in the 1-TL task the grid is smaller.

Now, there are two possibilities about how the game will be played–individually at your desk, or on the board. If Game Individual is randomly drawn [write on board], everyone will do the number task on their own, at their desk. If Game Board is randomly drawn, a single person will do the task on the board, in front of everyone. The person who will be called to the board will be randomly selected. Now we ask you: if the game is to be played individually and privately, do you prefer to do the 4-TL, more difficult task or the 1-TL, less difficult task? Now we will distribute decision sheets and you will mark your decision along with your name. [Distribute sheets] OK, now please turn the sheet over. If the game is to be played on the board and you are the one selected to do the task on the board, do you prefer to do the 4-TL, more difficult task on the board, or the 1-TL, less difficult task on the board, or do you prefer not to go on the board at all? Please select one on your decision sheet. [Collect sheets]. Now, we will have a draw. [Write Game Individual, Game Board on two pieces of paper, put in a bag, call a class representative to draw]. (If Game Individual is drawn) Everyone will do their

preferred task at their desk, privately. Now, we will distribute both tasks, the 4-TL and the 1-TL task to everyone. Based on what you marked on your decision sheet, take the one that you will do, and leave the other one. Is everyone ready? Start. [The game is timed]. (If Game Board is drawn) Now, we will randomly select one person using your decision sheets. If this person wanted to do the task on the board, he/she will do his/her preferred task on the board. If not, we will draw another person.

Simulation Exercise: Simulated Minimum Distance Estimation

Assume that the utility function is iso-elastic (CRRA) and the psychological cost function V is convex in its argument s.

$$U(x_i) = p\frac{(W+\alpha x_i)^{1-\rho_i}}{1-\rho_i} + (1-p)\frac{(W-x_i)^{1-\rho_i}}{1-\rho_i}$$

$$V(s_i) = \frac{s_i^2}{2}$$

The subscript i denotes an individual subject therefore we only assume heterogeneity in ρ, c and s. The other parameters are set to the values used in the actual experiments; $W = 5$, $\alpha = 3$, $p = 0.5$. We estimate this model using indirect inference. Gouriéroux et al. (2010) provide evidence in favor of using indirect inference in the context of estimating fully parametric models. Indirect inference requires the specification of a set of statistics which are known as auxiliary parameters (ap's). Estimation proceeds by comparing the ap's based on the sample with those based on the simulated data from the model. The estimated distribution parameters are determined by minimizing the weighted distance between the two sets of ap's. The ap's can be moments or functions of moments or any other statistics as long as each ap does have a probability limit as the number of cross-section units becomes large.[37]

We first fully parameterize our model. For simplicity, we assume that ρ is independent of c and s, but we allow for a positive correlation between c and s. We assume that ρ_i is distributed lognormally with

$$ln\rho \sim N(\mu_\rho, \sigma_\rho)$$

[37] These statistics do not have to be statistics of interest, nor do they need to be an unbiased estimator of anything. All we need is that they have a monotonic relationship with some of the structural parameters.

Similarly, we assume that c and s are joint lognormally distributed with:

$$\begin{bmatrix} \mu_s \\ \mu_c \end{bmatrix}, \begin{bmatrix} \sigma^2 & \sigma_{s,c} \\ \sigma_{c,s} & \sigma^2 \end{bmatrix}$$

In order to restrict the parameter space and to show that even a very restrictive model can generate the results we obtain, we set $\sigma_s = \sigma_c = \sigma$ and the correlation coefficient to 0.5. Given these restrictions we reduce the number of structural parameters to estimate, which we denote with vector θ_n, to 5, $\theta_n = \{\mu_\rho, \sigma_\rho, \mu_s, \mu_c, \sigma\}$.

Given this model and starting values of the 5 structural parameters, we first simulate x_i^*, and a vector of leadership indicator l_i as well as board task choice indicator b_i[38] for each subject M times. [39] We set the number of subjects to 769 for children and 625 for adolescents, as in data. Using these simulated data we generate k ap's, which describe the above structural environment. In principle, one can generate as many auxiliary parameters as possible, as long as the number is at least as many as the number of structural parameters to estimate. The model is just identified when $n = k$, and overidentified when $n < k$. The latter situation is useful to test the model by testing overidentifying restrictions. For this exercise we prefer a just-identified model as the purpose is not to test a particular model but rather show that the choices we observe in the data can be justified with a simple model.

To match the distribution of the coefficient of relative risk aversion, we use the vector x_i^* for the simulated data and Gneezy and Potters (GP) task choices in the actual data, we can generate two auxiliary parameters to identify μ_ρ and σ_ρ^2 :

$$ap_1^{sim} = mean(x_i)$$

$$ap_1^{data} = mean(GP_i)$$

and

$$ap_2^{sim} = std(x_i)$$

[38] Each individual i is compared to a random individual j to get the leadership decision. An alternative would be to compare it to the, say, classroom average. These choices do not change the results qualitatively.

[39] Consistency is achieved for any number, M, of simulated data sets. The issue is that the use of simulation inflates asymptotic standard errors by the factor $(1 + M^{-1})^{\frac{1}{2}}$; for M $\geq$ 10, this factor is negligible. Therefore we set the number of simulations to 10. It should also be noted that the asymptotic standard errors are unreliable in these highly non-linear models.

$$ap_2^{data} = std(GP_i)$$

To match the joint distribution of s and c we use the proportion of subjects who want to be the leader and who want to perform the task on the board:

$$ap_3^{sim} = prop(l_i)$$

$$ap_3^{data} = prop(Leader_i)$$

$$ap_4^{sim} = prop(b_i)$$

$$ap_4^{data} = prop(Board)$$

Finally we use the correlation between x and l.

$$ap_5^{sim} = corr(x, l)$$

$$ap_5^{data} = corr(GP, Leader)$$

Note that we have 5 auxiliary statistics to estimate 5 structural parameters (the model is just-identified) so the match should be exact, i.e, the below criterion function should be driven to zero:

$$\chi = (a^{sim} - a^{data})' \Omega^{-1} (a^{sim} - a^{data})$$

where Ω is the weighting matrix, which is the variance-covariance matrix of $(a^{sim} - a^{data})$.

Table A.1 presents the structural estimates and Table A.2 presents the goodness of fit results of the model using the correlation between leadership and board choice as a single criterion. The equality of simulated correlation coefficients (at the estimated structural parameter values) with those of the

actual data is established (see bootstrapped p-values).

Table A.1: Estimated Structural Parameters

	Children Sample		Adolescent Sample	
Estimated Structural Parameters	Girls	Boys	Girls	Boys
Mean Coefficient of Relative Risk Aversion ($ln(\rho)$)	-0.30	-0.41	-0.48	-0.38
Std. of Coefficient of Relative Risk Aversion (σ_ρ)	-0.24	-0.04	-0.65	-0.53
Mean psychic cost $ln(s)$	-3.85	-2.58	-1.14	-2.37
Mean psychic cost $ln(c)$	0.21	-0.13	1.61	0.19
Std. of psychic costs $ln(c)$ and $ln(s)$	2.12	0.47	2.18	2.13
Correlation between $ln(s)$ and $ln(c)$ (set)	0.5	0.5	0.5	0.5

Structural parameters are estimated by matching 5 ap's obtained from the model with those obtained from the main data by minimizing the criterion $\chi = (a^{sim} - a^{data})' \Omega^{-1} (a^{sim} - a^{data})$.

Table A.2: Goodness of Fit

	Children			
	Girls		Boys	
	Actual Data	Simulated Data	Actual Data	Simulated Data
Corr. between leadership and board choice	0.20	0.20	0.10	0.09
	p-value=0.92		p-value=0.58	
	Adolescents			
	Girls		Boys	
	Actual Data	Simulated Data	Actual Data	Simulated Data
Corr. between leadership and board choice	0.33	0.29	0.23	0.26
	p-value=0.39		p-value=0.42	

Presented (simulated) correlation coefficients are obtained by simulating the model at the estimated structural parameters in Table A.1. The equality between data and simulated correlation coefficients is tested using bootstrapped p-values (presented).

Main Results without Missing Data Imputation

Table A.3: Gender Gap in Leadership Decision

	Children		Adolescents	
	(1)	(2)	(3)	(4)
	Leader	Leader	Leader	Leader
Male	-0.006	-0.017	0.185***	0.097*
	(0.04)	(0.05)	(0.05)	(0.05)
Math Ability		-0.019		0.004
		(0.02)		(0.03)
Risk Tolerance		0.024		0.035**
		(0.02)		(0.02)
Private Self-Confidence		0.018		0.087
		(0.05)		(0.06)
Social Confidence		0.164***		0.244***
		(0.05)		(0.04)
Self Reported Grit		0.047*		0.054***
		(0.02)		(0.02)
Self Reported Gender Roles		-0.043		-0.013
		(0.03)		(0.02)
Class Size		0.001		-0.004
		(0.00)		(0.01)
Observations	769	468	625	483

Reported estimates are average marginal effects from logit regressions where the dependent variable is the binary leadership choice (no missing data imputation). The standard errors are clustered at the classroom level. * p<0.10, ** p<0.05, *** p<0.01.

Table A.4: Gender Gap in Leadership Decision

	Children		Adolescents	
	(1) Girls	(2) Boys	(3) Girls	(4) Boys
Math Ability	-0.045	0.010	-0.059	0.049*
	(0.04)	(0.03)	(0.05)	(0.02)
Risk Tolerance	0.044**	0.006	0.021	0.052**
	(0.02)	(0.04)	(0.03)	(0.02)
Private Self-Confidence	0.071	-0.044	0.103	0.064
	(0.06)	(0.06)	(0.08)	(0.07)
Social Confidence	0.160**	0.160	0.330***	0.178**
	(0.06)	(0.11)	(0.07)	(0.07)
Self Reported Grit	0.077*	0.017	0.054	0.050*
	(0.04)	(0.04)	(0.04)	(0.03)
Self Reported Gender Roles	-0.073	-0.013	-0.026	0.006
	(0.04)	(0.03)	(0.04)	(0.02)
Class Size	-0.001	0.003	-0.001	-0.007
	(0.00)	(0.00)	(0.01)	(0.01)
Observations	228	240	234	249

Reported estimates are average marginal effects from logit regressions where the dependent variable is the binary leadership choice (no missing data imputation). The standard errors are clustered at the classroom level. * p<0.10, ** p<0.05, *** p<0.01.