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Differences in Competitiveness at a Young Age: An Experiment

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Declaration of Authorship

The author hereby declares that he compiled this thesis independently, using only the listed resources and literature.

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Prague, May 17, 2013

Signature

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Abstract

In current world we can observe a substantial gender gap in the labor market as women tend to earn considerably less than men. One of the possible explanations of the wage gap might be the gap in the competitivness. Recent experimental economic literature has shown that there are differences between men and women in the preference to compete. In this study I explore competitiveness among children from the Czech Republic. Using a field experiment with a real task, I found that both boys and girls react to the competitive environment, but boys do compete significantly more than girls indicating a presence of the gender gap. On the contrary, age, number of siblings and activities, and education of parents do not affect the performance under competitive scheme.

JEL Classification	C93, D03, J16
Keywords	competitiveness; gender differences; experiment; children

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Abstrakt

V současném světě můžeme pozorovat značný rozdíl mezi pohlavími na trhu práce, jelikož ženy mají sklon vydělávat významně méně než muži. Jedním z možných vysvětlení rozdílu ve mzdách může být rozdíl v soutěživosti. Současná experimentální ekonomická literatura ukazuje, že je mezi muži a ženami rozdílný zájem soutěžit. V této práci zkoumám soutěživost mezi dětmi z České republiky. Za použití terénního experimentu s reálným úkolem jsem zjistil, že chlapci i dívky reagují na soutěživé prostředí, ale chlapci soutěží významně více než dívky. Na druhou stranu, věk, počet sourozenců či mimoškolních aktivit a vzdělání rodičů neovlivňují výkon při soutěživém schématu.

Klasifikace	C93, D03, J16
Klíčová slova	soutěživost; rozdíl mezi pohlavími; experiment; děti

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Seznam odborné literatury

Andreoni J, Vesterlund L. (2001). „Which is the fair sex? On gender differences in altruism,“ Q. J. Econ. 116:293–312

Bertrand, Marianne and Hallock, Kevin (2001). „The Gender Gap in Top Corporate Jobs.” National Bureau of Economic Research (Cambridge, MA) Working Paper No. 7931

Booth, Alison L. and Patrick J. Nolen (2009). „Choosing to compete: How different are girls and boys?” IZA Discussion Paper 4027.

Gneezy, Uri and Aldo Rustichini (2004). „Gender and competition at a young age,” American Economic Review, 94(2): 378–381

Niederle, Muriel and Lise Vesterlund (2007). „Do women shy away from competition? Do men compete too much?” Quarterly Journal of Economics, 122(3): 1067–1101.

Niederle, Muriel, Vesterlund, Lise (2008). „Gender differences in competition," Negotiation Journal 24 (4), 447–463.

Jurajda S., Münich D. 2008. „Gender gap in admission performance under competitive pressure." CERGE-EIWork. Pap. wp371, Cent. Econ. Res. Grad. Educ.–Econ. Inst., Prague

Předběžná náplň práce

Jaké faktory vysvětlují rozdíly v soutěživosti v dětském věku? Je to pohlaví, počet sourozenců, rodinné prostředí, věk, vzdělání rodičů? Jsou děti více soutěživé, když vítěz dostane odměnu? Odpovědi na tyto otázky nám můžou pomoci odkrýt, čím se odvozuje úspěch či neúspěch dětí jak v současnosti, tak i v budoucnosti.
V této práci budu pozorovat vzorek dětí z Prahy (CZ) v soutěžní disciplíně a pomocí regresní analýzy se pokusím odpovědět na výše položené otázky.

Osnova:
1. Úvod
2. Konstrukce experimentu
3. Výsledky
4. Závěr

Předběžná náplň práce v anglickém jazyce

What drives differences in competitiveness at a young age? Is it gender, number of siblings, family background, age, parent's education? Are children more competitive when payoffs are promised to the winner? Answers to these questions could help us analyze what derives the success or failure of children, both in the present and in the future.
In this study I will observe the sample of children from Prague, Czech Republic, in a competitive activity and using regression analysis I will attempt to answer these questions.

Outline:
1. Introduction
2. Experimental design
3. Results
4. Conclusion

1 Introduction

A substantial gender gap in the labour market is a well documented phenomenon. Bertrand and Hallock (2001) examined top five highest-paid employees in every large firm in the USA annually. The dataset included more than 42,000 executive-year observations between the years 1992 and 1997. Their results demonstrated that women earned about 45 % less than men. Also, women represented only 2.5 % of the sample and they were less likely to be employed in larger corporations. The same dataset was used in Burress and Zucca (2004) with similar conclusion. Blau and Kahn (2000) demonstrated that women were catching up since the 1970s, yet the reduction of the gender gap slowed down in 1990s indicating that it is unlikely to disappear completely. Bell (2005) using the data from 2,194 US firms in period from 1992 to 2003 confirmed the persistence and narrowing of the gender gap – according to this study, women earned from 8 % to 25 % less than their male counterparts after controlling for firm‘s size, occupational title and industry. In addition, the gender gap in pay was smaller in firms with woman in the Board. Even one of the most gender equilitarian country, Denmark[1], struggle with the gender differences as well. Smith et al. (2011) documented that even though gender gap reducing policy was introduced in the 1960s (e.g. public childcare), only 5 % of CEOs in 2005 were women (compared to 3 % in 1996). Authors examined the 2000 largest Danish corporations in the period 1996-2005 and found a significant gender gap as top executive women earned 31 % - 35 % less. On the contrary to the previous studies, the difference in Denmark was not disappearing during this time period.

The gender gap is not caused by lower education of women or lower level of female labor force participation as both indicators are presently very similar for both genders in most of the western countries. In growing economic experimental literature as one of the contributing factors is given that women shy away from competition whereas men compete too much (Niederle and Vesterlund, 2007). Other studies examined the male and female performance in competitive environment. Gneezy and Rustichini (2004) in field experiment among 9 - 10 years old children

[1] Denmark scored the third lowest gender inequality index in 2011 according to the UN Human Development Report 2011 (p139) available at http://hdr.undp.org/en/media/HDR_2011_EN_Complete.pdf

found statistical evidence that boys under competitive scheme improved and girls did not. The support for this result can be found also in evolutionary biology. Among many species, the males must fight in fierce competition in order to ensure a mate. Females, on the other hand, are choosy and waiting for the winner of the competition (Knight, 2002). On the contrary, Dreber et al. (2009) did not replicate results among 7 - 10 years old Swedish children as boys and girls improved equally.

In my study, inspired by Gneezy and Rustichini (2004), I try to find the gender difference among 5 - 12 years old children from Prague, Czech Republic. I run a field experiment during regular scout group meetings in order to provide a familiar background. Participants were asked to solve a real task as in Gneezy and Rustichini (2004) or Dreber et al. (2009), but instead of running, I choose more neutral, but not girlish, task – building a tower from LEGO® bricks. I did not choose running as it is dominantly boy task. Steele (1997) suggested that there might be a „stereotypical threat in the air"– the females perform worse, because it is expected that male will prevail. In many studies this threat was denoted as a reason why women in mixed groups compete less than men (see Gneezy et al., 2003).

Competitiveness is measured in the following way. First, the participants build the tower individually. Their performance is measured as time in seconds. Then, based solely on performance, pairs are created and participants are asked to accomplish the same task, but in pairs. The competitiveness is measured as time difference between the individual performance and performance in the pair. A separate control group is created as in Gneezy and Rustichini (2004) and Dreber et al. (2009). Children in this group perform task alone for the second time in order to control for otherwise unobservable effects as learning. During and after experiment, several non-experimental data (gender, age, number of siblings, number of after-school activities, and education of parents) were collected in order to identify the determinants that affect competitiveness.

My primary expectation was to replicate the findings of Gneezy and Rustichini (2004) – boys will outperform girls in competitive environment, but performance will be similar under non-competitive scheme. I also anticipated that older participants with more siblings and after-school activities and more educated parents will be more competitive. In addition, I expected that competitor's gender will alter the results.

I find evidence that both boys and girls respond to the competitive environment with stronger male reaction – boys on average scored better time in both

rounds despite the fact that the time change is strongly dependent on the time from the first round. Age, number of siblings and after-school activities have very limited and statistically insignificant effect on competitiveness. In addition, participants don't respond to the gender of the competitor. The effect of parental education is somehow opposite than expected – children with *more* educated parents compete *less*. However, several issues are linked with the result of education. See conclusion for further discussion. Moreover, no gender differences in such factors as learning is observed as mean times from both rounds of the control group are similar.

My results partially support evidence found by Gneezy and Rustichini (2004) – boys do outperform girls under competitive scheme while no significant difference was found in the first round. On the contrary, in my experiment both boys *and girls* have improved with almost no link to the gender of the competitor. This contradiction might be explained by higher neutrality of my task and, as Dreber et al. (2009) suggested, Czech Republic has a lower gender inequality index than Israel[2]. Furthermore, my study is consistent with Sutter and Rützler (2010) – competitiveness is not affected by age in this particular era of life.

The rest of the paper is organized as follows. In Section II summary of existing experimental literature on topic of gender differences is given. Section III contains the description of the experiment, subjects and data collected. The models used and results are discussed in Section IV, while Section V concludes.

[2] Czech Republic occupied 17th rank in gender equality index, whereas Israel 22th. For futher details see http://hdr.undp.org/en/media/HDR_2011_EN_Complete.pdf.

2 Literature review

This experiment was initiated by Gneezy and Rustichini (2004). They showed on sample of 140 Israeli children aged 9 - 10 difference between boys and girls in competitive and non-competitive environment. During physical education classes, time was measured as children were running on 60 meters long track. The procedure was as follows. First, every child ran the track by itself. Second, the pairs were created according to time achieved. Then, the children ran the same track in pairs. A separate group of children (24) was created and ran the track alone also for the second time. This group controlled for otherwise unobserved effects in order to compare the results in competitive and non-competitive environment. Under no competition scheme (every child ran by itself), boys and girls perform approximately the same. In the competitive environment boys significantly improved their performance while girls on average perform worse.

Dreber et al. (2009) discuss the results found by Gneezy and Rustichini (2004). Dreber et al. (2009) ran the similar experiment as Gneezy and Rustichini (2004) in Sweden among 7 - 10 years old children and add to the running 2, more "girlish", sports – dancing and skipping rope. When children were running, the performance of the boys increased same as in Gneezy and Rustichini. However, when children were skipping rope or dancing, no gender difference was found in reaction to competitiveness – one of explanation given was that Sweden has more gender neutral culture and history than Israel. Their results indicate that the cultural factors may correlate with performance under competitiveness even among Western countries.

Other studies suggest a significant difference can be found between man's and woman's willingness to compete. Niederle and Vesterlund (2007) examined in discrimination-free environment if gender differences may still occur. They ran an experiment among 80 adults (40 men and 40 women), where participants were assigned to solve a real task (adding 2-digit numbers). In one part of the experiment, the participants were asked to choose between tournament (competitive environment) and piece rate (non-competitive environment) scheme. While no differences in performace were found, twice as many men decided to pick the tournament scheme over the piece rate suggesting that "women shy away from competition and men compete too much" (Niederle and Vesterlund 2007, p1091).

These results are consistent with findings of Gneezy et al. (2003), where 324 students from an Israeli engineering university were asked to solve mazes. The groups of six students were made, either all male/female or equally mixed (3 men and 3 women). While men always reacted to the tournament scheme, women did not improve their performance in tournaments. However, this statement held for mixed tournaments only. In single-sex groups, females were able to slightly improve under competitive scheme.

Datta Gupta et al. (2005), inspired by Gneezy et al. (2003), asked the 240 undergraduate students (119 men and 121 women) to solve the mazes in their experiment as well. In addition, aversion to the risk was measured. Also, as a robustness check the payoffs were increased for a separate group – as a result, women entered the tournament more frequently, but the gender gap persisted. The results of the study were the same as in Niederle and Vesterlund (2007) or Gneezy et al. (2003) – women were less likely to choose a competitive scheme and they were affected by their risk aversion. On the other hand, only external factors (like co-participant's gender) were important to men when choosing payment scheme.

The role of socioeconomic background also matters when it comes to the willingness to compete. Almas et al. (2012) ran a controlled lab experiment with similar setup as Niederle and Vesterlund (2007) in Norway, country with the lowest UN gender inequality index. A large sample of 524 Norwegian participants aged 14 - 15 were asked to add up sets of 2-digit numbers. In case of 505 participants, detailed family background was known. Two important results were stated in the paper. First, children from poor families with less educated parents had lower propensity to compete (even when controlling for such factors as confidence, risk preferences etc.). Second, no difference was observed within the group with low income and less educated parents while boys from high socioeconomic background were much more willing to compete than girls with the same background.

At what age the gender gap in competitiveness is created? This might be a very interesting question since the gap was observed among adults and college students (see Niederle and Vesterlund, 2007; Gneezy et al., 2003; Datta Gupta et al., 2005; Gneezy et al., 2009), 14 – 15 years old Norwegian teenagers (Almas et al. 2012), Israeli younglings aged 9 - 10 years (Gneezy and Rustichini 2004) or 7 - 10 years old Sweden children (Dreber et al. 2009). Sutter and Rützler (2010) ran a large-sample (1,035 participants) experiment among German children and teenagers aged 3 - 18 years. For younger participants (age 3 – 8 years), the running task as in Gneezy

and Rustichini (2004) was used. The only difference between the Gneezy and Rustichini (2004) and Sutter and Rützler (2010) setup was that all participants could choose whether they want to compete or not in the second round. The older participants (9 – 18 years old) faced the task of adding numbers as in Niederle and Vesterlund (2007) and corresponding setup. However, authors did not find the starting age in which gender gap is created – the difference in willingness to compete was found even among three years old children and its size was similar for all age groups.

The effect of positive discrimination (or affirmative action) was studied in Niederle et al. (2008). 84 participants (42 men and 42 women) attended the controlled lab experiment. The setup used was analogous to the setup in Niederle and Vesterlund (2007) with one task added – an Affirmative Action tournament, where in groups of six 2 participants won instead of 1. The winners were highest performing women and the highest performers of the rest of the group. This quota ensured that at least one woman was victorious. However, this setup only changed the gender composition of participants entering the tournament (more women were willing to enter the tournament), but the number of high-performing individuals remained roughly unchanged as some high-performing man dropped out from the tournament.

The role of nature and information on relative performance was analyzed in Wozniak et al. (2010). On sample of 172 females and 173 males, the similar framework as in Niederle and Vesterlund (2007) and Günter et al. (2010) was used – adding 2-digit numbers and word creation. In addition, in Wozniak et al. (2010), participants were informed about relative performance and the phase of menstrual cycle was examined. As a result, highly performing women chose to enter more often. On the contrary, a lesser percentage of highly performing men decided to enter tournament. The poorly performing individuals, when facing the information about their results, entered the tournaments less likely (both men and women). Moreover, women in low hormonal phase of their menstrual cycle tended to select non-competitive scheme (random group at most) over tournaments in comparison to the women in non-low hormonal phase, where tournaments were most desired option. However, as the study concluded, the hormones were not the only explanation of the gender gap as it was present even between females with high hormonal level and males.

An alternative perspective is given in Günter et al. (2010). On sample of 24 male and 24 female students of different majors, the results were duplicated for the

task of solving the maze while in the verbal task (writing as many words possible starting with the same letter) no gender gap was found. Therefore the maze task was labeled as male task, whether the verbal task was denoted as neutral task. The study suggested a stereotypical threat as "being competitive in itself is regarded as stereotypically rather male, and in addition, being competitive in "male settings" for women still includes a negative stigma of being "bitchy""(Günter et al. 2010, p. 400).

More evidence that women's willingness to compete might not be inborn genetical competency but rather learned social norm is given in Booth and Nolen (2009) or Gneezy et al. (2009). In Booth and Nolen (2009) subjects of experiment were 260 students just under 15 years old from single-sex (66 from 2 all-girl schools and 46 from 2 all-boys schools) and coeducational schools (148 from 4 schools). The similar experimental setup with mazes was used as in Datta Gupta et al. (2005) and Gneezy et al. (2003). Their experimental evidence confirmed some of the findings of the aforementioned studies (e.g. the boys choosed to enter the tournament more than a girls), but also added some more: The girls from single-sex schools acted more like boys from coeducational school – they choosed the tournament scheme more than girls from a coeducational school even against boys and on average were as willing to compete as boys from coeducational school. Although no disscusion about choosing the school is provided (there might be some unobserved effect in school selection and preferences, therefore only some types of girls chose the single-sex schools), the results should be taken into consideration.

Gneezy et al. (2009) studied the patriarchal society (Massai tribe in Tanzania) and matrilinear society (Khasi tribe in India). In controlled field experiment with a real task of throwing a ball into the bucket, 155 participants (80 Khasi and 75 Massai) could choose whether they wanted to perform alone or compete in pair. The patriarchal Massai tribe's willigness to compete followed the similar patern as in western countries – roughly twice as many men (50 %) than women (26 %) entered the tournament scheme. On the other hand, in the matrilinear society of Khasi tribe, more women (54 %, compared to the 39 % of men) chose the competitive environment. Even though authors cautioned that several important factors vary between the tribes and that the sample is limited by number of villages, the results could be important in order to understand the gender gap.

Jurajda and Münich (2008) studied the relationship between gender and successfull admissions to the universities in the Czech Republic. As the admission procedure to the Czech universities is very stressfull competitive environment with

high payoffs (the possibility of obtaining the tertiary education), it is ideal for testing for gender differences in competitiveness. First, no difference was observed in applying to more competitive programs. Second, women tended to perform equally well as men when the admission rate was rather high, but in the most competitive environments (admission rate below 19 %) women were less likely to be accepted.

Competitiveness is not the only gender gap issue examined by experimental literature – various gender differences were found in numerous studies. I list a few in order to gain a more comprehensive picture in understanding the gender gap. Andreoni and Vesterlund (2001) examined the link between gender and altruism. In controlled lab experiment 142 college students were assigned to play modified dictator game. The simple statement that one gender is more kind than the other was not given. As the data showed, the answer was not so straightforward. According to this study men were more likely altruistic when it was cheap. Women were kinder than men when altruism was expensive. In other words, men tended to be perfectly selfish or selfless whether women had a tendency to share equally.

In Dreber and Johannesson (2007), authors found in controlled experiment that men were more likely to lie than women in order to secure a better financial outcome. Women have also tended to lose in first-price auctions (see e.g. Chen et al. 2013), which can be consistent with risk averse behaviour. On the contrary, when second-price auctions were used, no gender gap was found (Chen et al. 2013).

3 Experimental design, data and sample description

3.1 Experimental design

I conducted an experiment in which participants had to solve a real task, first in non-competitive scheme and then in competitive environment. The experiment has similar design as the one used in Gneezy and Rustichini (2004) and Dreber et al. (2009). The participants in my experiment were assigned to build a tower from 15 identical LEGO® bricks. The measured variable was time, the task was to build the tower as fast as possible.

The experiment was conducted during regular scout groups' meetings. The task didn't diverge from standard activities of scout organization. The precise procedure was as follows: Participants were asked to build the LEGO® tower twice. First, every participant built the tower alone, with me measuring their time. Subsequently I ranked the participants from the fastest to the slowest. Then I matched the participants in pairs, starting with the two fastest, then the third and fourth fastest to the last but one slowest and the slowest. The only relevant factor in matching pairs was the time achieved. When the number of participants was an odd number, the three slowest matched in triplet. When more than two children had the identical time, the match was decided randomly. After matching was complete, each pair of participants had to build the same tower. This time they were building the tower next to each other, so they could confront their performance with the performance of the second member of the pair. Only the experimenter and maximum of two (three) competitors were present in the room during the performance of the real task so as to prevent the possible effect of "embarrassment" or "show-off". A separate group of participants built the tower alone as the first time. I will refer to this group as to the control group further in the text. The group was created in order to control for otherwise unobservable effects as learning (in other words, if participants from this group will be faster in the second round, the improvement is not due to competition but because e.g. learning). Participants of this group were selected at each meeting. I used the data collected after first round in order to create the representative sample from all observations – I wanted to have the approximately same proportion of boys,

girls, age and number of siblings' categories as in the whole group. The instructions are listed as appendix.

Participants came to know their time from the previous round as well as the time of the other member of their pair right before the second round. Participants didn't know they were involved in an experiment as the experiment didn't diverge from standard activities. No rewards or other material compensation were promised to the participants and no rewards or other material compensation were distributed after the end of the experiment.

When participants finished the first tower, I asked them about their age, number of siblings and number of after-school activities. Moreover, a questionnaire was sent to the parents of each participant. Questions in the questionnaire are focused on the number of participant's siblings and their age, mother's education, father's education, age of the participant and number of after-school activities of the participant. When the answers from a participant and his/her parents varied, I chose the answer from the parents' questionnaire. The answers both from a participant and his parents will be used in analysis as variables of competitiveness.

3.2 Sample description

The subjects come from 6 different scout groups located in Prague, the capital city of the Czech Republic. 2 out of 6 groups have been gender heterogenous, rest is gender homogenous – 3 groups are female groups and 1 group is a purely male group. The participants of the experiments were children attending mostly primary schools. The youngest participant was 5 years old and the oldest one was 12 years old. The median age was 8 years. All participants simultaneously were members of the scout organization in Prague. The total number of participants is 67: 40 girls and 27 boys.

After the experiment, the questionnaires were sent to the subjects' parents to fill for missing non-experimental variables, particularly the education of both parents. Out of 67 possible, 38 questionnaires were collected.

3.3 Experimental and non-experimental data

Three variables were collected as experimental data – time in the first round, time in the second round and time change between second and first round. All three variables were measured in seconds.

Several non-experimental variables were gathered during the experiment – gender, age, number of older siblings, number of younger siblings, number of after-school activities, gender of the participant's competitor, mother's education and father's education. In my analysis, I create a dummy variable for high parental, father's and mother's education. I define the high education as obtaining at least a Master degree (in case of parental education, at least one parent obtained Master's degree).

You can find complete summary of descriptive statistics in Table 1.

TABLE 1 - SUMMARY OF THE VARIABLES

Variable name	Number of observations	Mean	Standart deviation	Minimum	Maximum	Units
Time in the first round	67	41.71045	13.56554	22.8	82	seconds
Time in the second round	67	36.79552	10.79173	19.8	65.1	seconds
Time change	67	-4.914925	9.882035	-28.6	16.1	seconds
Age	67	8.089552	1.378749	5	12	years
Number of older siblings	67	.761194	.760573	0	3	number
Number of younger siblings	67	.9104478	.9330845	0	4	number
Boy	67	.4029851	.4941997	0	1	1 if boy, 0 otherwise
Partner Boy	54	.4259259	.4991257	0	1	1 if boy, 0 otherwise
Number of activities	67	2.238806	1.425839	0	9	number
Parental education	38	.6052632	.4953554	0	1	1 if high education, 0 otherwise
Father's education	38	.4736842	.5060094	0	1	1 if high education, 0 otherwise
Mother's education	38	.5263158	.5060094	0	1	1 if high education, 0 otherwise

4 Results

4.1 Time in the first round

I start the analysis with the time achieved in the first round. Since the conditions during first round were identical to every participant, I can include all observations. The time from the first round is depicted in the Figure 1 as distribution histogram split by gender and Table 2 shows the precise results. The boys perform slightly better in the first round with mean time of 41.15 seconds. This outcome was expected as boys are more likely to play with the LEGO® bricks. An average girl achieves time 42.09 seconds. Using the nonparametric two-sample Wilcoxon rank-sum (Mann-Whitney) test based on ranks, no statistical evidence of difference between boys and girls was found (p = 0.6546). Note that the statistical insignificancy is consistent with findings of Gneezy and Rustichini (2004) or Dreber et al. (2009). Also, I found no difference between individuals from the control group and rest of the participants (p = 0.6119). Table 3 shows the results distributed by scheme used in the second round.

TABLE 2 - SUMMARY OF THE TIMES IN THE FIRST ROUND BY GENDER

Sex	Number of observations	Mean	Standart deviation of mean
Girls	40	42.0875	2.117129
Boys	27	41.15185	2.705694
Total	67	41.71045	1.657295

4.1.1 What drives the time in the first round?

Next, I study what influences the time in the first round. I use the OLS linear regression model with robust standard errors for the analysis. Table 4, columns 1, 2, 3, summarize the results.

The most statistically significant determinant appeared to be age of a participant – the older the participant is, the better time he/she scored. This result was strongly expected since the younger children have not fully developed their motor skills yet (see e.g. Thelen, 1995).

TABLE 3 - SUMMARY OF THE TIME IN THE FIRST ROUND BY SECOND ROUND SCHEME

Second round scheme	Number of observations	Mean	Standart deviation of mean
Competition	54	41.47593	1.868083
No-Competition	13	42.68462	3.706073
Total	67	41.71045	1.657295

The sex of the participant also played its part – I found statistical evidence that boys score a better time than girls. Note that this is inconsistent with a rank-sum test – the possible explanation is that gender is significant when controlled for other variables (e.g. age). In other words, in competition between a boy and a girl of the same age, the boy will probably prevail. As I mentioned above, it is more likely that boys play more with the LEGO® bricks than girls.

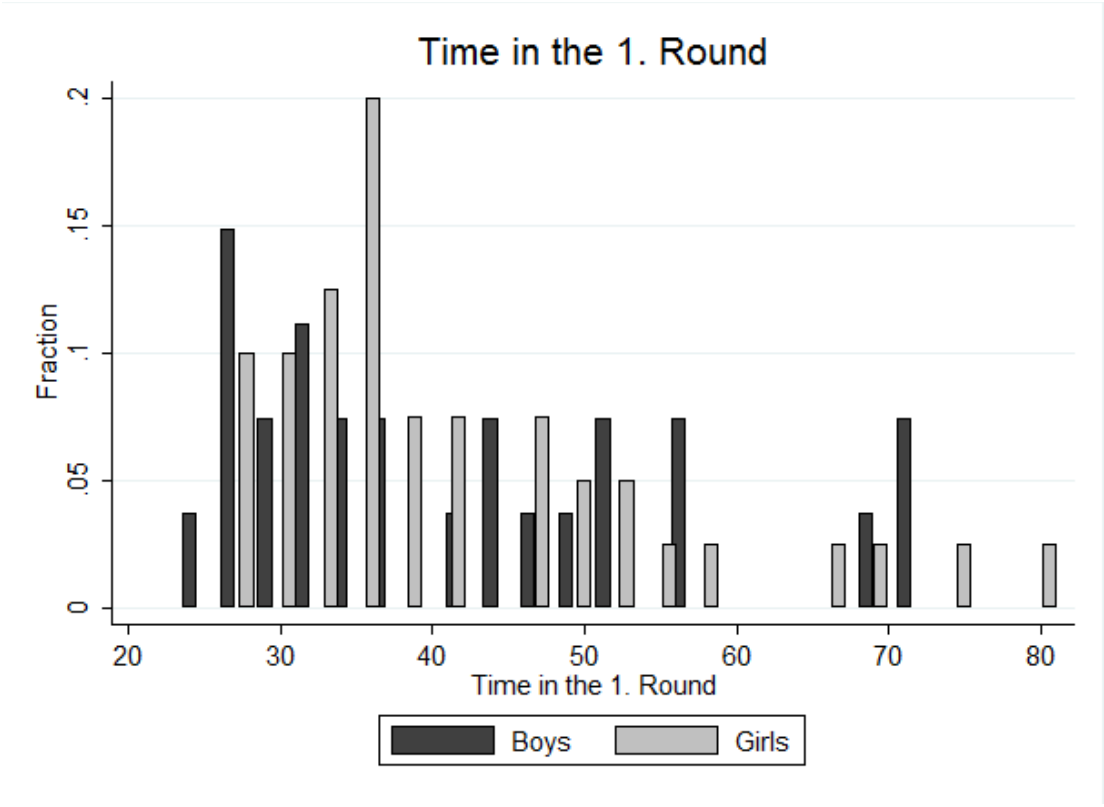

Figure 1. Distribution of times in the first round, by gender

I expected that children with more after-school activities will perform better as their motor skills should be more developed. However, this expectation emerged to be false – number of after-school activities is largely insignificant.

TABLE 4 - THE ROLE OF GENDER, AGE AND FAMILY BACKGROUND

VARIABLES	(1) Time in the first round	(2) Time in the first round	(3) Time in the first round	(4) Time in the first round	(5) Time in the first round	(6) Time in the first round
Boy	-7.96*	-8.10*	-7.96*	-8.08	-8.33	-7.75
	(4.720)	(4.675)	(4.702)	(5.542)	(5.673)	(5.880)
Age	-4.13***	-4.14***	-3.74***	-4.71**	-4.53**	-4.48**
	(0.944)	(0.938)	(0.865)	(1.947)	(1.982)	(2.066)
No of activities	-0.52	-0.66	-0.80	-0.46	-0.47	-0.14
	(0.919)	(0.815)	(0.834)	(1.658)	(1.679)	(1.621)
No of younger siblings	-0.30					-1.57
	(1.548)					(2.246)
No of older siblings	1.01					1.74
	(2.124)					(2.463)
Total no of siblings		0.14		0.18		
		(1.435)		(2.614)		
More than 1 sibling			-3.65		-1.96	
			(3.351)		(4.964)	
Father has high education						8.70**
						(3.509)
Mother has high education						-2.94
						(3.167)
One parent has high education				2.84	3.46	
				(4.887)	(4.935)	
Group fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	67	67	67	38	38	38
R-squared	0.414	0.410	0.423	0.612	0.615	0.688

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The rest of the variables are somehow connected with number of siblings. First, I analyse whether there is a link between the time in the first round and the number of younger and older siblings and do not find such a result (Column 1). Further, I create a new variable containing the total number of siblings and dummy variable that is equal to 1, if number of siblings is greater than 1 and 0 otherwise. Overall, none of the variables connected to the number of siblings are statistically

significant. Only the dummy variable is marginally significant (p = 0.280) and suggests that more siblings reduce the time in the first round.

Next, I control for the potential role of separate groups' characteristics (performance-sensitive leader etc.) by controlling for groups' fixed effects. For each group, one dummy was created and controlled for in the regression. The group fixed effect absorbs any variation across separate groups.

4.1.2 Role of parents' education

As I stated, 38 out of 67 parents have filled the questionnaire about their education. Since the sample is rather small, I created a series of dummy variables for higher and lower education of the parents, mother and father. In order to attain high level of variation, I define the high education as completed Master's degree. In case of parents' education, dummy is defined as one of the parents has the aforementioned level of education. Consequently, the lower education is defined as obtaining at maximum Bachelor or Foundation degree. Table 5 shows the results distributed by the education. We can see that participants with more educated parents were slighty faster with mean time 43.5 seconds than the participants with less educated parents (mean time 44.4 seconds). However, using Wilcoxon rank-sum (Mann-Whitney) test, the difference is not significant (p = 0.4463).

TABLE 5 - SUMMARY OF THE TIMES IN THE FIRST ROUND BY PARENTS' EDUCATION

	Number of observations	Mean	Standart deviation of mean
Lower education of parents	15	44.36	2.792606
Higher education of parents	23	43.47826	3.424735
Total	38	43.82632	2.321823

Next, I construct a separate OLS regression model with standard robust errors using only observations, where level of parents' education is known. The results are summarized in Table 4, columns 4, 5 and 6. The significance of most of the variables did not change when comparing to the previous regression model – all variables connected to the siblings are statistically insignificant similarly the number of after-school activities. The gender of a participant is only marginally significant in this

regression. I control for the groups' fixed effect in the identical way as I did in the first regression model.

The influence of education to time in the first round seems to be limited – only father education is significant. More educated father of participant indicates slower time. The high education of one of the parent or the mother education are both statistically insignificant.

Together, when controlling for the fixed effects, only age, gender of a participant and education of a father affect the time in the first round. It should be mentioned that siblings or mother education do not drive the time in the first round.

4.1.3 Role of the single – sex group

As scout organization has been one of the oldest voluntary educational organizations, some elements presented in its educational system might seem as outdated – the example may be the numerous single-sex groups. I therefore try to determine, if the heterogeneity of the group might have an effect on the performance in the first round. Table 6 shows the results distributed by gender of the group. I found strong statistical evidence (via Wilcoxon rank-sum (Mann-Whitney) test) that performance of single-sex and coeducatinal groups differ ($p = 0.0041$) and coeducational groups perform considerably poorer. Althought this supports the findings of Booth and Nolen (2009) or Gneezy et al. (2009), the caution with the interpretation should be in place. Firstly, there might be an unobserved effect that biases the results in favor of single-sex (e.g. performance-sensitive leaders). Secondly, my number of observations and groups is rather small with only one purely male group. However, the deeper analysis of the role of single-sex communities might bring some interesting answers.

TABLE 6 - SUMMARY OF THE TIMES IN THE FIRST ROUND BY GENDER OF THE GROUP

Sex of the group	Number of observations	Mean	Standart deviation of mean
Coeducatinal	27	47.18889	2.652604
Single sex - girls	31	39.00323	2.261018
Single sex - boys	9	34.6	3.649886
Total	67	41.71045	1.657295

4.2 Time in the second round

In the second round, we must analyze separately the control group and the rest. Out of 67 participants, 13 were picked in the control group as a robustness check. When performing under competitive scheme, both boys and girls on average improved their time in the second round. The distribution of competitive group is depicted as histogram in Figure 2, for the non-competitive group see Figure 3. The histograms are partitioned by gender, therefore comparison with the first round is possible. The time achieved in the second round by the group performed in a competitive environment is described in Table 7, the results of the control group are depicted in Table 8. In competition group, mean time of a boy is 32.4 seconds while girls on average scored 37.8 seconds. Under no-competition scheme, the boys achieved the mean time 46.0 seconds and average girl in non-competitive environment built a

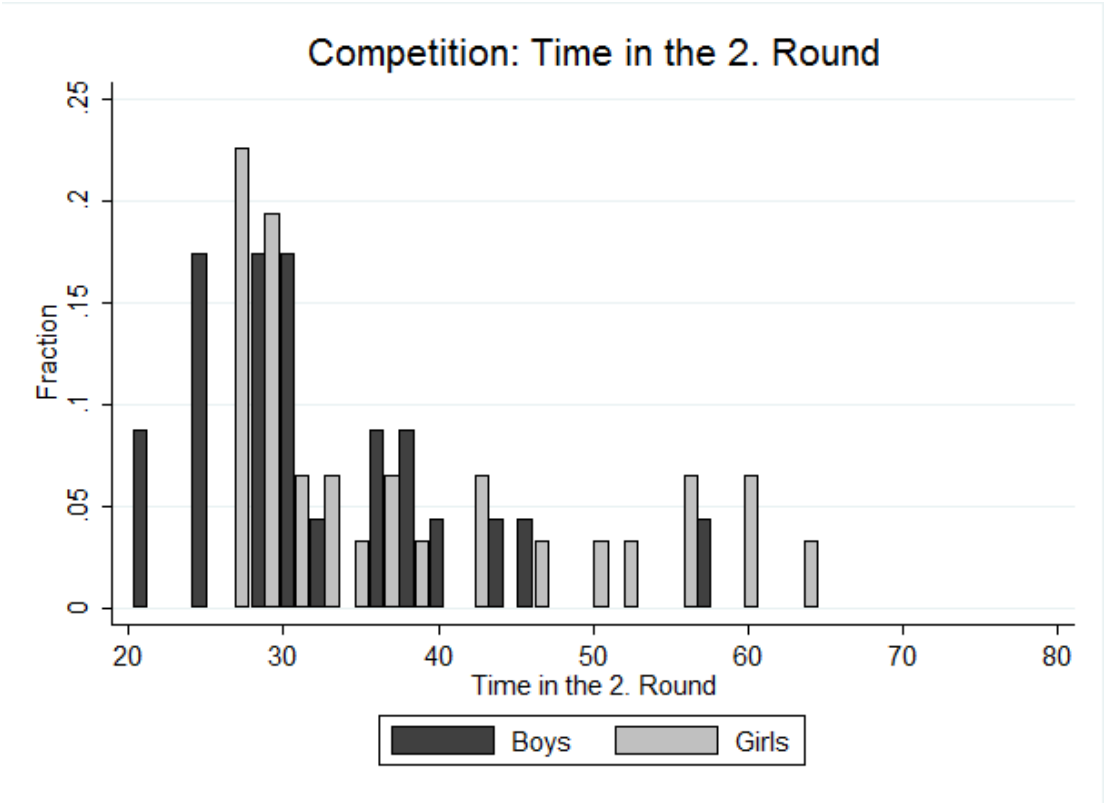

Figure 2. Distribution of times in the second round in the competitive environment in seconds, by gender

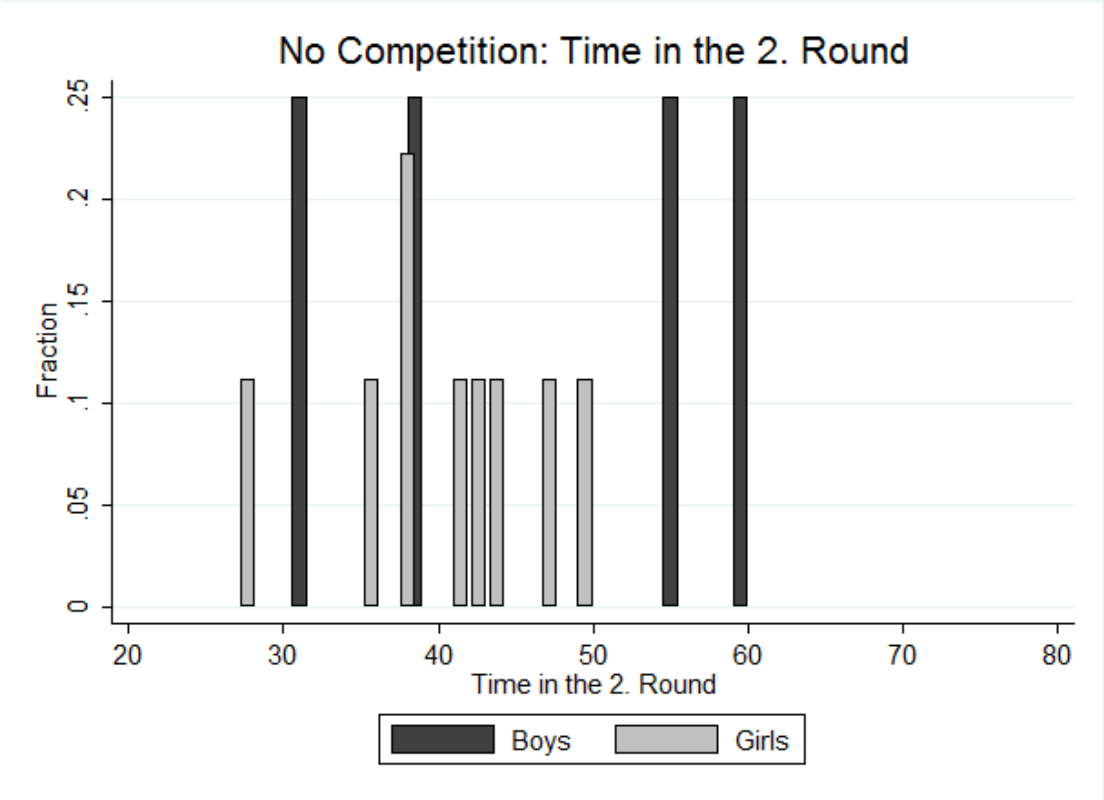

Figure 3. Distribution of times in the second round in the non-competitive environment in seconds, by gender

TABLE 7 - SUMMARY OF THE TIMES IN THE SECOND ROUND BY GENDER IN COMPETITIVE ENVIRONMENT

Sex	Number of observations	Mean	Standart deviation of mean
Girls	31	37.81613	2.103847
Boys	23	32.39565	1.809139
Total	54	35.50741	1.467136

tower in 40.4 seconds. The difference in time in the second round between competitive and non-competitive group according to the Wilcoxon rank-sum (Mann Whitney) test is statistically significant (p = 0.0174), hence the robustness check holds. Futhermore, I found marginal significance when gap between boys and girls in competition subgroup was examined (p = 0.1302). On the contrary, there is no change in no-competition subgroup when comparing to the results from the first round – the difference between boys and girls are still insignificant (p = 0.4398).

TABLE 8 - SUMMARY OF THE TIMES IN THE SECOND ROUND BY GENDER IN NON-COMPETITIVE ENVIRONMENT

Sex	Number of observations	Mean	Standart deviation of mean
Girls	9	40.44444	2.280967
Boys	4	45.975	7.100161
Total	13	42.14615	2.611921

4.3 Time change between second and first round

The final step of my study is the analysis of the most important experimental variable – the time change between second and first round. The variable is created as a simple difference: Time in the second round minus time in the first round. Similarly to the time in the second round, I analyze the control group separately as a robustness check. The results of competitive group can be found in Table 9; the results of a group performing under non-competitive scheme are shown in Table 10. As previously claimed, both boys and girls improved their time when facing competitive

TABLE 9 - SUMMARY OF THE TIME CHANGES BY GENDER IN COMPETITIVE ENVIRONMENT

Sex	Number of observations	Mean	Standart deviation of mean
Girls	31	-4.809677	1.653958
Boys	23	-7.530435	2.200758
Total	54	-5.968519	1.33393

environment, but only boys on average scored a better time in the second round under non-competitive scheme. The average time change between rounds for boys from the competitive group is -7.5 seconds. For girls from the competitive group, mean time change is -4.8 seconds. Figure 4 depicts the distribution of time change for competitive group. Under non-competitive environment, the girls achieved mean time change 0.21 seconds (therefore they were slower than in the first round) while boys

attained, on average, time change -2.2 seconds. The histogram of non-competitive group is shown in Figure 5. Using mean-comparison t-test the difference between means from the first and second round of the control group is statistically very isignificant (p = 0.8386). Futhermore, I've found a statistical evidence, that time change between second and first round differs in competitive and non-competitive environment using the Wilcoxon rank-sum (Mann Whitney) test (p = 0.0695). Hence, my study is consistent with Gneezy and Rustichini (2004) and Dreber et al. (2009). Next, I've tested whether there is difference between boys and girls. In a competition group, I found no statistical significance that there is difference between boys and girls (p = 0.3584), although the significance improved considerably when comparing to the p value of the possible difference from the time in the first round (p = 0.6546). This finding contradicts the Gneezy and Rustichini (2004). On the other hand, in Dreber et al. (2009), where besides running more "girlish" sports were chosen, the similar insignificance in girlish sports was found.

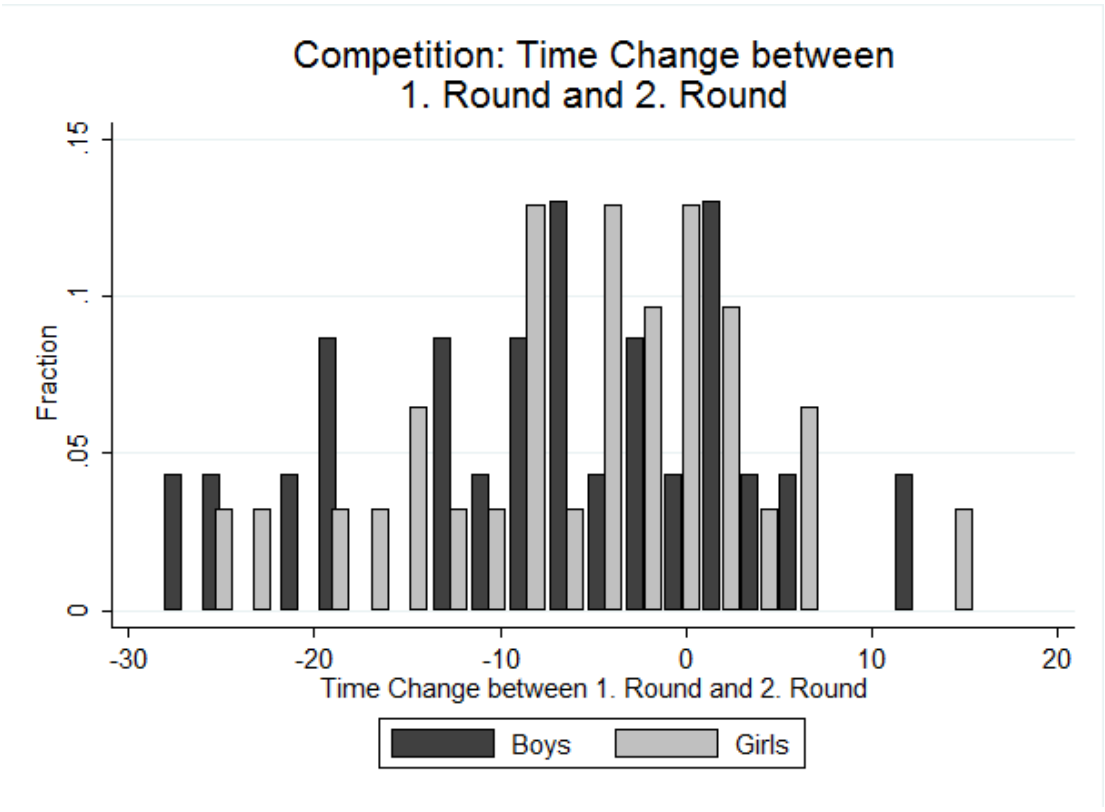

Figure 4. Distribution of change in times (time in the second round minus time in the first round) in the competitive environment in seconds, by gender

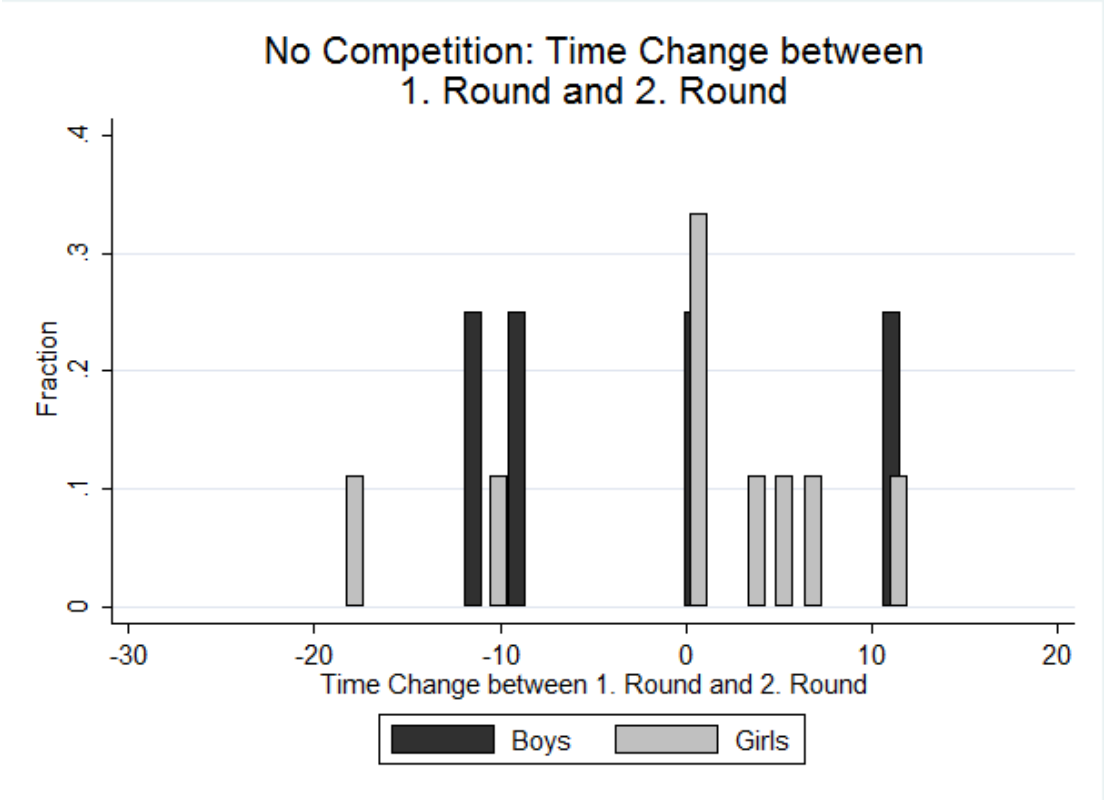

Figure 5. Distribution of change in times (time in the second round minus time in the first round) in the competitive environment in seconds, by gender

TABLE 10 - SUMMARY OF THE TIME CHANGES BY GENDER IN NON-COMPETITIVE ENVIRONMENT

Sex	Number of observations	Mean	Standart deviation of mean
Girls	9	.2111111	3.062154
Boys	4	-2.225	5.41716
Total	13	-1.569231	2.586591

4.3.1 What drives the time change?

Next, I'd like to focus on more detailed analysis of the time change. I estimate the model using OLS linear regression with standard robust errors. Table 11, columns 1, 2, 3, 4, 5, 6 summarize results.

There is strong statistical evidence that the time change depends on the time of the first round. The slower the participant was in the first round, the greater the time difference is. The explanation is quite straightforward – when you are slow, you are more likely to improve your result.

When I don't control for a gender of a participant's competitor, the gender of the participant is statistically significant. As it can be seen from Table 9, the boys improve more than girls. Note that the significance of the gender was not present in rank-sum test. This is caused by controlling for other variables in regression model (e.g. age of the participant).

Unlike in the model of the time in the first round, the age is insignificant. This suggests reaction to the competitive environment might not be affected by age at all. Futher evidence can be found in Sutter and Rützler (2010) where participants of the experiment were 3 – 18 years old.

Futhermore, the number of younger or older siblings is statistically insignificant. Even if I merge the number of siblings into the one variable (total number of siblings), there is still no statistical evidence. In order to determine the effect of siblings thoroughly, I created a dummy variable that is equal to 1 when a participant has more than 1 sibling and 0 otherwise. This variable is much more significant than the simple number of siblings, but it is insignificant as well. Overall, there is not enough evidence that number of siblings affects the performance in competitive environment.

Moreover, I include the number of afterschool activities. In case of statistical significance, the interpretation of this variable might be cumbersome. I can't infer whether the effect is caused by the correlation or we are dealing with causality – is the child competitive because of number of activites or is the child competitive and therefore it has chosen to visit more activities? Nevertheless, there is no statistical evidence that the number of activities influences the participant's competitiveness.

Next, I analyze the impact of gender of participant's competitor. I create a new variable to assess the influence properly. I use the dummy that is equal to 1 if the partner in the pair is boy and 0 otherwise. For thorough analysis, second variable is created by multiplication of the participant's gender and gender of the participant's competitor. However, both variables are statistically insignificant and due to the high correlation of "boy*partnerboy" variable and the gender of the participant, the gender become insignificant. In order to check the joint significance, I construct a linear parametric test. The variables are jointly significant as $p = 0.0840$.

In addition, as in the previous regression models, I control for the separate groups' characteristics that might have an unobserved effect on the competitiveness

TABLE 11 - THE ROLE OF GENDER, PREVIOUS PERFORMANCE, AGE AND FAMILY BACKGROUND

VARIABLES	(1) Time change	(2) Time change	(3) Time change	(4) Time change	(5) Time change	(6) Time change	(7) Time change	(8) Time change	(9) Time change	(10) Time change	(11) Time change
Boy	-8.72**	-8.84**	-8.69**	-10.73	-10.08	-10.94	-11.11***	-10.79***	-11.03**	-6.29	-5.54
	(3.562)	(3.675)	(3.657)	(7.419)	(7.417)	(7.717)	(3.776)	(3.597)	(4.506)	(8.674)	(8.790)
Time in the first round	-0.55***	-0.54***	-0.55***	-0.54***	-0.53***	-0.53***	-0.69***	-0.68***	-0.73***	-0.75***	-0.83***
	(0.091)	(0.089)	(0.090)	(0.095)	(0.094)	(0.092)	(0.115)	(0.112)	(0.135)	(0.157)	(0.241)
Age	-0.79	-0.98	-0.79	-0.63	-0.88	-0.62	-3.08*	-3.23	-2.91	-3.99	-4.04
	(0.922)	(0.953)	(0.938)	(0.959)	(1.037)	(0.982)	(1.716)	(1.912)	(1.765)	(2.462)	(2.641)
No of activities	0.05	0.16	0.03	0.03	0.15	0.00	0.46	0.47	0.38	0.85	0.88
	(0.697)	(0.685)	(0.704)	(0.730)	(0.712)	(0.746)	(1.617)	(1.659)	(1.509)	(1.668)	(1.483)
No of younger siblings			0.30			0.28			2.25		2.93
			(1.165)			(1.204)			(2.766)		(3.483)
No of older siblings			0.03			-0.09			4.08		5.12
			(1.622)			(1.734)			(4.038)		(4.803)
Total no of siblings	0.21			0.16			2.47			3.01	
	(1.205)			(1.258)			(2.722)			(3.147)	
More than 1 sibling		2.33			2.23			2.73			
		(2.388)			(2.546)			(3.951)			
Father has high education									-1.22		-0.73
									(3.531)		(4.562)
Mother has high education									1.15		0.43
									(3.896)		(5.299)
One parent has high education							2.16	2.63		1.95	
							(2.728)	(2.843)		(3.171)	
Partner in pair is a boy				-1.16	-0.78	-1.41				0.83	0.72
				(6.553)	(6.648)	(6.969)				(6.966)	(8.070)
Boy*partnerboy				2.91	1.80	3.27				-6.00	-7.31
				(7.980)	(8.092)	(8.546)				(10.305)	(10.640)
Group fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	16.74	17.40	16.72	14.76	16.21	14.58	35.61*	49.40***	35.90*	57.95**	47.79
	(10.726)	(10.938)	(10.849)	(10.730)	(11.518)	(10.804)	(17.003)	(15.272)	(18.737)	(20.111)	(28.096)
Observations	54	54	54	54	54	54	30	30	30	30	30
R-squared	0.550	0.561	0.551	0.552	0.561	0.553	0.680	0.669	0.687	0.687	0.699

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

(e.g. competitive-oriented leader, more competitive children in one group etc.) by controlling the groups' fixed effect. I use series of dummies (one for each group) and list them into the regression. These dummies absorb any unobserved fixed effect among the groups.

4.3.2 Role of parents' education

Almas et al. (2012) found evidence using a representative sample of adolescents in Norway that participants with more educated parents are more willing to compete. For my purposes, I use the identical dummies for education as in the time of the first round (high education is defined as Master's degree as a minimum). Table 12 shows the results distributed by the level of education and gender. The largest time difference was scored by boys with low educated parents followed by girls with low education - it implies that the participants with more educated parents are performing worse under competitive scheme. This is quite surprising result and contradicts the study of Almas et al. (2012). However, my sample is not as representative as sample used in Almas et al. (2012) and the definition of high and low education differs. Also, Almas et al. (2012) included the whole socioeconomic background while in my study only education is considered.

TABLE 12 - SUMMARY OF THE TIME CHANGE BY EDUCATION AND GENDER IN COMPETITIVE ENVIRONMENT

Education	Sex	Number of observations	Mean	Standart deviation of mean
Lower education of parents	Girl	9	-8.088889	3.3301
	Boy	4	-8.4	3.111002
	Total	13	-8.184615	2.421666
Higher education of parents	Girl	7	-2.328571	4.679475
	Boy	10	-5.84	3.461316
	Total	17	-4.394118	2.744466
Total		30	-6.036667	1.878318

Nonetheless, when testing the difference for statistical evidence, I found only marginal significance (p = 0.2018). When testing the level of education by gender, the significance is even smaller (p = 0.3222 for boys, for girls p = 0.4273).

Next, I analyze the role of education more carefully in separate OLS linear regression model with standard robust errors. I use only observation, where level of parents' education is known. The results from regression can be found in Table 11, columns 7, 8, 9, 10, 11.

Role of gender or time in the first round do not change when controlling for education. According to the model, you will achieve a larger time change if you are a boy and you had rather slow time in the first round.

On the other hand, age of the participant become more significant, in one case statistically (Table 11, column 7 and in other cases marginally (p value oscilate around value 0.1). Since in the regression model without education age variable was largely insignificant, a link between education of parents and age of the participant is possible and should be considered.

The role of siblings is, as in any other of models listed earlier, statistically not significant. None of variable listed approximate to the treshold of 10 % level of significance. It is worth mentioning, that the significance has considerably increased when control for education is included into the regression.

The role of education seems very limited in my regression model. I control for 3 variables – father's education, mother's education and whether at least one of the parents has high education. The most significant variable is at least one parent has a high education. The coefficient supports the evidence found by comparing means, however its significance is limited (best p = 0.367).

Together, I found that time from the first round and gender of the participant has a significant effect on the time change. When controlling for the education, the age become more significant, but the role of education is not noteworthy – this could be caused by small number of observations (30 in total).

4.3.3 Role of single – sex groups

Some groups within scout organization are gender homogenous. As stated earlier, there was a strong statistical significance that both boys and girls from homogenous groups outperform the members of coeducational groups. While performing under competitive scheme, the outcome is rather opposite. The participants from a

coeducational group tend to improve more than girls and boys from single-sex environment. Detailed results are given in Table 13. When testing for the time change, the evidence is not so strong, but still noteworthy – there is only marginal significance, that the participants from the heterogenous groups improved their time more than the participants from single-sex groups (p = 0.2245). However, the interpretation must be done with caution. The number of groups and observations is rather small (6 in total, 2 coeducational, 4 homogenous – 3 girl's group and 1 boy's group) and there might strong unobserved effect among the groups (the leaders might be competition-sensitive; more competitive children in one group could bias the entire results etc.). Furthermore, as my analysis revealed, slower time in the first round plays a major part in a size of the time change and participants from coeducational group did perform worse in the first round. For these reasons, a conclusion will not be given in this study, although papers discussing similar topic were published (see Gneezy et al. 2003, Booth and Nolen 2009 or Gneezy et al. 2009). Nevertheless, there is a possibility that the woman's position within the community might significantly affect her willingness to compete and her performance in competitive environment.

TABLE 13 - SUMMARY OF THE THE TIME CHANGE BY GENDER OF THE GROUP

Sex of the group	Number of observations	Mean	Standart deviation of mean
Coeducatinal	22	-7.754545	2.117835
Single sex - girls	25	-4.64	1.909721
Single sex - boys	7	-5.1	4.119004
Total	54	-5.968519	1.33393

5 Conclusion and recommendations

5.1 Conclusion

My study adds another fraction to the mosaic of experimental economic literature exploring one of the possible reasons of different outcome in labour market for men and women – competitiveness. As many papers showed, the propensity to compete and performance in competitive environment might be affected by nature (Wozniak et al. 2012), family background (Almas et al. 2012), nurture (Gneezy et al., 2009, Booth and Alison, 2009), gender (Niederle and Vesterlund 2007, Sutter and Rützler 2010) or reaction to the gender of competitor (Gneezy and Rustichini 2004, Günter et al. 2010).

An illustration of how (lack of) competitiveness can affect everyday's life was provided in Babcock et al. (2003). Woman's propensity to negotiate is much lower than man's (e.g. average male last negotiated 2 weeks ago, but woman 4 weeks ago), therefore women ask less likely for higher salaries, bonuses or other objects they may deserve or desire. As a result, whole society could suffer due to imbalance between men and women.

My experiment differs from standard laboratory experiment in several dimensions. Firstly, the study is designed as a field experiment. Participants perform the real task in familiar surroundings and every participant knew his/her competitor. Consequently, I can assume that the response to competitive environment in real life will be similar. Secondly, no material reward was promised or given after the end of the task. The subjects' performance was solely driven by their intrinsic motivation – the impact of exogenous incentives is not included in this work. In addition, only two (three) competitors and experimenter were present in the room during the real task realization in order to prevent the possible "embarrassment" or "show-off" effect. The participants also received feedback before the second round (time from the first round was announced before the start of the second round to both competitors at once) and during the task as they were competing next to each other. Finally, subjects of my experiment were children – social norms might be much less established in younger minds.

The main findings of my study are that both boys and girls react to the competitive environment and boy's response to the competitive scheme is stronger.

Boys achieved larger time change despite the fact that they also attained a faster time in the first round (as my analysis showed, the slower time in the first round have a positive effect on the size of the time difference). On the contrary, number of siblings and number of after-school activities do not influence the performance neither under non-competitive or competitive environment. Age of the participant affects his performance in the first round, but not his/her competitiveness, which is the identical result as in Sutter and Rützler (2010). Moreover, in contrast to Gneezy and Rustichini (2004), gender of the participant's competitor had no effect on the outcome.

Role of family background (parents' education, respectivelly) somehow relates to the performance and propensity to compete. From my results, more educated father of the participant indicates lower performance in the first round. Also, stronger reaction to competitive environment demonstrated the subjects with less educated parents opposed to the findings of Almas et al. (2012). I should, however, caution the reader before any inference will be made. Only limited number of observations was used in my analysis. In addition, the definition of higher education can be easily questioned (e.g. bachelor degree should be considered as high education). Moreover, no information about family income was collected, therefore I worked with an incomplete picture of family background.

As an example of good practice of reduction of the gender gap and minimizing the possible discrimination I see the hiring process of largest American orchestras. The hiring process is described in Goldin and Rouse (2000). In 1970, there were only 5 % of women among all players. When the blind auditions were used during hiring process, females are more likely to advance to the next rounds by 50 % and probability that a woman will be a winner of a final round increased. According to the study, the symphonic orchestra's female players raised up to 25 % among all players.

5.2 Recommendations for further research

During my research, some questions arose and remained unanswered in my study, as it was not the purpose of this work to give a proper response. Moreover, as my analysis contains only limited number of subjects, replication of the experiment in similar geographical location with larger sample can either confirm or reject my findings.

First of all, I found evidence that the single sex and coeducational groups somehow might differ in performance and willingness to compete. Possible differences (which were not replicated by my research) are described in Booth and

Alison (2009) or Gneezy et al. (2009). I do not conclude this finding as the number of groups in my study is rather small. However, there is the opportunity for further research as understanding the difference of gender-pure and gender-mixed communities might help in closing the gender gap.

Secondly, as a consequence of the lack of observations, the competition between boy and girl was not examined. As showed in Niederle and Vesterlund (2007), women shy away from competition when competing with male partner.

Thirdly, even though my experiment allowed the competitors to observe their partner, fully open competition (the competitors are observed by larger amount of participants) may alter my results. In Gneezy and Rustichini (2004) where open competition was used, a pair of girls did not response to the competitive environment. On the contrary, a significant improvement of female pair was observed in my study. Also, the gender of the experimenter can bias the result.

In addition, more study of influence of family background should be made. In order to examine the role of parents' education and family well-being thoroughly, much larger sample of more representative individuals (my average subject have above-average educated parents) must be used and information about family income and other relevant factors collected.

Furthermore, as previously stated, no rewards or any other material compensation were used in my experiment. The comparison and understanding the gender difference in intrinsic motivation and exogenous incentives can be highly valuable for policy-makers aiming at removing the gender gap.

Finally, I studied behaviour only in the competitive environment. Completely different outcomes might arise when element of cooperation will be used. Ivanova-Stenzel and Kübler (2005) observed a large gender differences in cooperation in dependence on the team gender composition.

Bibliography

Almås, Ingvild, Alexander W. Cappelen, Kjell G. Salvanes, Erik Ø. Sørensen, and Bertil Tungodden. 2012. "Willingness to Compete: Family Matters." *Norwegian School of Economics, Discussion Paper*, 24/2012 edition.

Andreoni, James, and Lise Vesterlund. 2001. "Which Is the Fair Sex? Gender Differences in Altruism." *The Quarterly Journal of Economics* (116): 293–312.

Babcock, Linda, Sara Laschever, Michele Gelfand, and Deborah Small. 2003. "Nice Girls Don't Ask." *Harvard Business Review* (81): 14–15.

Bell, Linda A. 2005. "Women-Led Firms and the Gender Gap in Top Executive Jobs." *IZA Disscusion Paper*, 1689 edition, sec. IZA.

Bertrand, Marianne, and Kevin F. Hallock. 2001. "The Gender Gap in Top Corporate Jobs." *Industrial and Labor Relations Review* (55): 3–21.

Blau, Francine, and Lawrence Kahn. 2000. "Gender Differences in Pay." *Journal of Economic Perspectives* (14): 75–99.

Booth, Alison L., and Patrick J. Nolen. 2009. "Choosing to Compete: How Different Are Girls and Boys?" *IZA Working Paper*, 4027 edition.

Burress, Joanne Healy, and Linda J. Zucca. 2004. "The Gender Equity Gap in Top Corporate Executive Positions." *Mid - American Journal of Business* (19): 55–63.

Datta Gupta, Nabanita, Anders Poulsen, and Marie-Claire Villeval. 2005. "Male and Female Competitive Behavior: Experimental Evidence." *IZA Disscusion Paper*, 1833 edition.

Dreber, Anna, and Magnus Johannesson. 2008. "Gender Differences in Deception." *Economics Letters* (99): 197–199.

Dreber, Anna, Emma von Essen, and Eva Ranehill. 2009. "Outrunning the Gender Gap: Boys and Girls Compete Equally." *SSE/EFI Working Paper Series in Economics and Finance*, 709 edition.

Gneezy, Uri, Leonard L. Kenneth, and John A. List. 2009. "Gender Differences in Competition: Evidence Form a Matrilineal and Patriarchal Society." *Econometrica* 2009 (77): 1937–1664.

Gneezy, Uri, Muriel Niederle, and Aldo Rustichini. 2003. "Performance in Competitive Environments: Gender Differences." *Quaterly Journal of Economics*: 1049–1074.

Gneezy, Uri, and Aldo Rustichini. 2004. "Gender and Competition at a Young Age." *American Economic Review Papers and Proceedings*.

Goldin, Claudia, and Cecilia Rouse. 2000. "Orchestrating Impartiality: The Impact of 'Blind' Auditions on Female Musicians." *The American Economic Review* (90): 715–741.

Günther, Christina, Neslihan Arslan Ekinci, Christiane Schwieren, and Martin Strobel. 2010. "Women Can't Jump? – An Experiment on Competitive Attitudes and Stereotype Threat." *Journal of Economic Behaviour and Organization* (75): 395–401.

Chen, Yan, Peter Katuščák, and Emre Ozdenoren. 2013. "Why Can't a Woman Bid More Like a Man?" *Games and Economic Behavior* (77): 181–213.

Ivanova-Stenzel, Radosveta, and Dorothea Kübler. 2005. "Courtesy and Idleness: Gender Differences in Team Work and Team Competition." *SFB 649 Discussion Paper*, 2005,049 edition.

Jurajda, Štěpán, and Daniel Münich. 2008. "Gender Gap in Admission Performance Under Competitive Pressure." *CERGE-EI Working Papers*, wp371 edition.

Knight, Jonathan. 2002. "Sexual Stereotypes." *Nature* (7).

Niederle, Muriel, Carmit Segal, and Lise Vesterlund. 2008. "How Costly Is Diversity? Affirmative Action in Light of Gender Differences in Competitiveness." *Working Paper*.

Niederle, Muriel, and Lise Vesterlund. 2007. "Do Women Shy Away from Competition? Do Men Compete Too Much?" *Quaterly Journal of Economics* (122 (3)): 1067–1101.

Niederle, Muriel, and Lise Vesterlund. 2008. "Gender Differences in Competition." *Negotiation Journal* (24 (4)): 447–463.

Smith, Nina, Valdemar Smith, and Mette Verner. 2010. "The Gender Pay Gap in Top Corporate Jobs in Denmark: Glass Ceilings, Sticky Floors or Both?" *IZA Disscusion Paper*, 4848 edition.

Steele, Claude M. 1997. "A Threat in the Air: How Stereotypes Shape Intellectual Identity and Performance." *American Psychologist* (52): 613–629.

Sutter, Matthias, and Daniela Rützler. 2010. "Gender Differences in Competition Emerge Early in Life." *Discussion Paper Series // Forschungsinstitut Zur Zukunft Der Arbeit*, 5015 edition.

Thelen, Esther. 1995. "Motor Development: A New Synthesis." *American Psychologist* 1995 (50): 79–95.

Wilkinson, Nick. 2008. *An Introduction to Behavioral Economics*. Basingstoke, UK: Palgrave Macillan.

Wozniak, David, William T. Harbaugh, and Ulrich Mayr. 2010. "Choices About Competition: Differences by Gender and Hormonal Fluctuations, and the Role of Relative Performance Feedback." *Working Paper*.

Appendix A: Instructions

Instructions were given orally in this form:

You have 15 lego bricks in front of you. Your task is to build the tower from all the bricks as fast as possible. I will measure your time. Do you have any questions?

Your time is [time]. Can I ask you few more questions? How old are you? Do you have brother or sister? How old are they? Are you visiting any other after-school activity beside scouts?

I will take your times and rank them from fastest to slowest. Then I will arrange you in pairs according to your speed. I will tell you your time and time of the other member of your pair. Now you will have to build the tower again from the same amount of bricks, but you will race in pair. Do you have any questions?

Your times are [time1] and [time2]. Good job!

When participant is in the control group:

Now I want you to build the tower again. I will tell you your time before you start to build again. Do you think you will be faster? Do you have any questions?

Your time is [time]. Good job!]