Willingness to Compete: Family Matters

Ingvild Almås, Alexander W. Cappelen, Kjell G. Salvanes, Erik Ø. Sørensen, Bertil Tungodden

Willingness to Compete: Family Matters

Ingvild Almås

Institute for International Economic Studies, University of Stockholm, SE-106 91 Stockholm, Sweden, ingvild.almas@iies.su.se

Alexander W. Cappelen, Kjell G. Salvanes, Erik Ø. Sørensen, Bertil Tungodden

Department of Economics, Norwegian School of Economics, 5045 Bergen, Norway
{alexander.cappelen@nhh.no, kjell.salvanes@nhh.no, erik.sorensen@nhh.no, bertil.tungodden@nhh.no}

This paper studies the role of family background in explaining differences in the willingness to compete in a cognitive task. By combining data from a lab experiment conducted with a fairly representative sample of adolescents in Norway and high-quality register data on family background, we show that family background is fundamental in two important ways. First, boys from low socioeconomic status families are less willing to compete than boys from better-off families, even when controlling for confidence, performance, risk preferences, time preferences, social preferences, and psychological traits. Second, family background is crucial for understanding the large gender difference in the willingness to compete. Girls are much less willing to compete than boys among children from better-off families, whereas we do not find any gender difference in willingness to compete among children from low socioeconomic status families. Our data suggest that the main explanation of the role of family background is that the father's socioeconomic status is strongly associated with boys' willingness to compete. We do not find any association between the willingness to compete for boys or girls and the mother's socioeconomic status or other family characteristic that may potentially shape competition preferences, including parental equality and sibling rivalry.

Keywords: family background; socioeconomic status; lab experiment; competitiveness

1. Introduction

A growing experimental literature has identified a significant gender difference in the willingness to compete. Females are typically more competition averse than males (Croson and Gneezy 2009, Niederle and Vesterlund 2011). This may potentially explain a wide range of real-world economic phenomena, including observed gender differences in educational and occupational choices, and brings a new dimension into the public debate on gender-equalizing policies (Bertrand 2011, Buser et al. 2014, Flory et al. 2015, Niederle 2016, Niederle and Vesterlund 2010, Zhang 2012). But why do males and females differ in their willingness to compete?

The novel contribution of the present paper is that we study how competition preferences relate to family background. We use a unique data set combining experimental data on the willingness to compete (in a strictly cognitive task) for a fairly representative sample of Norwegian adolescents in ninth grade (14–15 years old) with high-quality register data on parents' income and education. We establish that family background is fundamental in two important ways. First, there is a strong socioeconomic gradient in competition preferences. As shown in the left panel of Figure 1, children from low socioeconomic status (SES)

families are much less willing to compete than children from medium or high SES families, and this result holds even when controlling for confidence, performance, risk and time preferences, social preferences, and psychological traits.[1] Second, family background is crucial for understanding the gender difference in competition preferences. As shown in the right panel of Figure 1, girls from well-off families are much less willing to compete than boys from well-off families, whereas we do not find a statistically significant gender difference in competitiveness preferences among children from low SES families. These results are also robust to the inclusion of our set of background variables.

Different mechanisms may explain an association between the socioeconomic status of the family and children's willingness to compete. The family may shape competition preferences through role modeling and social norms, where the process of cultural

---

[1] We return to a more detailed discussion of our definition of low SES families in §4. In the main analysis, we focus on the comparison between low SES families and the rest of the population, since the socioeconomic effect is largely driven by the low SES families. A more disaggregated analysis is offered in Online Appendix A (available as supplementary material at http://dx.doi.org/10.1287/mnsc.2015.2244).

Figure 1   Differences in the Willingness to Compete
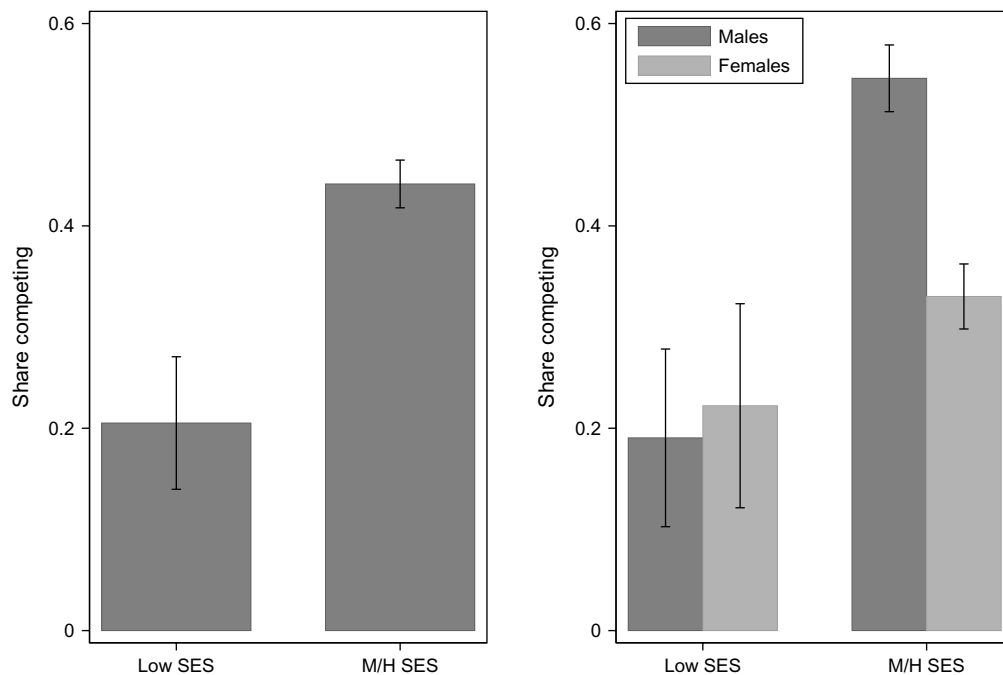
Notes. The figure reports the share of the participants that chose to compete by gender and family background. A participant is defined to be from a low SES family if the family is in the bottom fifth of both the education and income distributions. The standard errors are indicated. M/H, medium/high.

transmission may depend on the socioeconomic status of the family. Parents in low SES families may represent role models that do not encourage competition preferences in their children, and may hold gender-role social norms that are associated with boys being more competitive than girls. The cultural transmission may also interact with innate differences between boys and girls. It may, for example, be the case that females are less inclined to develop a willingness to compete and their competition preferences are therefore less affected by the family situation. Finally, an association between the socioeconomic status of the family and competition preferences may reflect that these preferences are highly heritable, where both low SES parents and low SES children may be characterized by being less willing to compete.

We show that the main explanation of competition preferences being strongly associated with family background in our study is a strong association between the father's socioeconomic status and the competition preferences of the boys. As can be seen from the right panel of Figure 1, boys from low SES families are much less willing to compete than boys from medium and high SES families, and we find that this relationship is driven by the socioeconomic status of the father. We do not find a similar relationship between fathers and girls, and, more generally, the competition preferences of the girls appear not to be sensitive to family background. These findings are consistent with role modeling being important in

shaping competition preferences, possibly interacting with innate gender differences in the willingness to compete. But our data limit the extent to which we can study this mechanism, since we do not have measures of the parents' willingness to compete and the time they spend with their children. Furthermore, we cannot rule out that the observed association is produced by a latent variable influencing the willingness to compete of the father and the son. We do provide some evidence, however, suggesting that social norms in the family are not shaping competition preferences; we do not find any association between a measure of parental equality and the willingness to compete.

Our findings contribute to the growing literature on what shapes competition preferences and have implications for the discussion of which institutional arrangements to introduce in response to observed differences in the willingness to compete (Balafoutas and Sutter 2012). In a recent important study, Gneezy et al. (2009) provide evidence showing that the culture of a society plays an important role in shaping people's willingness to compete. They find that the gender gap is reversed in the matrilineal culture of the Khasi in India, in which more females than males select into a competitive environment.[2] In light

---

[2] Booth and Nolen (2012) also provide evidence from the United Kingdom suggesting that socialization is an important driver of the gender gap in competitiveness. They find that girls from single-sex schools are more likely to compete in an experiment than girls from coeducational schools.
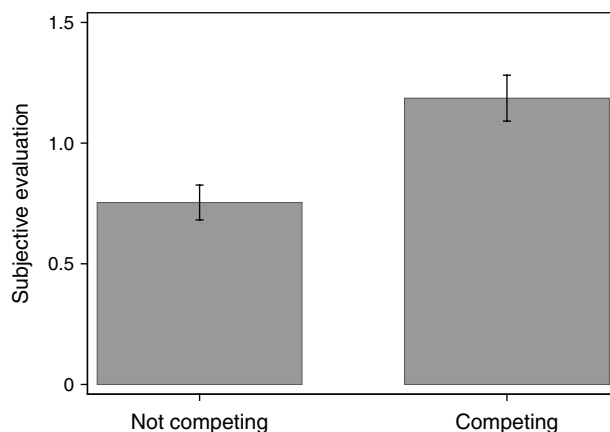
of this finding, they argue in favor of public policies targeting socialization and education early in life to eliminate the gender gap in competition preferences. An interesting aspect of the present study is that it is conducted in a Scandinavian country that for a long time has implemented gender-equalizing policies. In 2012, Norway ranked highest on the gender equality index of the United Nations, comprising measures of educational attainment, labor market participation, and health, which is consistent with our not observing any gender differences in the experimental data with respect to overconfidence, risk preferences, time preferences, and social preferences.[3] Still, we find that females are substantially less willing to compete than males, which maps to the fact that the Scandinavian countries have very gender-segregated labor markets, both horizontally and vertically (Birkelund and Sandnes 2003).[4] Consistent with competitiveness preferences being relevant for labor market choices, we find that children choosing to compete in the experiment are much more likely to find competitive (and typically high paid) occupations more attractive than children choosing not to compete ($p < 0.01$), as shown in Figure 2.

This paper unfolds as follows: §2 describes the sample and the data, whereas §3 gives an overview of the experimental design. Section 4 provides a descriptive analysis, where we break down the data by both gender and socioeconomic status of the family. In §5, we report the main analysis on what explains the willingness to compete, whereas §6 studies in more detail potential mechanisms in the family that may shape competition preferences. Section 7 discusses some implications for policy before offering concluding remarks. In Online Appendix A, we present the complete regression estimates and further robustness analysis.

2. Sample and Data

The participants were adolescents in ninth grade (14–15 years old), who were soon to make important choices about whether to pursue a vocational or academic track in high school. We randomly selected and

---

[3] For further details on the gender equality index, see http://hdr .undp.org/en/content/table-4-gender-inequality-index (accessed November 15, 2015).

[4] See also the paper by Cárdenas et al. (2012), who find a larger gender difference in competitiveness in cognitive tasks (a math task and a word task) in a highly gender-equal Scandinavian country, Sweden, than in a much less gender-equal Latin American country, Columbia. On the other hand, it should be noted that Dreber et al. (2014), who also study reaction to competition in several different tasks (running, skipping rope, and dancing), do not find a gender difference among children in Sweden. We consider the willingness to compete only in a strictly cognitive task, and it remains an open question whether our results extend to other competition environments.

Figure 2   Subjective Evaluation of Occupations

Notes. The figure reports the participants' subjective evaluation of occupations (on a scale from 1 (low) to 7 (high)), where it was stated that the evaluation should be conditional on the income being the same in all occupations. We report the difference in subjective evaluation between the three most competitive occupations (lawyer, stock broker, and self-employed) and the other occupations (electrician, nurse, bureaucrat for the municipality, fire fighter, actor, and journalist). The average difference is reported separately for the participants who chose not to compete ("not competing") and those who chose to compete ("competing"). The standard errors are indicated.

invited 11 public middle schools in the Bergen municipality to take part in the experiment.[5] The Bergen municipality, which includes the second largest city in Norway as well as less populated rural farming areas, is close to the national average with respect to the distribution of income, education, and occupation. At each school, we randomly selected two classes (in one school, three classes), and all the students in the selected classes received a personal invitation to participate in the experiment. Participation was voluntary, and both students and their parents had to consent to participation. The participation rate was high; 523 out of 602 invited students took part in the experiment (87%). Hence, the selected sample is fairly representative for adolescents in this age group in Norway.

In collaboration with Statistics Norway, we matched the data from the experiment to Norwegian register data, which is a high-quality, linked, national

---

[5] There were 31 public middle schools in Bergen in 2011 and 3,014 students in ninth grade. For practical reasons, we restricted ourselves to the 23 schools that had at least 50 students in ninth grade. Among these schools, we did a random selection of schools based on probabilities proportional to the number of students in ninth grade. Almost all children attend public schools in Norway (97.2%). Privately run schools are also to a large degree funded by the municipal authorities, and need to demonstrate an alternative pedagogical or religious background to qualify for funding. Student achievement, as measured by the Programme for International Student Assessment test, is marginally (but not statistically significantly) better in private versus public schools in Norway (Dronkers and Robert 2008, Table 3).

Table 1   **Parental Background: Comparison of Sample and Population in Norway**

	Father		Mother	
	Population	Sample	Population	Sample
Panel A: Education				
Only compulsory education	0.200	0.151 (0.016)	0.203	0.169 (0.017)
Some high school education	0.438	0.408 (0.022)	0.385	0.345 (0.021)
Some college education	0.362	0.441 (0.022)	0.412	0.486 (0.022)
Panel B: Income				
Mean income	578	661 (26)	380	401 (9)
10th percentile	262	307 (24)	186	215 (13)
25th percentile	367	405 (9)	273	289 (8)
50th percentile	480	533 (17)	361	378 (8)
75th percentile	653	770 (34)	454	465 (10)
90th percentile	939	1,059 (50)	561	595 (30)

Notes. In panel A, we report the share of individuals in each category of education, where "population" refers to the full population having children in the 1996 cohort in Norway, weighted by the number of such children, and "sample" refers to the parents of the 483 participants for which we have data on family background. "Only compulsory education" means that the parent has 10 years of education; "some high school education" means that the parent has 11–13 years of education; "some college education" means that the parent has more than 13 years of education. In panel B, we report the mean and the distribution of total income in 2009, in NOK (2009) thousands (from administrative register data). Standard errors are in parentheses (for the sample only).

administrative data set. We detailed parental background information on education and income for 483 of the 523 children. Table 1 shows that our sample of parents is fairly representative of the Norwegian population.[6] From panel A, we observe that there is a slightly higher share of parents with at least some college education in the sample compared to the population at large (44.1% versus 36.2% for fathers, 48.6% versus 41.2% for mothers), and a slightly lower share of parents with only compulsory education (15.1% versus 20.0% for fathers, 20.3% versus 16.9% for mothers). As shown in panel B, the mean earnings of the parents in our sample are somewhat higher than in the representative population (14.4% for fathers, 5.5% for mothers), but overall the income distributions of the sample and the representative population are very similar.

It is also interesting to observe from Table 1 that, both in our sample and in the population at large,

there is a larger share of mothers than fathers with some college education, which reflects the long history of gender-equalizing policies in Norway. At the same time, we also observe that the mothers have significantly lower incomes than the fathers, consistent with lower female labor market participation and the fact that Norway has very gender-segregated labor markets (Birkelund and Sandnes 2003).

3. Experimental Design

We conducted 10 experimental sessions at the Norwegian School of Economics, where each session lasted for approximately two hours and used a Web-based interface. All students received a show-up fee of NOK 50 (approximately USD 8) in addition to what they earned in the lab experiment. The participants were not given any feedback on the different incentivized parts of the experiment until the end of the session. They were then given an overview of the outcomes and paid the sum of what they had earned in each part. The average total payment from the experiment was NOK 361. The experiment was double blind, i.e., neither participants nor experimenters could associate decisions with particular participants.[7]

The experimental session consisted of two parts: an incentivized part and a nonincentivized part. In the incentivized part, we measured competition preferences, social preferences, risk preferences, time preferences, and the participants' knowledge of the labor market. In the nonincentivized part, we collected data on psychological traits using the Big Five Inventory (John et al. 1991, Benet-Martínez and John 1998); time use; family and individual background characteristics; the participants' subjective evaluation of subjects at school, occupations, and job characteristics; fairness views; and their general knowledge of society.[8] We did not randomize the order of the different parts, and thus we cannot rule out order effects. The complete set of instructions is provided in Online Appendix B. In the following we focus on the behavioral games used to measure preferences.

In measuring competition preferences, we largely followed the approach of Niederle and Vesterlund

---

[6] We do not have data on whether the parents are divorced or whether they both live with the children.

[7] Special care was taken so that the payment procedure ensured participant–experimenter anonymity. At the end of the experiment, the computer assigned a payment code to each of the participants, and a group of assistants, who were not present in the lab during the experiment, prepared envelopes containing the payments corresponding to each payment code. The assistants also made sure that it was impossible to identify the amount of money by simply looking at the envelope. After bringing the envelopes to the lab, the assistants immediately left, and the envelopes were handed out in accordance with the payment codes. A similar procedure was implemented for payments from the time preference decisions.

[8] Heckman (2011) and Becker et al. (2012) show that economic preferences and psychological personality measures are complementary in explaining life outcomes and behavior.

(2007).[9] First, participants were asked to add sets of four two-digit numbers over a three-minute period under a competitive tournament scheme, where they earned NOK 50 if they got at least as many correct answers as the mean score in the same session and NOK 0 otherwise. A timer on their computer screen informed each participant of how much time was left, and the number of correct answers was updated each time the participant moved to a new set of four two-digit numbers.

Second, without receiving any feedback on their performance in the first round, they were told to do the same task again for another three minutes. In this round, they could choose between being compensated with a fixed piece rate of NOK 1 per correct answer or entering into a competition where they would receive NOK 3 per correct answer if they got at least as many points as the mean score in this session in the first round, and NOK 0 otherwise.[10]

We also collected data on their confidence in the competitiveness game. Before they started working in the first round, we asked them to state how well they believed that they would perform on the task relative to the other participants in their session. Specifically, they were asked to state the fraction (in deciles) of participants they believed would do better than them on the task, which gives us a measure of their confidence. Comparing the participants' answers to this question with their actual performance provides us with a measure of their overconfidence.

To get a measure of their risk preferences, we asked the participants to choose between a safe alternative and a risky alternative in a structured sequence of situations. Correspondingly, to get a measure of time preferences we asked the participants to choose in a structured sequence of situations between receiving a sum of money today or a larger sum of money after three weeks. In the following analysis, we use the number of times a participant chose the risky option and the later option as proxies of their risk and time

preferences, but our results are not sensitive to alternative measures of these preferences. Finally, to measure social preferences, we conducted a version of a real effort dictator game (Cappelen et al. 2010). First, we asked all participants to work on a counting task in which they earned a fixed sum of money plus a bonus that depended on their performance relative to that of the others. We then matched each participant with another participant with the same performance record and asked them to decide how they would distribute the sum of the fixed payments between themselves and the other participant. The share given to the other participant provides us with a measure of their level of selfishness. To measure whether the participants had an egalitarian or a meritocratic fairness view, we followed the impartial spectator approach of Cappelen et al. (2013). Specifically, we asked all participants to decide as impartial spectators how the bonus earned by two other participants should be distributed, where they could choose between an equal division (egalitarian fairness view) or a division in proportion to the productivity of the two participants (meritocratic fairness view).

4. Descriptive Statistics

In this section we provide an overview of gender and socioeconomic differences in our sample.

4.1. Gender Differences

We find a large gender difference in the willingness to compete in the present experiment. As shown in Table 2, boys are much more likely than girls to choose competition (51.6% versus 32.2%).[11]

We also find a gender difference in performance in the first round, where boys score higher than girls (11.0 versus 9.8 correct answers).[12] But as shown in the upper left panel of Figure 3, the gender difference in the willingness to compete applies to almost all performance levels. Similarly, we observe from the upper right panel of Figure 3 that the gender difference in competitiveness also applies to almost all confidence levels.

The gender difference in willingness to compete is particularly striking when we compare it to the absence of gender differences in overconfidence,

---

[9] Because of time restrictions, we did not include an initial piece rate stage as in Niederle and Vesterlund (2007), which means that we cannot study how performance was affected by the introduction of competition. Furthermore, we had different payment schemes in the two rounds of competition, where the payment structure in the initial round was designed such that it could facilitate the spectator choice of the participants later in the experiment. We cannot rule out that these design features affected the competition choice of the students.

[10] Note that the competitive payment scheme is also efficiency increasing when a participant gets more than the mean score. Since it is well known that boys are more efficiency oriented than girls (Almås et al. 2010, Fehr et al. 2013), this may potentially bias our results in favor of finding a gender difference in competitiveness (because women care less for efficiency and might therefore have less incentive to go for the competitive payment scheme).

[11] In Table A1 in Online Appendix A, we provide an overview of the experimental data for the full sample of 505 participants. On all experimental variables, there are only minimal differences between the full sample and the restricted sample of 483 participants for which we also have data on family background (Tables 2 and 3).

[12] Note that this does not necessarily imply that the girls are less able to do the task. The first round in our experiment was a tournament, and Gneezy et al. (2003) and Gneezy and Rustichini (2004) show that women may be less effective than men in competitive environments, even if they are able to perform similarly in noncompetitive environments.

Table 2   **Overview of Differences by Gender**

	Means		Std. dev.		p-value
	Boys	Girls	Boys	Girls	(Equal means)
Variables pertaining to the competition game					
Compete	0.516	0.322	0.501	0.468	<0.001
Performance	10.98	9.82	4.979	4.372	<0.001
Confidence	57.88	51.70	18.34	16.96	<0.001
Overconfidence	1.120	0.601	26.70	29.15	0.839
Other experimental measures					
Risk	3.636	3.652	2.274	2.134	0.935
Patience	4.268	4.030	2.122	1.901	0.194
Selfish	0.306	0.310	0.243	0.230	0.858
Egalitarian	0.268	0.270	0.444	0.445	0.953
Personality					
Openness	0.307	0.354	0.435	0.404	0.221
Conscientiousness	0.428	0.477	0.485	0.452	0.247
Extraversion	0.379	0.450	0.374	0.411	0.048
Agreeableness	0.711	0.760	0.349	0.407	0.158
Neuroticism	−0.572	−0.362	0.426	0.466	<0.001
Background					
Father education (years)	14.01	14.27	2.84	2.82	0.326
Mother education (years)	14.26	14.09	2.66	2.82	0.502
Father average income (1,000s)	550	544	198	245	0.857
Mother average income (1,000s)	322	321	158	145	0.917

Notes. The table reports the variables by gender for the restricted sample of 483 participants for which we have data on family background. *Compete* is an indicator variable taking the value one if the participant chose to compete. *Performance* is the number of correct answers on the addition task in the first round. *Confidence* is the participant's belief about their own performance (defined as the percentage of participants in the session that the participant believed performed worse than himself or herself). *Overconfidence* is the difference between *performance* (here defined as the percentage of participants in the session that performed worse than the participant) and *Confidence*. *Risk* is the number of times the risky alternative was chosen. *Patience* is the number of times the later option was chosen. *Selfish* is the share given to the other participant. *Egalitarian* is an indicator variable taking the value one if the participant divided the bonus equally as a spectator. *Personality* is measured by the Big Five Inventory. The background variables are taken from administrative register data, where *education* refers to years of schooling, and *income* is in 2009 NOK thousands, averaged over the past 10 years, and includes transfers and capital incomes. A participant is defined to be from a low SES family if the family is in the bottom fifth of both the education and income distributions. The rest of the participants are defined to be from medium and high SES families. The *p*-values refer to the Pearson's chi-squared test for the indicator variables and to *t*-tests of equality with unequal variances for all the other variables.

social preferences, time preferences, and risk preferences in our sample, as reported in Table 2. Females are often found to be less overconfident (Niederle and Vesterlund 2007), more risk averse (Croson and Gneezy 2009), and more generous (Engel 2011) than males, but these gender patterns do not apply to Norwegian adolescents.[13] This may reflect that Norway is a highly gender-equal society, which makes it even more intriguing to observe large gender differences in competition preferences.

On the Big Five personality measures, we observe that the girls score higher on all dimensions, but the differences are only statistically significant for extraversion and neuroticism. Overall, the observed gender differences in personality are in line with what has been documented in other studies (Schmitt et al. 2008), where it also has been shown that adolescence

is a key period in the development of individual personality (Soto et al. 2011).

Finally, we observe that there are no gender differences in family background, which means that girls are not more likely to grow up in families with low socioeconomic status. This is consistent with there not being a gender preference with respect to children, which is as expected in a gender equal society.

4.2. Socioeconomic Differences
In this subsection, we consider differences between children across socioeconomic backgrounds, where we focus on the differences between children from low socioeconomic families and the rest of the children.[14] Our main definition of a low SES family is that the family is in the bottom fifth of both the income and education distributions in the sample, where family income is measured as the sum of the income of the father and the mother, and family education is

---

[13] Our findings on social preferences are in line with the findings of Almås et al. (2010), who also do not find a gender difference in the level of selfishness and the fairness views in a fairly representative sample of Norwegian adolescents.

[14] There are only small differences between children from medium and high SES families; see Table A2 in Online Appendix A.

Table 3   Overview of Differences by SES

	Means		Std. dev.		*p*-value
	M/H SES	Low SES	M/H SES	Low SES	(Equal means)
Variables pertaining to the competition game					
Compete	0.441	0.205	0.497	0.409	0.004
Performance	10.61	8.18	4.707	4.430	0.002
Confidence	55.92	43.21	17.63	17.45	<0.001
Overconfidence	0.653	3.333	27.790	29.140	0.583
Other experimental measures					
Risk	3.646	3.615	2.171	2.602	0.943
Patience	4.196	3.667	2.018	2.004	0.121
Egalitarian	0.245	0.538	0.431	0.505	<0.001
Selfish	0.311	0.283	0.236	0.246	0.505
Personality					
Openness	0.337	0.255	0.415	0.478	0.309
Conscientiousness	0.456	0.403	0.468	0.485	0.516
Extraversion	0.418	0.357	0.392	0.406	0.373
Agreeableness	0.746	0.600	0.372	0.433	0.047
Neuroticism	−0.480	−0.367	0.450	0.535	0.207
Background					
Father education (years)	14.42	10.87	2.743	1.455	<0.001
Mother education (years)	14.46	11.00	2.648	1.376	<0.001
Father average income (1,000s)	570	285	348	89.4	<0.001
Mother average income (1,000s)	332	210	153	64.9	<0.001

Notes. The table reports the variables by SES (medium/high (M/H) and low) for the restricted sample of 483 participants for which we have data on family background. All variables are as described in Table 2.

measured as the sum of the years of education of the father and the mother.[15] According to this definition, 8.1% of the participants are from low SES families (39 out of 483 participants). In the further analysis, we also consider different cutoff levels, education and income separately, and the socioeconomic background of mothers and fathers separately.

We focus on the bottom fifth of the education distribution since this captures a distinct group of families where one parent has no more than compulsory schooling and the other parent has no more than high school. In a highly educated society, such a family clearly has a low educational background. Some parents with only compulsory education have done well in terms of income, however, and thus we also impose the restriction that the families are in the bottom fifth of the income distribution. Correspondingly, we define a high SES family as a family that is in the top fifth of both the income and education distributions. According to this definition, 16% of the participants are from high SES families (79 out of 483 participants).

From Table 3, we observe that there is a significant socioeconomic gradient in the willingness to compete, where low SES children are much less likely than

medium and high SES children to choose competition (23.1% versus 43.9%). The low SES children perform, as expected, significantly worse than the medium and high SES children on the task (8.4 versus 10.6 correct answers), whereas we do not find a statistically significant difference between the socioeconomic groups in overconfidence. The socioeconomic gradient in the willingness to compete is persistent across performance and confidence levels, as shown in the bottom panels of Figure 3.

On the other experimental measures, we observe, in particular, that the low SES children are much more likely than the medium and high SES children to choose an egalitarian (and not a meritocratic) division of the bonus as an impartial spectator (51.3% versus 24.8%). The low SES children also give away a smaller share in the dictator game and are less patient, but these differences are not statistically significant.[16] We do not observe any difference in risk preferences between the socioeconomic groups.

On the personality measures, we observe that the low SES children score lower on openness, extraversion, and agreeableness and higher on neuroticisim, but only the difference in agreeableness is statistically

---

[15] Out of 483 participants, 31 are in the bottom fifth of the national income distribution; our results are robust to focusing on this smaller group. A cutoff at the 24.7 percentile in the national income distribution would give the same group of low SES participants as we apply in the present analysis.

[16] These findings may clearly differ across cultures. Bauer et al. (2014), for example, find in a study conducted in the Czech Republic that children of parents with low education are more spiteful, more selfish, and less altruistic. See also the paper by Khadjavi and Nicklisch (2014), who report from a field study that looks at how the willingness to compete among preschool children in Germany is related to the ambitions and preferences of their parents.

Figure 3   Share That Chose to Compete by Performance and Confidence
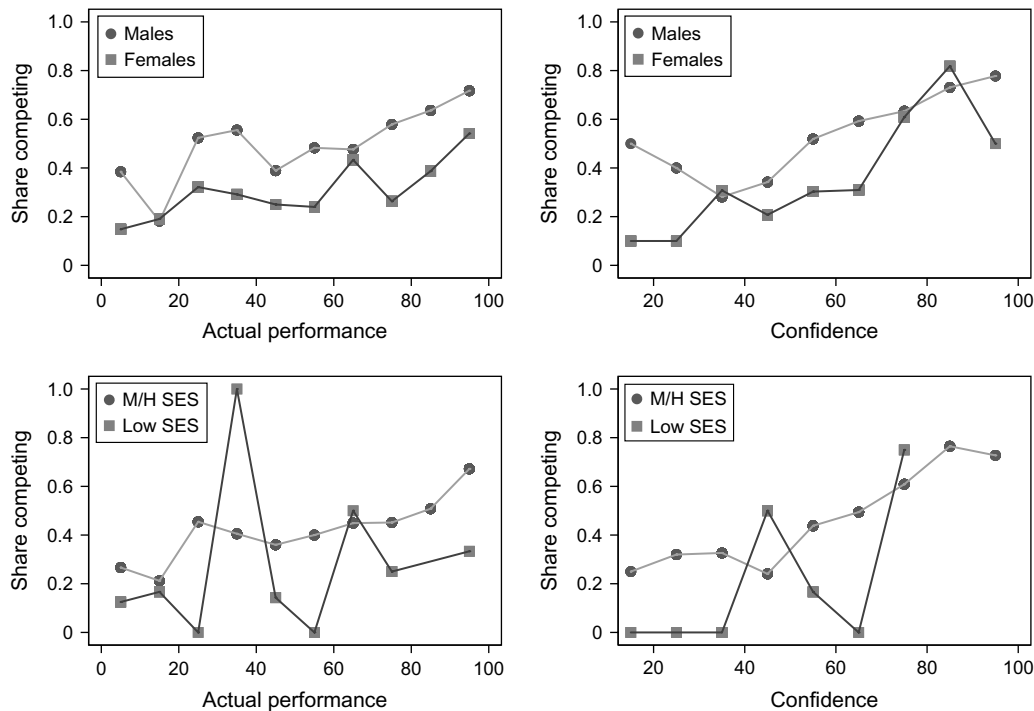
Notes. The upper left panel shows the share of boys and girls that chose to compete by actual performance in the first round (defined by the decile of the performance distribution they belong to). The upper right panel shows the share of boys and girls that chose to compete by confidence (defined by the decile of the performance distribution they believe they belong to). The lower left panel shows the share of low SES and medium/high (M/H) SES participants that chose to compete by performance. The lower right panel shows the share of low SES and M/H SES participants that chose to compete by confidence. A participant is defined to be from a low SES family if the family is in the bottom fifth of both the education and income distributions. The rest of the participants are defined to be from medium and high SES families.

significant. Finally, by definition, there are large differences between the socioeconomic groups in family background variables. The father's income is, on average, twice as high for the medium and high SES children; the mother's income is, on average, 54% higher. The parents in the medium and high SES families also have, on average, 3.5 more years of education than parents in low SES families.

5.   Explaining Willingness to Compete
In this section, we study in more detail how gender and socioeconomic background are associated with the participants' willingness to compete.

Table 4, which reports from a linear probability regression, confirms that there is a highly statistically significant gender difference in the competition choice.[17] This gender difference in competitiveness is robust to controlling for performance and confidence, other experimental variables, psychological variables, and family background.[18] The estimated

effect of gender on the competition choice is lower when including the performance variable (13.8 percentage points versus 19.4 percentage points), which is as expected given the gender difference in performance, but not sensitive to the inclusion of the other variables. In all specifications, the gender effect is highly significant, and thus our study clearly demonstrates that even in a gender equal society, girls are more averse to competition than boys.

Table 5, however, shows that family background is also closely linked to the competition choice. Low SES children are much less willing to compete than medium and high SES children, the estimated difference without any controls being 23.6 percentage points. We observe that this partly works through the low SES children performing worse on the task; controlling for performance reduces the estimated effect of low SES to 17.9 percentage points. The inclusion of the other variables reduces the estimated effect somewhat more, but even when including all background variables, we observe that the estimated low SES effect on the competition choice is as large as the estimated gender effect reported in column (5) in Table 4.

In Table 6, we consider whether family background affects boys and girls differently in their competition

---

[17] In Online Appendix A, we report the full regression results for the tables reported in the paper; see Tables A3–A6.

[18] We report these results by gender in Tables A7 and A8 in Online Appendix A.

Table 4   Effect of Gender on Willingness to Compete

	(1)	(2)	(3)	(4)	(5)	(6)
Female	−0.194***	−0.168***	−0.142***	−0.139***	−0.135***	−0.138***
	(0.044)	(0.044)	(0.044)	(0.043)	(0.044)	(0.044)
Performance		0.023***	0.043***	0.040***	0.036***	0.035***
		(0.004)	(0.006)	(0.006)	(0.006)	(0.006)
Overconfidence			0.005***	0.004***	0.004***	0.004***
			(0.001)	(0.001)	(0.001)	(0.001)
Included controls						
Experimental variables	No	No	No	Yes	Yes	Yes
Big Five personality	No	No	No	No	Yes	Yes
Low SES	No	No	No	No	No	Yes
Observations	483	483	483	483	483	483
R^2	0.039	0.085	0.118	0.173	0.186	0.191

Notes. The table reports regressions of the indicator value *compete* (taking the value one if the participant chose to compete) on a set of explanatory variables. *Female* is an indicator variable taking the value one if the participant is a female. *Performance* is the number of correct answers on the addition task in the first round. *Overconfidence* is the difference between *performance* (here defined as the percentage of participants in the session that performed worse than the participant) and *confidence* (defined as the percentage of participants in the session that the participant believed performed worse than himself or herself). *Experimental variables* includes *risk*, *patience*, *selfish*, and *egalitarian* (see Table 2 for definitions). *Big Five personality* includes *openness*, *conscientiousness*, *extraversion*, *agreeableness*, and *neuroticism*. *Low SES* is an indicator variable taking the value one if the participant is from a low SES family, that is, if the family is in the bottom fifth of both the education and income distributions. Robust standard errors are in parentheses.

   ***$p < 0.01$.

choice by introducing an interaction variable between family background and gender. We observe that that there is a large and highly significant negative effect on the willingness to compete for boys coming from low SES families, but no such effect for girls. The estimated effect of low SES for boys is 26.6 percentage points and highly statistically significant, whereas the estimated effect for girls is 2.4 percentage points and not statistically significant. From the estimated interaction term, we observe that the difference in how family background affects boys and girls is statistically significant.

In Figure 4, we show that the estimated socioeconomic gradients for boys and girls are largely robust to the cutoff level used in the definition of low SES; for all cutoff levels we find a large negative effect of low SES on the boys and a negligible effect on the girls. In Online Appendix A, we report further robustness checks. First, we show that our results are robust to using a probit specification (see Tables A9–A11). Second, we show that the results are robust to the inclusion of indicator variables for medium SES and high SES (see Table A12) and to the estimation of a linear model where the low SES dummy is replaced

Table 5   Effect of Low SES on Willingness to Compete

	(1)	(2)	(3)	(4)	(5)	(6)
Low SES	−0.236***	−0.179**	−0.140**	−0.120*	−0.125*	−0.135*
	(0.069)	(0.070)	(0.067)	(0.068)	(0.067)	(0.070)
Performance		0.024***	0.045***	0.043***	0.038***	0.035***
		(0.004)	(0.006)	(0.006)	(0.006)	(0.006)
Overconfidence			0.005***	0.005***	0.004***	0.004***
			(0.001)	(0.001)	(0.001)	(0.001)
Included controls						
Experimental variable	No	No	No	Yes	Yes	Yes
Big Five personality	No	No	No	No	Yes	Yes
Female	No	No	No	No	No	Yes
Observations	483	483	483	483	483	483
R^2	0.017	0.067	0.104	0.158	0.174	0.191

Notes. The table reports regressions of the indicator value *compete* (taking the value one if the participant chose to compete) on a set of explanatory variables. *Low SES* is an indicator variable taking the value one if the participant is from a low SES family, that is, if the family is in the bottom fifth of both the education and income distributions. Standard errors are in parentheses. *Performance* is the number of correct answers on the addition task in the first round. *Overconfidence* is the difference between *performance* (here defined as the percentage of participants in the session that performed worse than the participant) and *confidence* (defined as the percentage of participants in the session that the participant believed performed worse than himself or herself). *Experimental variables* includes *risk*, *patience*, *selfish*, and *egalitarian* (see Table 2 for definitions). *Big Five personality* includes *openness*, *conscientiousness*, *extraversion*, *agreeableness*, and *neuroticism*. *Female* is an indicator variable taking the value one if the participant is a female. Robust standard errors are in parentheses.

   *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

Table 6   Willingness to Compete: Interaction Between Low SES and Gender

	(1)	(2)	(3)	(4)	(5)
Low SES	−0.355***	−0.299***	−0.264***	−0.275***	−0.266***
	(0.092)	(0.093)	(0.088)	(0.082)	(0.080)
Female	−0.216***	−0.190***	−0.165***	−0.168***	−0.163***
	(0.046)	(0.046)	(0.046)	(0.045)	(0.046)
Low SES × Female	0.247*	0.237*	0.241*	0.316**	0.291**
	(0.139)	(0.138)	(0.130)	(0.125)	(0.126)
Predicted					
Low SES (female)	−0.108	−0.061	−0.023	0.041	0.024
	(0.104)	(0.104)	(0.099)	(0.101)	(0.104)
Included controls					
Performance	No	Yes	Yes	Yes	Yes
Overconfidence	No	No	Yes	Yes	Yes
Experimental variables	No	No	No	Yes	Yes
Big Five personality	No	No	No	No	Yes
Observations	483	483	483	483	483
R^2	0.061	0.100	0.129	0.185	0.197

Notes. The table reports regressions of the indicator value *compete* (taking the value one if the participant chose to compete) on a set of explanatory variables. *Low SES* is an indicator variable taking the value one if the participant is from a low SES family, that is, if the family is in the bottom fifth of both the education and income distributions. Standard errors are in parentheses. *Female* is an indicator variable taking the value one if the participant is a female. *Low SES × Female* is an interaction variable between *low SES* and *female*. *Low SES (female)* is the sum of the estimated parameters for *low SES* and *low SES × Female*. *Performance* the number of correct answers on the addition task in the first round. *Overconfidence* is the difference between *performance* (here defined as the percentage of participants in the session that performed worse than the participant) and *confidence* (defined as the percentage of participants in the session that the participant believed performed worse than himself or herself). *Experimental variables* includes *risk, patience, selfish,* and *egalitarian* (see Table 2 for definitions). *Big Five personality* includes *openness, conscientiousness, extraversion, agreeableness,* and *neuroticism.* Robust standard errors are in parentheses.

$^*p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

by the family's total years of education or total income (see Table A13).[19]

We note that the gender interaction term is not statistically significant when we use cutoff levels above 25% or the linear model, which shows that the differential gender effect of socioeconomic background is mainly driven by the families in the bottom fifth of the distribution. Accordingly, we observe that the gender interaction term is highly significant for low SES and insignificant for high SES in Table A12.

To summarize, we find that both gender and family background are important factors for understanding competition preferences, and, in particular, that family background is strongly negatively associated with a willingness to compete for boys.

6. Family Mechanisms

We now turn to a study of mechanisms in the family that may potentially shape competitiveness preferences. We do this by running the same type of regression as reported in our main specification in column (5) in Table 6, but where in some specifications we consider alternative definitions of low SES and in others we replace the low SES dummy with other family variables of interest.

First, we consider the relative importance of the socioeconomic status of the father and the mother, to see whether there is evidence in the data of same-gender role modeling (Bussey and Bandura 1984). Is it the case that low SES fathers make boys less willing to compete, whereas low SES mothers make girls less willing to compete? In columns (2) and (3) in Table 7, we report separate regressions for low SES being defined by one of the parent's education and income. We observe from column (2) that having a low SES father has a huge negative effect on boys' willingness to compete, but no statistically significant effect on girls. We do not find the same-sex pattern for the mothers, however, as seen from column (3). In fact, the pattern for low SES mothers is the same as for low SES fathers, but the estimated effects are smaller and not statistically significant. Thus, it appears that our finding of low SES family background being detrimental for willingness to compete is primarily driven by the negative effect of the fathers on the boys.[20]

Second, to study further whether our results are driven by social norms in the family, we study the association between parental equality and competition preferences. Parental equality typically comes with more liberal gender-role attitudes (Myers and Booth 2002, Pope and Sydnor 2010,

---

[19] High SES students are more willing to compete than medium SES students, as shown in Figure A1, but these differences are not statistically significant when we include background variables; see Table A12.

[20] In Table A14 in Online Appendix A, we show that this result also applies if we use the joint distribution of income and education for fathers and mothers to define low SES.

Figure 4   Different Cutoff Levels
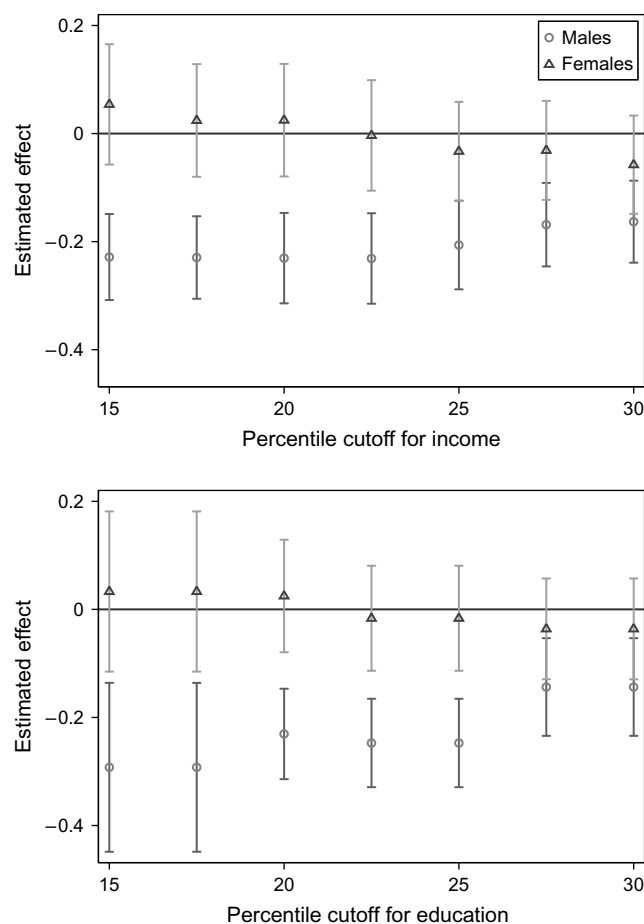
Notes. The graphs show the estimated effect of family background for different cutoffs of the education and the income of the family, where the cutoff level is indicated by the x axis. The specification estimated corresponds to column (5) in Table 6 (with the full set of controls). In the upper panel, the x axis shows the cutoffs for the education of the family, where the cutoff for the income of the family is kept at 20%. In the lower panel, the x axis shows the cutoffs for the income of the family, where the cutoff for the education of the family is kept at 20%. Standard errors are indicated.

Bertrand et al. 2015), and it seems plausible to assume that traditional gender roles are associated with boys being more competitive than girls. We might therefore expect the gender gap in competitiveness to be narrower in families with greater parental equality. There is, however, no evidence of this mechanism in our data, as shown in columns (4) and (5) in Table 7. We here proxy equality between parents with the relative income difference between fathers and mothers (column (4)) and the absolute difference in years of education (column (5)), but for neither specification do we see any effect on the willingness to compete for girls or boys.[21]

[21] In Table A15 in Online Appendix A, we provide descriptive statistics on the family variables used in Table 7. Furthermore, in Table A16 in Online Appendix A, we report the results for a

Finally, we consider whether the number of siblings or birth order has an impact on the competition preferences. Sibling rivalry has been extensively studied both in animal and human behavior, where the basic idea is that siblings are competitors for parents' resources (Black et al. 2005, Downey 2001). One might therefore expect that children with more siblings are more used to competition, and thus also more willing to enter into competitive environments. For the same reason, one might expect that the firstborn is less competitive, since the firstborn typically is less exposed to competition from siblings.[22] As shown in columns (6) and (7) in Table 7, our estimates are in the expected direction both for boys and girls. More siblings make you more competitive (column (6)) and being the firstborn makes you less competitive (column (7)), but the effects are relatively small and not statistically significant.

To summarize, our analysis suggests that the father's socioeconomic status is the most important family mechanism in shaping competition preferences among boys.[23] One possible explanation for this finding is the combination of two forces: medium and high SES fathers spend more developmentally effective time with their children than low SES fathers (Guryan et al. 2008, Rege and Solli 2013); and fathers serve a distinct parenting role (Kalil et al. 2011). Fathers typically engage with their children in more competitive activities, like sports, and also spend more time with their sons than their daughters (Lundberg 2005, Baker and Milligan 2013), and the fact that medium and high SES boys are particularly exposed to the competitive cultures of these activities may make them more attracted to competition also later in life.[24]

specification where the proxy for parental equality is a dummy for whether the mother earns more than the father or for whether the mother has more education than the father. It has been shown in other studies that the social norm "a man should earn more than his wife" is crucial for understanding important labor market and family outcomes (Bertrand et al. 2015), but we do not find any evidence of this mechanism shaping the competition preferences of the children.

[22] Recent evidence from China suggests that the role of siblings in shaping competitiveness preferences is potentially of great importance. Cameron et al. (2013) find that the one-child policy had a detrimental effect on individuals' competition preferences. We only have 15 children with no siblings and thus are not able to distinguish between the effect of being the firstborn and being an only child.

[23] We also show in Table A17 in Online Appendix A that the father's socioeconomic status does not affect the performance, risk, or confidence of the boys and girls in a way that can explain our findings.

[24] There is also evidence showing that parents in general engage differently with sons and daughters, for example, by reading more to the daughters (Bertrand and Pan 2013). This is consistent with our finding the same low SES pattern, although weaker, for mothers.

Table 7   Willingness to Compete: Family Mechanisms

	Low SES			Parental power difference		Siblings	
	(1) *Parents*	(2) *Father*	(3) *Mother*	(4) *Father's/Mother's inc.*	(5) *Father's/Mother's edu.*	(6) *Siblings*	(7) *Firstborn*
Family	−0.266***	−0.226***	−0.137	0.004	−0.010	0.006	−0.095
	(0.080)	(0.087)	(0.126)	(0.007)	(0.033)	(0.029)	(0.061)
Female	−0.163***	−0.164***	−0.147***	−0.149***	−0.141***	−0.162*	−0.162***
	(0.046)	(0.045)	(0.045)	(0.051)	(0.044)	(0.088)	(0.056)
Family × Female	0.291**	0.329**	0.175	0.006	−0.010	0.014	0.053
	(0.126)	(0.160)	(0.182)	(0.010)	(0.048)	(0.041)	(0.088)
Predicted							
Family (female)	0.024	0.103	0.038	0.010	−0.020	0.020	−0.042
	(0.104)	(0.136)	(0.131)	(0.007)	(0.035)	(0.028)	(0.063)
Included controls							
Performance	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Overconfidence	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Experimental variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Big Five personality	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	483	476	481	483	474	483	483
R²	0.197	0.195	0.188	0.188	0.190	0.187	0.191

Notes. The table reports regressions of the indicator value *Compete* (taking the value one if the participant chose to compete) on a set of explanatory variables. *Family* differs across the six specifications: *Family* (*Parents*) is an indicator variable taking the value one if the participant is from a low SES family, that is, if the family is in the bottom fifth of both the education and income distributions. *Family* (*Father*) is an indicator variable taking the value one if the participant has a low SES father, that is, if the father is in the bottom fifth of both the education and the income distribution of the fathers. *Family* (*Mother*) is an indicator variable taking the value one if the participant has a low SES mother, that is, if the mother is in the bottom fifth of both the education and income distributions of the mothers. *Family* (*Father's/Mother's inc.*) is the father's income divided by the mother's income. *Family* (*Father's/Mother's edu.*) is the father's years of education minus mother's years of education. *Family* (*Siblings*) is the number of siblings. *Family* (*Firstborn*) is an indicator variable taking the value one if the participant is the firstborn in the family. *Female* is an indicator variable taking the value one if the participant is a female. *Family × Female* is an interaction variable between *family* and *female*. *Family (female)* is the sum of the estimated parameters for *Family* and *Family × Female*. *Performance* is the number of correct answers on the addition task in the first round. *Overconfidence* is the difference between *performance* (here defined as the percentage of participants in the session that performed worse than the participant) and *confidence* (defined as the percentage of participants in the session that the participant believed performed worse than himself or herself). *Experimental variables* include *risk*, *patience*, *selfish*, and *egalitarian* (see Table 2 for definitions). *Big Five personality* includes *openness*, *conscientiousness*, *extraversion*, *agreeableness*, and *neuroticism*. Robust standard errors in parentheses.

    *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

The fact that we find much weaker evidence of the father's socioeconomic status shaping the competition preferences of the girls may also reflect a gene–environment interaction. In particular, it may be the case that innate differences in competition preferences are allowed to develop more in the medium and high SES families, in which children face more opportunities (Schmitt et al. 2008).[25] Consequently, girls may be less responsive to medium and high SES fathers being more competitive because girls are biologically less inclined to compete than boys. Another possibility is that willingness to compete is, like many other personality traits, highly heritable and prevalent among males. The observed association between the father's SES and the willingness to compete of the son may then be produced by the latent variable influencing the willingness to compete of both the father and the son.

[25] The evidence on gender differences in the willingness to compete early in life, which would be suggestive of innate biological differences in competition preferences, is mixed; see Samek (2013) and Sutter and Glätzle-Rützler (2015). See also Guo and Stearns (2002) and Turkheimer et al. (2003) for studies of how socioeconomic status and genetic dispositions may interact in the context of the intellectual development of children.

7. Conclusion

We have shown that family matters for competition preferences in a strictly cognitive task. In particular, we find that boys with low SES fathers are much less willing to compete than boys with high SES fathers. We do not find a similar pattern for girls, and as a consequence we find that gender differences in competitiveness are sensitive to family background; there is no gender difference in competitiveness among children from low SES families, but a large and significant gender difference among children from medium and high SES families. An interesting avenue for future research would be to test the generality of these findings, by varying the cultural context, the stakes involved, and the nature of the competitive task. In particular, it might be the case that the observed effect of low SES is driven by the fact that we use a cognitive task, and thus it is important to study the socioeconomic gradient in competition preferences also in other environments.

Our results shed light on the ongoing debate on the role of nature versus nurture in explaining gender differences in competition preferences. The strong association between the father's socioeconomic status and

the competition preferences of boys is consistent with the gender gap reflecting a socialization process, and in this respect we complement the study by Gneezy et al. (2009) by showing that the family is a crucial part of the nurture process. But our study also shows that a gender gap in competition preferences does not necessarily reflect a lack of female empowerment, consistent with the finding in Schmitt et al. (2008) that gender differences in personality traits (Big Five) are greater in prosperous, healthy, and egalitarian cultures. This may partly reflect a gene–environment interaction, where the biological development of boys is more susceptible to a stressful environment than that of girls (Schmitt et al. 2008). Thus, it may be the case that innate differences in competitiveness inclinations between boys and girls are attenuated by growing up in a low socioeconomic family environment, but emerge for more well-off children facing greater opportunities. Thus, from a policy perspective, it is crucial to identify whether a gender gap in competitiveness reflects a lack of female empowerment or innate biological differences, where the latter would make it more challenging to justify policies aiming at promoting stronger competition preferences among females. To shed further light on this issue, it would be interesting for future research to collect data on competition preferences and various personality traits of both parents and their children.

The present paper also speaks to the literature in labor economics that has documented that there is a strong intergenerational correlation in income and educational attainment between fathers and sons (Bowles and Gintis 2002), and to recent work arguing that father presence appears to be crucial for this association (Baker and Milligan 2013, Bertrand and Pan 2013, Gould and Simhon 2011, Kalil et al. 2013).[26] Our study highlights that the father's role in shaping competition preferences may be an important underlying mechanism for the intergenerational correlation, and the observed socioeconomic gradient may reflect that medium and high SES fathers are more present than low SES fathers and cultivate a greater willingness to compete in their sons that may benefit them later in their careers. Interestingly, this mechanism may also shed light on the observation in Cárdenas et al. (2012) of a larger gender gap in the more gender equal societies, since more gender equality typically would imply that fathers spend more time at home with their children.[27] Finally, our results may shed light on the absence of a gender gap in competitiveness studies conducted in Armenia and China (Khachatryan et al.

2014, Zhang 2014). We find no gender gap among the low SES children, which may suggest that low economic development more broadly does not foster gender differences in competitiveness.

Differences in competition preferences that initially are due to socialization in adolescence may over time manifest themselves in neural structures that have lasting implications for choices also made in adulthood (Knudsen et al. 2006). This may provide justification for policies targeting low SES children with interventions that may give them the opportunity to cultivate competition preferences, which at the same time should respect the inherent variation in competitiveness inclinations between and within the genders.

Supplemental Material

Acknowledgments

---

[26] See also the growing literature on the role of noncognitive abilities on labor market outcomes and social behavior (Heckman et al. 2006).

[27] There may certainly be other effects of gender equality working in the opposite direction, including a change in the father's role.

References
Almås I, Cappelen AW, Sørensen E, Tungodden B (2010) Fairness and the development of inequality acceptance. *Science* 328(5982):1176–1178.

Baker M, Milligan K (2013) Boy-girl differences in parental time investments: Evidence from three countries. NBER Working Paper 18893, National Bureau of Economic Research, Cambridge, MA.

Balafoutas L, Sutter M (2012) Affirmative action policies promote women and do not harm efficiency in the laboratory. *Science* 335(6068):579–582.

Bauer M, Chytilová J, Pertold-Gebicka B (2014) Parental background and other-regarding preferences in children. *Experiment. Econom.* 17(1):24–46.

Becker A, Deckers T, Dohmen T, Falk A, Kosse F (2012) The relationship between economic preferences and psychological personality measures. *Annual Rev. Econom.* 4:453–478.

Benet-Martínez V, John OP (1998) Los Cinco Grandes across cultures and ethnic groups: Multitrait multimethod analyses of the Big Five in Spanish and English. *J. Personality Soc. Psych.* 75(3):729–750.

Bertrand M (2011) New perspectives on gender. Ashenfelter OC, Card D, eds. *Handbook of Labor Economics*, Vol. 4, Chap. 17 (North Holland, Amsterdam), 1543–1590.

Bertrand M, Pan J (2013) The trouble with boys: Social influences and the gender gap in disruptive behavior. *Amer. Econom. J.: Appl. Econom.* 5(1):32–64.

Bertrand M, Pan J, Kamenica E (2015) Gender identity and relative income within households. *Quart. J. Econom.* 130(2):571–614.

Birkelund GE, Sandnes T (2003) Paradoxes of welfare states and equal opportunities: Gender and managerial power in Norway and the USA. *Comparative Soc. Res.* 21:203–242.

Black SE, Devereux PJ, Salvanes KG (2005) The more the merrier? The effect of family composition on children's outcomes. *Quart. J. Econom.* 120(2):669–700.

Booth A, Nolen P (2012) Choosing to compete: How different are girls and boys? *J. Econom. Behav. Organ.* 81(2):542–555.

Bowles S, Gintis H (2002) The inheritance of inequality. *J. Econom. Perspect.* 16(3):3–30.

Buser T, Niederle M, Oosterbeek H (2014) Gender, competitiveness and career choices. *Quart. J. Econom.* 129(3):1409–1447.

Bussey K, Bandura A (1984) Influence of gender constancy and social power on sex-linked modeling. *J. Personality Soc. Psych.* 47(6):1292–1302.

Cameron L, Erkal N, Gangadharan L, Meng X (2013) Little emperors: Behavioral impacts of China's one-child policy. *Science* 339(6122):953–957.

Cappelen AW, Sørensen EØ, Tungodden B (2010) Responsibility for what? Fairness and individual responsibility. *Eur. Econom. Rev.* 54(3):429–441.

Cappelen AW, Konow J, Sørensen EØ, Tungodden B (2013) Just luck: An experimental study of risk taking and fairness. *Amer. Econom. Rev.* 103(3):1398–1413.

Cárdenas JC, Dreber A, von Essen E, Ranehill E (2012) Gender differences in competitiveness and risk taking: Comparing children in Colombia and Sweden. *J. Econom. Behav. Organ.* 83(1):11–23.

Croson R, Gneezy U (2009) Gender differences in preferences. *J. Econom. Literature* 47(2):1–27.

Downey DB (2001) Number of siblings and intellectual development: The resource dilution explanation. *Amer. Psychologist* 56(6–7):497–504.

Dreber A, von Essen E, Ranehill E (2014) Gender and competition in adolescence: Task matters. *Experiment. Econom.* 17(1):154–172.

Dronkers J, Robert P (2008) Differences in scholastic achievement of public, private government-dependent, and private independent schools: A cross-national analysis. *Educational Policy* 22(4):541–577.

Engel C (2011) Dictator games: A meta study. *Experiment. Econom.* 14(4):583–610.

Fehr E, Glätzle-Rützler D, Sutter M (2013) The development of egalitarianism, altruism, spite and parochialism in childhood and adolescence. *Eur. Econom. Rev.* 64(1):369–383.

Flory JA, Leibbrandt A, List JA (2015) Do competitive work places deter female workers? A large-scale natural field experiment on gender differences in job-entry decisions. *Rev. Econom. Stud.* 82(1):122–155.

Gneezy U, Rustichini A (2004) Gender and competition at a young age. *Amer. Econom. Rev.* 94(2):378–381.

Gneezy U, Leonard KL, List JA (2009) Gender differences in competition: Evidence from a matrilineal and a patriarchal society. *Econometrica* 77(5):1637–1664.

Gneezy U, Niederle M, Rustichini A (2003) Performance in competitive environments: Gender differences. *Quart. J. Econom.* 118(3):1049–1074.

Gould ED, Simhon A (2011) Does quality time produce quality children? Evidence on the intergenerational transmission of human capital using parental deaths. Discussion Paper 5487, Institute for the Study of Labor, Bonn, Germany.

Guo G, Stearns E (2002) The social influence on the realization of genetic potential for intellectual development. *Soc. Forces* 80(3):881–910.

Guryan J, Hurst E, Kearney M (2008) Parental education and parental time with children. *J. Econom. Perspect.* 22(3):23–46.

Heckman JJ (2011) Integrating personality psychology into economics. NBER Working Paper 17378, National Bureau of Economic Research, Cambridge, MA.

Heckman JJ, Stixrud J, Urzua S (2006) The effects of cognitive and noncognitive abilities on labor market outcomes and social behavior. *J. Labor Econom.* 24(3):411–482.

John OP, Donahue EM, Kentle RL (1991) The Big Five Inventory—Versions 4a and 54. Technical report, Institute of Personality and Social Research, University of California, Berkeley.

Kalil A, Ugaz J, Guryan J (2011) Parents' shared and solo time with children: Composition and correlates. Mimeo, University of Chicago, Chicago.

Kalil A, Mogstad M, Rege M, Votruba ME (2013) Father presence and the intergenerational transmission of educational attainment. Mimeo, University of Stavanger, Stavanger, Norway.

Khachatryan K, Dreber A, von Essen E, Ranehill E (2014) Gender and preferences at a young age: Evidence from Armenia. Mimeo, Middlesex University, London.

Khadjavi M, Nicklisch A (2014) Parents' ambitions and children's competitiveness. Working Paper 08, WiSo, University of Hamburg, Hamburg, Germany.

Knudsen EI, Heckman JJ, Cameron JL, Shonkoff JP (2006) Economic, neurobiological, and behavioral perspectives on building America's future workforce. *Proc. Natl. Acad. Sci. USA* 103(27):10155–10162.

Lundberg S (2005) Sons, daughters and parental behavior. *Oxford Econom. Papers* 21(3):340–356.

Myers SM, Booth A (2002) Forerunners of change in nontraditional gender ideology. *Soc. Psych. Quart.* 65(1):18–37.

Niederle M (2016) Gender. Kagel JH, Roth AE, eds. *Handbook of Experimental Economics*, Vol. 2 (Princeton University Press, Princeton, NJ). Forthcoming.

Niederle M, Vesterlund L (2007) Do women shy away from competition? Do men compete too much? *Quart. J. Econom.* 122(3):1067–1101.

Niederle M, Vesterlund L (2010) Explaining the gender gap in math test scores: The role of competition. *J. Econom. Perspect.* 24(2):129–144.

Niederle M, Vesterlund L (2011) Gender and competition. *Annual Rev. Econom.* 3(1):601–630.

Pope DG, Sydnor JR (2010) Geographic variation in the gender differences in test scores. *J. Econom. Perspect.* 24(2):95–108.

Rege M, Solli IF (2013) The impact of paternity leave on fathers' future earnings. *Demography* 50(6):2255–2277.

Samek AC (2013) Is there a gender gap in preschoolers' competitiveness? An experiment in the U.S. *J. Econom. Behav. Organ.* 92:22–31.

Schmitt DP, Realo A, Voracek M, Allik J (2008) Why can't a man be more like a woman? Sex differences in Big Five personality traits across 55 cultures. *J. Personality Soc. Psych.* 94(1):168–182.

Soto CJ, John OP, Gosling SD, Potter J (2011) Age differences in personality traits from 10 to 65: Big Five domains and facets in a large cross-sectional sample. *J. Personality Soc. Psych.* 100(2):330–348.

Sutter M, Glätzle-Rützler D (2015) Gender differences in the willingness to compete emerge early in life and persist. *Management Sci.* 61(10):2339–2354.

Turkheimer E, Haley A, Waldron M, D'Onofrio B, Gottesman II (2003) Socioeconomic status modifies heritability of IQ in young children. *Psych. Sci.* 14(6):623–628.

Zhang YJ (2012) Can experimental economics explain competitive behavior outside the lab? Working paper, University of California, Berkeley, Berkeley.

Zhang YJ (2014) Culture and the gender gap in competitive inclination: Evidence from the communist experiment in China. Mimeo, Hong Kong University of Science and Technology, Hong Kong.