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Gender and competition in adolescence: task matters

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Keywords Competitiveness · Risk preferences · Altruism · Adolescents · Gender differences · Experiment

JEL Classification C91 · D03 · J16

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1 Introduction

Women's economic and political opportunities have long been more restricted than those of men. This situation has gradually improved in the Western world: female participation in the labor market has increased substantially during the last decades and women today are in many countries at least as likely as men to complete higher education. Yet, both occupational segregation and gender wage gaps persist.

Gender differences in economic preferences provide one possible explanation for the observed gender gaps in the labor market (Croson and Gneezy 2009; Bertrand 2010). Gender differences in preferences are often studied through laboratory and field experiments, and according to this literature men are typically more competitive, more risk taking and less altruistic than men (see, e.g., Eckel and Grossman 2008a; 2008b; Croson and Gneezy 2009; Bertrand 2010; Engel 2011). Moreover, in addition to possible general gender differences in these economic preferences, women and men may also choose different areas for competition. Previous literature suggests that gender differences in competitiveness among adults, but not children, can depend on the nature of the competitive task. Most often, gender-neutral or female-oriented competitive tasks reveal no differences in preferences for competition, whereas men tend to compete more in male-oriented tasks (e.g. Günther et al. 2009; Grosse and Reiner 2010; Shurchkov 2012). This has also been shown in a field experiment in the labor market: Flory et al. (2010) find that women are less likely than men to choose to apply to jobs with highly competitive compensation regimes, but only if the domain of the job has a male stereotype.

An open question is how gender matters for competitive preferences in different tasks among adolescents. Competitiveness in certain tasks has been shown to predict educational choices, raising the possibility that gender differences in competition among adolescents might have long-lasting effects. For example, students that self-select into laboratory competitions using mathematical tasks are more willing to take a high school entrance exam than students less inclined to compete (Zhang 2010) and are more likely to choose more math oriented and prestigious university majors (Buser et al. 2012). Similarly, Örs et al. (2008) find that women perform less well compared to men on the very competitive entry exam to one of France's higher ranked schools, while outperforming men in two less competitive settings. It further seems to be more male associated tasks that are important for labor market outcomes. Favara (2012) finds that, independent of ability, stereotypically male choices lead to higher earnings and that gender stereotypic educational choices are made as early as the age of 14. In a similar vein, mathematical test scores, as opposed to for example verbal test scores, have been found to be a good predictor of future income (Niederle and Vesterlund 2010). If boys and girls choose certain competitive tasks and avoid others differently during adolescence, this may thus have long-term labor market effects, impacting vertical and horizontal occupational segregation by gender, as well as the gender wage gap.[1] Therefore, we believe it is important to understand the extent to which gender differences in preferences for competition are present among adolescents, and how these differ depending on the task.

[1] In particular, this might give rise to segregation in secondary education and consequently segregation in college or university education.

In this paper we study gender differences in preferences for competition among Swedish adolescents aged 16–18 years. We measure competitiveness both by relative performance in competitive vs. non-competitive settings and by self-selection into a competitive payment scheme. Previous studies mainly focus on competitiveness among adults or younger children, thus we contribute to filling the gap between these two age groups.

Importantly, we study competitiveness in two tasks with varying gender associations; a "male" oriented task based on mathematical ability and a "female" oriented one based on verbal ability (e.g. Cvencek et al. 2011; Nosek and Smyth 2011). This has previously not been explored among adolescents. Given previous studies on competitiveness in other age groups, we expect adolescent boys to be more competitive in the mathematical task compared to adolescent girls, whereas we do not have a clear hypothesis for the verbal task in this age group.

We find that gender differences in competitiveness exist already among 16–18 year olds, but that it depends on the task. Whereas we find no gender difference in performance change under a competitive setting in comparison to a non-competitive setting, in either a mathematical or a verbal task, female participants are significantly less likely than male participants to self-select into a competitive setting in a mathematical task, but not in a verbal task. The difference between the genders is large and economically relevant. More than twice as many boys as girls choose to enter the competition. This is not true for a verbal task, where adolescent boys and girls are equally competitive in terms of self-selection. The gender difference in competitiveness between the two tasks is driven by a significantly lower number of girls choosing to compete in the math task than in the verbal task. Among boys the number of competitors is stable across the tasks. However, the gender gap in choosing to compete in the mathematical task diminishes and is no longer significant when we control for actual performance and relative performance beliefs.[2] Our results suggests that if competitiveness matter for labor market choices, then policies addressing gender gaps in this market should account for possible self-selection into and away from competitions already during adolescence, considering that this self-selection varies by gender and competitive domain. Addressing the performance beliefs of females seems to be of particular interest. In our sample, girls are more under-confident in math than boys, thus improving girls' confidence through for example performance feedback could potentially eliminate the gender gap in competitiveness in math.

We also study gender differences in risk preferences and altruism, measured through incentivized behavioral tasks, since these preferences also exhibit gender differences and have been proposed to explain part of the gender gap in labor market outcomes (see, e.g., Bertrand 2010 for further discussion). We hypothesize that if anything adolescent boys in our sample will be more risk taking and less altruistic compared to adolescent girls. Our results confirm this: adolescent girls in our sample

[2] Boys perform on average significantly better in the math task across all classes. From an optimality perspective though, the share of girls choosing to compete should not be smaller than that of boys. This is due to the fact that the gender composition of classes varies a lot and depends on academic specialization. Some classes therefore contain a large majority of girls or boys, and this is mirrored among the top performers in each class.

are indeed less risk taking and more altruistic than boys in a dictator game in which the recipient is a charity.

The outline of our paper is the following. We discuss related previous literature in Sect. 2, present the experimental setup in Sect. 3, and move on to our results in Sect. 4. We finish by a discussion in Sect. 5.

2 Literature review

Previous literature on competitiveness typically shows that among adults (primarily self-selected university students), men tend to choose competitive settings much more often than women in mathematical and spatial tasks (Gneezy et al. 2003; Niederle and Vesterlund 2007; Datta Gupta et al. 2011) but rarely in verbal tasks (Günther et al. 2009; Grosse and Reiner 2010; Shurchkov 2012; though see Wozniak et al. 2010 who find that men remain more competitive than women in a verbal task). This result is also confirmed in a large representative sample of the Swedish population aged 18–73 (Boschini et al. 2012), where men are more competitive than women in a math task but not in a verbal task.

Exploring tasks associated with predominantly male stereotypes (running, fishing task, mazes, math, throwing balls), gender differences are often, but not always, found among children and adolescents. Sutter and Rützler (2010) find that boys are more competitive than girls already among three year olds in Austria, whereas Savikhin (2011) find no gender difference in the choice to compete among 3–5 year olds in the US. Gneezy and Rustichini (2004) find that in Israel, 9–10 year old boys but not girls react to competitions by improving their performance. Exploring both children and adolescents in India, Andersen et al. (2013) find no gender difference at any age in a matrilineal society, whereas girls become less competitive than boys during puberty in a patriarchal society. Two other studies on adolescents both find that boys are more competitive than girls: Almås et al. (2012) find this to be the case in Norway, as do Booth and Nolen (2012a) in mixed sex groups in the UK. Only two studies thus far look at competitiveness in tasks that vary in gender stereotype. Contrary to the results suggested by studies on adults, tasks do not appear to matter neither for Swedish children aged 9–10 (Dreber et al. 2011), nor for Colombian and Swedish children aged 9–12 (Cárdenas et al. 2012). However, little is known about competitiveness among adolescents (16–18 year olds). Our results indicate that gender differences, varying by task, are present already among adolescents. This is an important group to study: during this short time span in life many important decisions are made, regarding for example educational track.

When it comes to risk preferences among adults, women are typically found to be less risk taking than men. Previous literature on children and adolescents finds either no gender gap (Harbaugh et al. 2002; Almås et al. 2012), or that boys are more risk taking than girls (Cárdenas et al. 2012; Eckel et al. 2012; Borghans et al. 2013; Sutter et al. 2013). However, context or sample also seems to influence the gender gap in risk taking (see, e.g., Booth and Nolen 2012b; Cárdenas et al. 2012; Gong and Yang 2012).

In a meta-analysis of adult altruism, Engel (2011) find that women are more altruistic than men. Previous literature on children and adolescents sometimes (Harbaugh et al. 2003; Gummerum et al. 2010) but not always (Benenson et al. 2007; Blake and Rand 2010; Almås et al. 2012; Eckel et al. 2011) finds that females are more altruistic.

3 Experimental setup

The study was conducted in nine school classes in five high schools in the Stockholm area during the fall of 2009. We contacted all schools in the cities of Stockholm, Uppsala and Västerås. Though we may have some selection regarding which schools that decided to participate, participation at the student level was compulsory. The school classes include a mix of different educational specializations. A total of 216 high school adolescents aged on average 17 years (min 15 and max 19 years old) participated in the study.[3] Half of the participants were female.

The experiment consisted of three parts, conducted in the classroom, using pen and paper. All participants faced the tasks in the same order: first the competitiveness tasks, then the altruism task, and finally the risk task. The experiment was conducted within a compulsory class and no show up fee was provided for participation. Participants were informed that each of the three parts consisted of a chance to earn money since one of the three parts would be randomly selected for payment, and the amount of money they could earn depended on the outcome of the choices they made in this part. After completing all parts the participants were given a survey with additional questions.[4]

Competitiveness is typically measured as either the change in performance in a competitive setting compared to a non-competitive setting, or as a preference for competition, such as self-selecting into a tournament instead of a piece-rate payment scheme. The competitive part of the experiment consisted of three different stages. In the first stage, a piece-rate scheme, the participants were told that they had two minutes to solve as many exercises as possible of the task, for which they would be given SEK 3 (corresponding to about USD 0.5) each. In the second stage, a tournament, the participants were again told that they would get two minutes to solve exercises, but that they now would be randomly paired with three other individuals[5] in the class who solved the same type of task, and that if they solved more or the same amount of exercises as these other individuals, they would get SEK 12 per exercise, whereas

[3]Among the participants, 56 attended the first year (57 % girls), 95 the second (51 % girls) and 50 the third year in high school (50 % girls). 15 students attended a mixed class with students from years 1 and 2 (47 % girls). For these students we have no information on which year they actually attended at the moment of the study.

[4]Participants earned on average about SEK 25. In comparison to previous studies on adults these incentives are small (see for example Niederle and Vesterlund 2007), while in comparison to similar studies on children the incentives are more important (see for example Cárdenas et al. 2012).

[5]When constructing this comparison group we made a random draw with replacement for each participant separately. This implied that a participant could be drawn for comparison more than once.

if they solved fewer exercises they would get SEK 0. In the third stage, the participants were told that they were to solve exercises for another two minutes, and that they now could choose whether they wanted to be given their payoff according to the piece-rate scheme or the tournament (where they would again compete against three random other individuals in their class). The participants did not get any feedback about their performance in any stage of the competitive task.

Performance is measured as the number of correct exercises solved. Our measure of reaction to competition is the absolute change in performance between the first and second stages. The choice in the third stage gives us a measure of competitiveness as a preference for competition. After the competitiveness task was over, we asked the participants to estimate where in the performance distribution of their class they believed themselves to be, for both the piece-rate scheme and the forced competition. This allows us to measure over-confidence as the discrepancy between performance beliefs and the actual performance of a participant. We focus on the relative performance beliefs from the forced competition since this is more competition specific. The elicitation of performance beliefs was not incentivized.

To vary the gender stereotype of the competitive task, the participants first completed all three stages of the competitiveness in a mathematical task and then in a verbal task. These tasks have previously been used as examples of tasks with opposing gender stereotypes.[6] The implementation of the competitive tasks, as well as the math task which involved adding a series of three two digit numbers, was inspired by the seminal paper by Niederle and Vesterlund (2007) and similar to the setup used in Cárdenas et al. (2012). The verbal task was a word search task, where participants were asked to find words of at least three letters in a box with rows and columns of letters. Words could be formed in any direction; horizontally, vertically and diagonally. Examples of the tasks can be found in the appendix.

After the competitive part, the participants took part in a dictator game, where they were asked to distribute SEK 50 between themselves and a well-known charity.[7] They were informed that if this part was selected for payment the money they gave to the charity would be sent by us to the charity at the end of the study. Having a charity rather than another participant as recipient might increase overall giving, as suggested by Eckel and Grossman (1996). The amount that the participants give to the charity is our measure of altruistic behavior.

The third and last part of the experiment measured risk preferences in two tasks. Our main measure of risk preferences consists of six choices where individuals choose between a lottery in the form of a coin flip that gives SEK 100 or 0 with equal probability and a safe option where the certain monetary amount increases successively over the six choices (from SEK 20 to 75). This measure is easy to understand for the participants. The constant probability diminishes problems with gender differences in probability weighting (e.g. Fehr-Duda et al. 2006) and this measure has also

[6] In one of our previous studies in Sweden, the math task has been rated as more boyish and the word task as more girlish by both genders (Cárdenas et al. 2012). Moreover, vocabulary knowledge is positively correlated with reading comprehension (Yovanoff et al. 2005).

[7] The charity was the Swedish section of "Save the children". We chose Save the Children since it is a large and well-established NGO in Sweden. Even if Save the Children does not explicitly focus or work on gender issues, there could be gender differences in perceptions of the charity.

been shown to be stable to changes in the list design (Bosch-Domènech and Silvestre 2012).

Our first measure of risk preferences relies on the point where the individual switches from preferring the lottery to preferring the safe option. This measure excludes inconsistent participants, i.e. participants with multiple switching points. 14 of our participants made inconsistent choices. When we analyze risk taking as the number of times a person chooses the risky option compared to the safe, we include subjects that made inconsistent choices. Using this measure of risk preferences in our analysis does not change the results. To further analyze risk preferences we also included a survey question where the participants were asked to self-report their general risk taking propensity on a scale from 0 to 10, where 10 is "very risk taking" and 0 is "not risk taking at all". Dohmen et al. (2011) compared these two measures of risk preferences and found them to be positively correlated. After the three parts of the study were conducted, a survey was included in order to measure performance beliefs, self-reported risk taking as well as other variables.[8] In the end, one part was randomly selected for payment and the money was handed out in private in cash to the participants.

To summarize; we analyze competitiveness as the performance change in a mathematical task and a verbal task and as the choice to compete or not in the two tasks, altruistic behavior via a dictator game, and risk preferences through incentivized choices over lotteries and safe options as well as self-reported risk taking. We further look at additional measures such as relative performance beliefs.

4 Results

This section consists of three parts. To simplify, we start by studying gender differences in competitiveness in the two tasks using the two measures of competitiveness. We then explore altruism, followed by an analysis of risk preferences. When exploring competitive preferences we control for relative performance beliefs and risk preferences.[9]

All tests of the means throughout the paper are analyzed using the non-parametric Mann-Whitney test and t-test. When comparing proportions between unmatched data we use a two-smaple test of proportions. Only the p-values for the Mann-Whitney tests and tests of proportions are displayed (since none of the variables are normally

[8] We collected a variety of variables (the full survey is available from the authors on request). In this paper we use class (year), birth month, height, GPA, and life satisfaction (scale 0–10).

[9] We also perform a regression analysis for each behavior using the control variables from the survey (class year, birth month, height, GPA, and life satisfaction). The female coefficient remains similar for all behaviors except altruism, where it is no longer significant. Most control variables are not significant. For those that are significant, we find the following correlations: altruism is negatively correlated with birth month (individuals born early are more altruistic) whereas it is positively correlated with class year and GPA. Risk taking is positively correlated with class year. Competitiveness as measured by the choice to compete in the verbal task is negatively correlated with GPA. For competitive performance change we also conduct a quantile regression on absolute performance change and find no gender gap in math or word search in any part of the performance distribution.

Table 1 Average performance, stage 1 and 2

	N	Math, stage 1	Math, stage 2	p-value	Word, stage 1	Word, stage 2	p-value
Boys	107	8.79	8.82	0.948	8.79	8.57	0.546
Girls	109[a]	7.31	7.44	0.510	8.74	8.61	0.542
p-value		0.010	0.020	–	0.524	0.952	–

[a]One girl had to leave the class room and therefore did not participate in the first part of the word task

distributed according to a Kolmogorov-Smirnov test) unless the tests differ in statistical significance, in which case results from t-tests are also reported. We have also compared whether the distributions for each reported variable differ between boys and girls using a Kolmogorov-Smirnov test. The results are similar to those reported for mean values. Results are reported to be significant if the two-sided test is $p < 0.05$, but we report the p-values throughout the results.

4.1 Competitiveness

In this section we explore competitiveness as measured by absolute performance change and as the choice whether to compete or not. Participants took part in both the mathematical task and the verbal task, with half of the classes randomly chosen to perform the math task first and the other half to perform the word task first. The order of the tasks does not influence our results. We also include an analysis where we control for relative performance beliefs and risk preferences.

4.1.1 Performance and choice

Table 1 compares the performance between boys and girls in the first stage (a piece-rate scheme) and the second stage (a tournament). Studying performance in each stage separately, boys perform significantly better than girls in math in both stages, whereas there is no gender difference in performance in the verbal task.[10]

When it comes to absolute performance change, our first measure of competitiveness, we find no increase in performance under the competitive compensation scheme for either gender. Neither boys nor girls react to the competitive environment by increasing their performance comparing the second and the first stage. This stands in contrast to most previous studies measuring performance change conducted elsewhere than Sweden, but is in line with another study from Sweden (Cárdenas et al. 2012). As a robustness check, we also analyze the relative performance change ((performance in stage 2 − performance in stage 1)/performance in stage 1). This does not alter our results. Thus, there is no significant gender gap in competitiveness with this measure in either task.

[10]Given that the gender gap in math performance in Sweden is small compared to many other countries (Guiso et al. 2008) this is a somewhat puzzling result. However, it might have to do with the specific sample of schools in our study.

Table 2 Shares choosing to compete in stage 3

Task\Gender	N	% competing math	N	% competing word	p-value
Boys	106	0.358	105	0.333	0.701
Girls	109	0.165	109	0.275	0.050
p-value	–	0.001	–	0.356	

Table 2 compares the proportion of boys with the proportion of girls choosing to compete in both the math task and the word task. We find a significant gender gap in math but not in word search, although the point estimate goes in the same direction for both tasks.[11]

In math, 36 % of the boys choose to compete compared to 17 % of the girls ($p = 0.001$). The corresponding numbers in word search are 33 % and 28 % respectively ($p = 0.356$).[12] This difference in gender gaps between the tasks is mainly due to girls choosing differently across the two tasks. The share of girls choosing to compete in the verbal task is significantly larger than the share choosing to compete in the math task ($p = 0.050$). Looking at boys, the share choosing to compete is stable across the two tasks ($p = 0.701$).

Given girls' lower average performance in the math task it may be optimal for girls to compete less than boys in our sample. We therefore calculated, based on performance in the stage two tournament, the winning probability of a specific participant if he or she chose to compete against three randomly chosen participants in his or her class. If this probability was 0.25 or more, the expected value of choosing to compete was equal to or larger than choosing piece rate. The result indicates that as many girls as boys should choose to compete (35 % versus 36 %). This result is mainly due to the fact that the gender representation across classes with different specializations is very skewed in many classes, with large majorities of boys or girls depending on track. The proportion of boys choosing to compete in the math task is not significantly different from the optimal proportion ($p = 0.959$) whereas girls compete less than optimally ($p = 0.002$). In the verbal task, girls ought to compete at a slightly higher rate than boys, but the difference is not significant ($p = 0.173$). As with the math task, the proportion of boys entering competition in the verbal task is not significantly different than the optimal level ($p = 0.768$), but girls enter at significantly lower rates ($p = 0.045$).

4.1.2 Relative performance beliefs and risk preferences

We found a gender gap in performance in the math task in each of the two stages separately. All or part of the observed gender gap in choice may be due to partici-

[11] One participant did not choose payment scheme for the third stage in math, and two did not perform in this stage. In the word task, two participants did not choose a payment scheme. When possible, these individuals are included in the analysis. Including or excluding these participants has no effect on the results.

[12] A sample size analysis indicates that 2037 observations would be needed to obtain a significant result for the gender gap in competition choice in word search. The basis for the power calculation is a significance level of 5 % and a power of 80 %.

pants incorrectly or correctly anticipating their probability of winning the tournament should they choose to compete.

We start by exploring confidence. Our measure of confidence is the difference between relative performance beliefs and actual relative performance, both in terms of quartile in the performance distribution. When assigning individuals to a quartile for actual relative performance, we divide each class into four equal groups (roughly equal groups when the class size cannot be divided by four) with 1 being the worst quartile and 4 being the best. In some cases several individuals performed equally across groups. Those individuals are given an expected quartile. For example, if four individuals perform similarly, and two needs to be assigned to the worst quartile and two to the second to worst quartile, these individuals all received the expected quartile 3.5.

Table 3 reports the number of correct guesses regarding relative performance, divided by task and gender. Relative to their performance, we find that girls are under-confident in both the mathematical and the verbal task (Math: $p < 0.001$; Word: $p < 0.001$), whereas there is some evidence that boys are under-confident in the mathematical task but not in the verbal task (Math: $p = 0.065$; Word: $p = 0.659$).[13] Comparing confidence in the two tasks, girls are as under-confident in the mathematical task as in the verbal task ($p = 0.851$). Boys, on the other hand, are more confident in the verbal task ($p = 0.041$). When we compare boys and girls, girls are significantly more under-confident in the verbal task ($p < 0.001$), and there is some evidence that girls are more under-confident in math ($p = 0.097$). This is interesting given that most studies on children and adults find that both genders are overconfident. However, in a study of confidence in math performance among 14-year old children in Sweden, Dahlbom et al. (2011) find that boys are overconfident and girls are under-confident.

Individual risk preferences as well as relative performance beliefs have previously been found to influence competitive choices (e.g. Niederle and Vesterlund 2007; Niederle and Yestrumskas 2008). Looking at risk preferences in our incentivized risk task, girls in our sample who self-select into competition are significantly more risk taking than other girls in both the mathematical task ($p = 0.049$) and the verbal task ($p = 0.004$). For boys, there is a significant difference in risk taking between those who compete and those who do not only in math ($p = 0.009$). However, exploring the self-reported risk measure, the only significant difference is when comparing boys choosing to compete or not in math ($p = 0.006$).

4.1.3 Regression analysis: gender gap in competitive choice

We also conducted a regression analysis analyzing the gender gap in competitive choices. We perform three regressions per task, with and without including control variables such as relative performance beliefs and risk preferences as can be seen in Tables 4 (math) and 5 (word) below. We analyze the full sample of individuals, however 45 participants (two classes) were not asked to state their performance beliefs

[13] A t-test indicates that boys are significantly under-confident in math ($p = 0.041$).

Table 3 Distribution of guessed ranks for men and women separately

Men	Guessed rank	Correct guess	% correct	Over-confident	Under-confident
Math					
1. Best	9	5	55	4	–
2.	23	9	39	8	6
3.	30	10	33	7	13
4. Worst	18	6	33	–	12
Total	80				
Word					
1. Best	11	3	38	8	–
2.	25	7	28	11	7
3.	30	13	43	8	9
4. Worst	14	6	43	–	8
Total	80				
Women	**Guessed rank**	**Correct guess**	**% correct**	**Over-confident**	**Under-confident**
Math					
5. Best	3	2	67	1	–
6.	16	4	25	8	4
7.	31	5	16	10	16
8. Worst	41	17	41	–	24
Total	91				
Word					
5. Best	1	1	100	0	–
6.	22	6	27	4	12
7.	46	13	28	9	24
8. Worst	21	10	48	–	11
Total		90			

The sample size in this table is smaller compared to previous tables since 45 participants (two classes) were not asked to state their performance beliefs regarding stage 2 performance

regarding stage 2 performance.[14] We thus also analyze a restricted sample excluding these individuals and those for whom we don't have all control variables. We report bootstrapped standard errors, clustered by school class, due to a small number of clusters.

In math, we find that controlling for actual individual performance diminishes the size of the observed gender gap with 27 % in the restricted sample and the coefficient

[14] Actual performance and beliefs about performance in the regression analysis is based on performance and relative performance beliefs in the second stage (the tournament). Using performance in the third stage instead of performance in the second stage does not qualitatively change our gender results. Since 14 participants were inconsistent in their choices in the risk task, the risk measure included here is the number of risky choices the participants make.

Table 4 OLS regression, dependent variable: choice to compete in math (= 1) or not (0)

Variables	Math (restricted sample)			Math (full sample)	
	1	2	3	4	5
Female	−0.191***	−0.140*	−0.058	−0.193***	−0.144**
	(0.062)	(0.077)	(0.070)	(0.052)	(0.063)
Performance		0.035***	0.014*		0.036***
		(0.006)	(0.008)		(0.006)
Beliefs			0.158***		
			(0.045)		
Risk			0.057***		
			(0.016)		
Constant	0.380***	0.063	−0.285	0.358***	0.042
	(0.055)	(0.087)	(0.087)	(0.045)	(0.072)
Observations	169	169	169	215	215
R-Squared	0.045	0.134	0.246	0.049	0.138

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors in parentheses (999 bootstrap repetitions). 45 (2 school classes) participants were not asked to state their beliefs about second stage performance, one participant did not answer the risk question and one did not choose payment scheme

Risk is measured as the number of risky choices

on female becomes only marginally significant (comparing the coefficients in regression 1 and regression 2 in Table 4). When comparing regression 1 with regression 3 in the restricted sample, i.e. also adding controls for relative performance beliefs and risk preferences, the effect of female diminishes with another 43 % of the original difference, and is no longer significant. Beliefs about relative performance account for 30 % points and risk preferences for the remaining 13 % points. This can be compared to the results reported in Niederle and Vesterlund (2007), who find that 27 % of the gender gap in tournament entry in their sample can be attributed to differences in relative performance beliefs. In our setting, the three control variables thus account for about 70 % of the gender gap found in regression 1. Including only beliefs about relative performance in the restricted sample, in addition to the gender dummy, renders the dummy insignificant and diminishes the coefficient on the dummy with more than 50 %. [15]

The gender gap in tournament choice in the verbal task is not significant, independent of whether we control for performance or not. Performance beliefs and risk taking are, as in math, positively related to choosing to compete in the verbal task.

[15] Including interaction variables between female and performance and female and performance beliefs do not provide further insights; the results do not alter.

Table 5 OLS regression, dependent variable: choice to compete in word (= 1) or not (0)

Variables	Word (restricted sample)			Word (full sample)	
	1	2	3	4	5
Female	−0.056	−0.053	0.066	−0.058	−0.058
	(0.089)	(0.085)	(0.089)	(0.071)	(0.070)
Performance		0.016***	−0.004		0.009**
		(0.005)	(0.004)		(0.004)
Beliefs			0.218***		
			(0.041)		
Risk			0.061***		
			(0.020)		
Constant	0.359***	0.222**	−0.319**	0.333***	0.254***
	(0.079)	(0.091)	(0.137)	(0.077)	(0.085)
Observations	167	167	167	214	214
R-Squared	0.003	0.02	0.184	0.004	0.01

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors in parentheses; 999 bootstrap repetitions 45 (2 school classes) participants were not asked to state their beliefs about second stage performance, one participant did not answer the risk question and two did not choose payment scheme

Risk is measured as the number of risky choices

Table 6 Altruism

	N	Average donation
Boys	107	23.20
Girls	109	29.32
p-value	–	0.014

4.2 Altruism

Girls are significantly more altruistic than boys in our sample of adolescents ($p = 0.014$). Girls give on average SEK 29 and boys SEK 23 out of SEK 50 to the charity that is the recipient in our dictator game, see Table 6.[16]

4.3 Risk preferences

Analyzing the incentivized risk task we corroborate most previous findings that boys are more risk taking than girls. The average certainty equivalent to the lottery with equal probabilities of winning 100 and 0 is 45.2 for boys. For girls the certainty

[16] A correlation analysis between all the behaviors we examine also shows that altruism is positively related to risk taking (as number of risky choices) in the incentivized risk task ($p < 0.001$), but not in the self-reported question. We also find no correlation between altruism and competitive choices ($p = 0.255$ for math and $p = 0.479$ for word). A similar pattern is found among boys and girls separately. See Appendix Table 8. Our regression results do not change if we include altruism as a control variable.

Table 7 Risk preferences

	N[a]	Average certainty equivalent	N	General risk
Boys	103	45.22	107	6.15
Girls	98	37.12	109	5.59
p-value	–	0.002	–	0.026

[a]One girl did not participate in this part and 14 participants (10 girls) made inconsistent choices (the gender difference is not significant: $p = 0.102$)

equivalent is significantly lower, 37.1 ($p = 0.002$), see Table 7.[17] Our second measure of risk taking, self-reported risk propensity, supports this pattern. On a scale from 0 to 10 boys rated their average risk propensity to 6.15, whereas girls averaged on 5.59 ($p = 0.026$). Our two risk measures are significantly positively correlated (Spearman's rho = 0.219, $p = 0.002$).

4.4 Summary of results

In sum, we find no gender gap in performance change when our participants are forced to compete. Boys and girls are equally likely to choose to compete in a verbal task, but boys are significantly more likely to choose to compete in a mathematical task. However, this gender difference diminishes and becomes insignificant when we control for relative performance beliefs. We also find that among adolescents, girls give more in a dictator game where the recipient is a charity, and that boys are more risk taking than girls.

5 Discussion

Gender differences in preferences are one potential explanation to the often observed gender gap in labor market outcomes. Here we study adolescents since they have received little attention in previous literature at the same time as adolescence is a period during which many important decisions are made that can have lifelong consequences. If gender dissimilarity in competitive domains arises already during adolescence, it may have important effects on educational segregation and consequently labor market outcomes through occupational segregation and the gender wage gap.

Previous literature shows that gender differences in competitiveness exist among adults in areas such as spatial and mathematical tasks, whereas a gender gap is not often found in tasks that are more associated with females, such as verbal tasks. In our sample of 16–18 year olds, we find no gender difference in performance change

[17]The result is qualitatively similar when analyzing the number of risky choices instead of the switching point in order to include individuals that switch back and forth between the lottery and the safe points. Girls are still less risk taking compared to boys ($p = 0.007$). Moreover, there is no gender difference in the variance of the incentivized risk taking variable ($p = 0.210$).

in either a mathematical task or a verbal task, comparing performance in a forced tournament to performance in a piece-rate scheme. However, female participants are significantly less likely than male participants to self-select into a competitive setting in the mathematical task, whereas there is no gender difference in the verbal task. Our results are thus in line with what is typically found among adults. An optimality analysis suggests that boys and girls should enter the competition at comparable rates also in the math task. This analysis assumes that the students are aware of their performance rank relative to other students in their class, which may not be the case since beliefs are not entirely correct. The gender difference in the choice to compete in the mathematical task is economically relevant, with a proportion more than twice as large among boys as among girls. However, the gender gap diminishes and becomes insignificant when we control for actual performance, relative performance beliefs and risk preferences, or beliefs only. Thus, the gender gap in competitiveness in the math task could potentially be caused by gender differences in confidence or optimism, and eliminated through for example performance feedback (as in Wozniak et al. 2010). We further find that adolescent girls are more altruistic and less risk taking than adolescent boys, corroborating the general findings on adults as well as some studies on children and adolescents. Including risk preferences and altruism as control variables do not change our results on competitiveness.

To what extent our results are generalizable to adolescents in other countries and settings are not clear, in particular since Sweden typically scores very high on gender equality (e.g. Hausmann et al. 2010) but at the same time has a high horizontal occupational segregation by gender compared to many other countries (e.g. Charles and Grusky 2004). More research is needed on adolescent samples in other countries, as well as more generally on when and why gender differences in preferences arise. Our results suggest that by increasing girls' confidence, we may see more girls take advanced math courses, which may lead to a larger share of females in traditionally male-dominated fields of education and, in turn, can lead to increased earnings and an increased probability of possessing a managerial position for women (this latter relationship has been shown by e.g. Joensen and Nielsen 2013). One way to increase girls' confidence in math is by increasing the confidence level in math of the female teachers (Beilock et al. 2010). Another way to increase the share of girls studying math is suggested by Joensen and Nielsen (2013) who find that increasing the flexibility of combining advanced math courses with other courses in high-school induced more Danish girls to take advanced math. If math is a path to a high powered career and gender differences in preferences for competition, varying by task, emerge in adolescent age, our study highlights the importance of teaching math with a larger variety of applications at early age. Math can be combined with and applied to a large variety of fields, not only traditional math fields such as Physics and Chemistry but also Humanities and Social sciences.

There are some results on competitiveness in different age groups and cultural settings among adults. Flory et al. (2010) investigate gender differences in competitiveness in different age groups in matrilocal and patrilocal villages in Malawi and find that men are more competitive only in patrilocal villages, where the gender gap is the largest among the youngest cohort in their sample (individuals aged 18–22) and then decreases and eventually disappears with age.[18] Mayr et al. (2012) find that among adults aged 25–75 in the US, men are more competitive in a mathematical task in all age groups. In our study we have only investigated one specific age group in Sweden, whereas an interesting extension would compare young children, adolescents and adults in the same study looking at competitiveness in different tasks.

Biological variables may also play a role. Adolescence is associated with hormonal changes in both boys and girls, and there is a burgeoning literature in economics suggesting that hormonal variables may affect economic decision making (e.g. Kosfeld et al. 2005; Apicella et al. 2008; Sapienza et al. 2009; Wozniak et al. 2010, Brañas-Garza and Rustichini 2011; Buser 2012; Schipper 2012; though see Zethraeus et al. 2009). How biological variables influence the gender gap in preferences among adolescents would thus be interesting to explore in future work.

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Appendix

These are example exercises, of a similar type as the participants encountered during the study.

Example math exercise: $10 + 83 + 56 =$ __________

Example word puzzle:

H	**U**	**N**	**D**	**E**	**F**
E	**T**	**A**	**T**	**Y**	**O**
U	Å	**T**	**S**	**T**	**B**
M	**V**	**T**	**O**	**R**	Å
S	**O**	**I**	**A**	**O**	**O**

[18] Matrilocality often refers to a society in which a married couple lives with or close to the wife's parents.

Table 8 Correlation matrix between altruism, risk preferences and competitiveness

	Altruism	Math choice	Word choice	Number of risky choices	
Altruism	1.000				
Math choice	0.153	1.000			
	0.118				
Word choice	0.008	0.113	1.000		
	0.935	0.252			
Number of risky choices	0.270	0.267	0.171	1.000	
	0.005	0.006	0.082		
Self-reported risk	−0.018	0.249	0.093	0.214	1.000
	0.796	0.000	0.177	0.002	

References

Almås, I., Cappelen, A. W., Salvanes, K. G., Sørensen, E., & Tungodden, B. (2012). *Willingness to compete: family matters*. Department of Economics, NHH, Discussion paper, 23/2012.

Andersen, S., Ertac, S., Gneezy, U., List, J., Maximiano, & Gender, S. F. (2013). Competitiveness and socialization at a young age: evidence from a matrilineal and a patriarchal society. *Review of Economics and Statistics*.

Apicella, C. L., Dreber, A., Campbell, B., Gray, P., Hoffman, M., & Little, A. C. (2008). Testosterone and financial risk-taking. *Evolution and Human Behavior*, *29*, 385–390.

Beilock, S. L., Gunderson, E. A., Ramirez, G., & Levine, S. C. (2010). Female teachers' math anxiety affects girls' math achievement. *Proceedings of the National Academy of Sciences of the United States of America*, *107*(5), 1860–1863.

Benenson, J. F., Pascoe, J., & Radmore, N. (2007). Children's altruistic behavior in the dictator game. *Evolution and Human Behavior*, *28*(3), 168–175.

Bertrand, M. (2010). In *New perspectives on gender. Handbook of labor economics, vol. 4, (Part b)* (pp. 1543–1590). Chap. 17.

Blake, P. R., & Rand, D. G. (2010). Currency value moderates equity preference among young children. *Evolution and Human Behavior*, *31*, 210–218.

Booth, A. L., & Nolen, P. J. (2012a). Choosing to compete: how different are girls and boys? *Journal of Economic Behavior and Organization*, *81*(2).

Booth, A. L., & Nolen, P. J. (2012b). Gender differences in risk behaviour: does nurture matter? *Economic Journal*, *122*(558), F56–F78.

Bosch-Domènech, A., & Silvestre, J. (2012). *Measuring risk aversion with lists: a new bias*. Barcelona GSE Working Paper Series, Working Paper #634.

Borghans, L., Golsteyn, B. H. H., Heckman, J. J., & Meijers, H. (2013). Gender differences in risk aversion and ambiguity aversion. *Journal of the European Economic Association*, *7*(2–3), 649–658.

Boschini, A., Dreber, A., von Essen, E., Muren, A., & Ranehill, E. (2012). *Gender and preferences: a study on a simple random sample of the Swedish population*. Working paper.

Brañas-Garza, P., & Rustichini, A. (2011). Organizing effects of testosterone and economic behavior: not just risk taking. *PLoS ONE 6*(12).

Buser, T. (2012). The impact of the menstrual cycle and hormonal contraceptives on competitiveness. *Journal of Economic Behavior & Organization*, *83*(1), 1–10.

Buser, T., Niederle, M., & Oosterbeek, H. (2012). *Gender, competitiveness and career choices*. NBER Working Paper Series, w18576.

Cárdenas, J.-C., Dreber, A., von Essen, E., & Ranehill, E. (2012). Gender differences in competitiveness and risk taking: comparing children in Colombia and Sweden. *Journal of Economic Behavior & Organization*, *83*(1), 11–24.

Charles, M., & Grusky, D. B. (2004). *Occupational ghettos: the worldwide segregation of women and men*. Stanford: Stanford University Press.
Croson, R., & Gneezy, U. (2009). Gender differences in preferences. *Journal of Economic Literature*, *47*(2), 1–27.
Cvencek, D., Meltzoff, A. N., & Greenwald, A. G. (2011). Math–gender stereotypes in elementary school children. *Child Development*, *82*(3), 766–779.
Dahlbom, L., Jakobsson, A., Jakobsson, N., & Kotsadam, A. (2011). Gender and overconfidence: are girls really overconfident? *Applied Economics Letters*, *18*(4), 325–327.
Datta Gupta, N., Poulsen, A., & Villeval, M.-C. (2011). Gender matching and competitiveness: experimental evidence. *Economic Inquiry*, *51*(1), 816–835.
Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J., & Wagner, G. G. (2011). Individual risk attitudes: measurement, determinants and behavioral consequences. *Journal of the European Economic Association*, *9*(3), 522–550.
Dreber, A., von Essen, E., & Ranehill, E. (2011). Outrunning the gender gap: boys and girls compete equally. *Experimental Economics*, *14*(4), 567–582.
Eckel, C., & Grossman, P. (1996). Altruism in anonymous dictator games. *Games and Economic Behavior*, *16*, 181–191.
Eckel, C., & Grossman, P. (2008a). Men, women and risk aversion: experimental evidence. In C. Plott & V. Smith (Eds.), *Handbook on experimental economics results* (pp. 1063–1071). New York: Elsevier.
Eckel, C., & Grossman, P. (2008b). Differences in the economic decisions of men and women: experimental evidence. In C. Plott & V. Smith (Eds.), *Handbook on experimental economics results* (pp. 509–519). New York: Elsevier.
Eckel, C. C., Grossman, P. J., Johnson, C. A., de Oliveira, A. C. M., Rojas, C., & Wilson, R. K. (2011). Social norms of sharing in high school: teen giving in the dictator game. *Journal of Economic Behavior & Organization*, *80*(3), 603–612.
Eckel, C. C., Grossman, P. J., Johnson, C. A., de Oliveira, A. C. M., Rojas, C., & Wilson, R. K. (2012). School environment and risk preferences: experimental evidence. *Journal of Risk and Uncertainty*, *45*(3), 265–292.
Engel, C. (2011). Dictator games: a meta study. *Experimental Economics*, *14*(4), 583–610.
Favara, M. (2012). *The cost of acting "girly": gender stereotypes and educational choices*. IZA Discussion Paper No. 7037.
Fehr-Duda, H., de Gennaro, M., & Schubert, R. (2006). Gender, financial risk, and probability weights. *Theory and Decision*, *60*(2–3), 283–313.
Flory, J., Leibbrandt, A., & List, J. (2010). *Do competitive work places deter female workers? A large-scale natural field experiment on gender differences in job-entry decisions*. NBER Working Paper Series, w16546.
Gneezy, U., & Rustichini, A. (2004). Gender and competition at a young age. *The American Economic Review*, *94*(2), 377–381.
Gneezy, U., Niederle, M., & Rustichini, A. (2003). Performance in competitive environments: gender differences. *The Quarterly Journal of Economics*, *118*(3), 1049–1074.
Gong, B., & Yang, C.-L. (2012). Gender differences in risk attitudes: field experiments on the Matrilineal Mosuo and the Patriarchal Yi. *Journal of Economic Behavior & Organization*, *83*(1), 59–65.
Grosse, N. D., & Reiner, G. (2010). Explaining gender differences in competitiveness: gender-task stereotypes. *Jena Economic Research Papers*, 2010–017.
Guiso, L., Monte, F., Sapienza, P., & Zingales, L. (2008). *Culture, Gender, and Math-Science*, *320*(2880), 1164–1165.
Gummerum, M., Hanoch, Y., Keller, M., Parsons, K., & Hummel, A. (2010). Preschoolers' allocations in the dictator game: the role of moral emotions. *Journal of Economic Psychology*, *31*(1), 25–34.
Günther, C., Arslan Ekinici, N., Schwieren, C., & Strobel, M. (2009). Women can't jump?—An experiment on competitive attitudes and stereotype threat. *Journal of Economic Behavior & Organization*, *75*(3), 395–401.
Harbaugh, W. T., Krause, K., & Vesterlund, L. (2002). Risk attitudes of children and adults: choices over small and large probability gains and losses. *Experimental Economics*, *5*(1), 53–84.
Harbaugh, W. T., Krause, K., & Liday, S. G. (2003). *Bargaining by children*. Unpublished manuscript, University of Oregon.
Hausmann, R., Tyson, L., & Zahidi, S. (2010). The global gender gap report. *World Economic Forum. Geneve*.
Joensen, J. S., & Nielsen, H. S. (2013). *Math and gender: is math a route to a high-powered career?* IZA Discussion Paper 7164.

Kosfeld, M., Heinrichs, M., Zak, P. J., Fischbacher, U., & Fehr, E. (2005). Oxytocin increases trust in humans. *Nature*, *435*, 673–676.

Mayr, U., Wozniak, D., Davidson, C., Kuhns, D., & Harbaugh, B. (2012). Competitiveness across the life span: the feisty fifties. *Psychology and Aging*, *27*(2), 278–285.

Nosek, B. A., & Smyth, F. L. (2011). Implicit social cognitions predict sex differences in math engagement and achievement. *American Educational Research Journal*, *48*(5), 1125–1156.

Niederle, M., & Vesterlund, L. (2007). Do women shy away from competition? Do men compete too much? *The Quarterly Journal of Economics*, *122*(3), 1067–1101.

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

Niederle, M., & Yestrumskas, A. H. (2008). *Gender differences in seeking challenges: the role of institutions*. NBER Working Paper Series, w13922.

Örs, E., Frederic, P., & Eloic, P. (2008). *Performance gender-gap: does competition matter?* CEPR Working Paper 6891.

Sapienza, P., Zingales, L., & Maestripieri, D. (2009). Gender differences in financial risk aversion and career choices are affected by testosterone. *Proceedings of the National Academy of Sciences of the United States of America*, *106*, 15268–15273.

Savikhin, A. (2011). *Is there a gender gap in preschoolers' competitiveness? An experiment in the U.S.* Mimeo.

Schipper, B. C. (2012). *Sex hormones and choice under risk*. Mimeo.

Shurchkov, O. (2012). Under pressure: gender differences in output quality and quantity under competition and time constraints. *Journal of the European Economic Association*, *10*(5), 1189–1213.

Sutter, M., & Rützler, D. (2010). *Gender differences in competition emerge early in life*. IZA Discussion Paper 5015.

Sutter, M., Kocher, M. G., Rützler, D., & Trautmann, S. T. (2013). Impatience and uncertainty: experimental decisions predict adolescents' field behavior. *The American Economic Review*, *103*(1), 510–531.

Wozniak, D., Harbaugh, W., & Mayr, U. (2010). *Choices about competition: differences by gender and hormonal fluctuations, and the role of relative performance feedback*. MPRA Paper 21097.

Yovanoff, P., Duesbery, L., Alonzo, J., & Tindal, G. (2005). Grade-level invariance of a theoretical causal structure predicting reading comprehension with vocabulary and oral reading fluency. *Educational Measurement, Issues and Practice*, *24*(3), 4–12.

Zethraeus, N., Kocoska-Maras, L., Ellingsen, T., von Schoultz, B., Lindén Hirschberg, A., & Johannesson, M. (2009). A randomized trial of the effect of estrogen and testosterone on economic behavior. *Proceedings of the National Academy of Sciences of the United States of America*, *106*, 6535–6538.

Zhang, J. (2010). *Do girls in China compete just as much as boys? Evidence from an experiment that predicts educational choice*. Mimeo.