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Adverse selection into competition: Evidence from a large-scale field experiment in Tanzania*

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An influential literature has shown that women are less willing to compete than men, and the gender gap in competition may contribute to explaining gender differences in educational choices and labor market outcomes. This study reports from a large-scale randomized controlled trial of a women empowerment program in Tanzania targeting young women at the end of secondary school. Combining the randomized controlled trial, a lab-in-the-field experiment and survey data, we provide evidence suggesting that the program caused adverse selection into competition: low performing women competed more, while there was no effect on the high performers. We provide a theoretical framework to illustrate an adverse selection mechanism that may contribute to explain why the program only affected the willingness to compete

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among low performers. Our results emphasize the importance of understanding sorting mechanisms and heterogeneous treatment effects in the design of policies and programs.
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1. Introduction

An influential literature has shown that women are less willing to compete than men (Niederle and Vesterlund, 2007, 2011; Niederle, 2017; Booth, 2009; Croson and Gneezy, 2009), and that the gender gap in competition may contribute to explaining gender differences in educational choices and labor market outcomes (Almås et al., 2016; Berge et al., 2015; Buser et al., 2014, 2017, 2020b; Kamas and Preston, 2018; Reuben et al., 2015a,b; Zhang, 2013). It may also contribute to misallocation of talent and lower productivity in the economy if high performing women are less likely than high performing men to enter into certain occupations or educations because they find them too competitive. A growing literature has therefore started studying how society should respond to the gender gap in competition (Flory et al., 2015; Niederle et al., 2013; Niederle, 2017; Sutter et al., 2016; Samek, 2019), both in the design of institutions and potentially in terms of policies that may make women more willing to compete.

Women empowerment programs have received great attention in the policy debate on gender inequality (Bandiera et al., 2020; Buvinić and Furst-Nichols, 2014; Dhar et al., 2020), but we have limited knowledge of whether such programs actually contribute to a change in the competitiveness behavior of women. In the present paper, we study a large-scale randomized controlled trial of a women empowerment program in Tanzania targeting young women. The aim of the program was to make the participants believe in themselves and take an entrepreneurial mind set in life. To study whether this program affected the willingness to compete, we implemented a lab-in-the-field competition experiment where the women could choose between competing against men at their school or work for a piece rate pay.

The main finding of our study is that the women empowerment program mainly induced low performers to enter into competition, those who in fact would have benefited economically from not competing. Importantly, the program failed to increase the willingness to compete among the high performers. As a result, we find that the program led to a significant reduction in experimental earnings. We provide a theoretical framework to discuss an adverse selection mechanism that may explain our results. The key insight from the model is that the program is most likely to affect the competition choice of those individuals who are close to indifferent between competing and not competing, and for certain distributions of preferences, there will be many more low performing women close to this threshold than high performing women. This would reflect a situation where many high performers do not compete because they are very risk or competition averse.

The paper relates to several literatures. It contributes to the experimental literature on competition by providing large-scale evidence on how the decision to compete relates to risk taking, confidence, and the nature of the competition (Apicella et al., 2017; Boschini et al., 2019; Buser et al., 2020a; Dreber et al., 2011; Fallucchi et al., 2020; Flory et al., 2018; Niederle, 2017; van Veldhuizen, 2018), and by providing new empirical and theoretical insights on adverse selection into competition. Further, it speaks to the growing literature on the malleability of individual preferences and traits (Alan and Ertac, 2019; Almås et al., 2015; Andersen et al., 2013; Booth and Nolen, 2012; Chetty et al., 2016; Gneezy et al., 2009; Sutter and Glätzle-Rützler, 2014; Balafoutas and Sutter, 2012; Niederle et al., 2013; Tungodden, 2019; Zhang, 2018), by showing that people's willingness to compete can be changed. Finally, it contributes to the recent literature studying policy making in heterogenous populations, which has highlighted that policies aiming to change individual behavior do not necessarily move those who would benefit most from a behavioral change (Cornelissen et al., 2018; Exley et al., 2020). We show that a women empowerment program causes an increase in overcompetition among low performing women and fail to reduce undercompetition among high performing women. This insight highlights the challenge and importance of designing policies that account for heterogeneity. Ideally, we should aim to design policies that reduce overcompetition among low performers and reduce undercompetition among high performers.

The remainder of the paper is organized as follows. Section 2 provides an overview of the research design and sample, and Section 3 reports the main results. In Section 4, we present a theoretical framework that shows a general mechanism that may contribute to explaining why the intervention caused adverse selection into competition. Section 5 provides some concluding comments and suggestions for future research. Supplementary analysis, including various robustness checks, are presented in Online Appendix A to F and details about the field intervention and lab-in-the-field experiment are reported in Online Appendix G and H.

2. Research Design and Sample

We conducted a large-scale randomized controlled field experiment on women empowerment in Tanzania, where we pre-specified the willingness to compete in a lab-in-the-field competition experiment as a main empowerment outcome.[1] We here provide an overview of the field inter-

[1] A more comprehensive analysis of all the parts of the randomized controlled field experiment are provided in Berge et al. (2018). The pre-analysis plan is registered with the The American Economic Association's registry for randomized controlled trials (AEARCTR-0000150). See appendix H for the list of topics covered in the training modules.

vention, the lab-in-the-field competition experiment, and variables in the baseline survey and follow-up survey used in the present analysis.

2.1. Randomized controlled field experiment

The randomized controlled field experiment was conducted in public schools in rural and semi-rural parts of Tanzania that at the time of the intervention were in their last year of secondary school (Form IV in Tanzania). Few of them will continue schooling, and they therefore have to consider other opportunities once they are out of school, such as opening a small scale business.[2]

The aim of the field intervention was to study two approaches to empowerment of young women in the transition into adulthood: entrepreneurship training and reproductive health training. The intervention was implemented by the public schools in collaboration with Femina Hip, a leading civil society organization working with youth in Tanzania. Femina Hip designed both the entrepreneurship program and the reproductive health training under the names "Build your life" (entrepreneurship training) and "Protect your life" (reproductive health training). The modules were designed to be delivered at eight weekly training sessions, while the combination of both treatments was designed for 16 weekly training sessions. Both treatments were offered in a classroom setting and each training session lasted 1.5 - 2 hours.

The aim of the entrepreneurship training was to economically empower young women, providing them with both practical knowledge as well as non-cognitive skills needed in order to establish and run their own business. Topics included customer care, marketing, record keeping, pricing of products, personal finance, and sessions aiming at improving entrepreneurial mindset and self-confidence. Of particular relevance for the present study was the module entitled "We are Girls! We Can!", where participants were urged to "be brave and know that you can make it as a young business woman!", as well as being told that girls have the same abilities as boys. Moreover, in another module, focusing on entrepreneurial values and attitudes, the participants were urged to have positive thoughts, and "to go ahead with a plan or idea despite the chance of failing". The aim of the reproductive health-training was to enable the young women to take control of their own body and health. The training provided practical and objective information about reproductive health and gender empowerment, including information and guidance about

[2]To continue schooling after Form IV, students must pass a national examination: the Certificate of Secondary Education Examination. In 2016, only 22% passed this exam and qualified for Form V at the national level (Mirondo, 2017). In our sample, which consists of young women in rural and semi-rural public schools, an even lower share passed the national examination (6%).

contraception and the consequences of risky sexual behavior, as well as making them aware of basic gender equality rights.

During the baseline in April 2013, we sampled 80 public schools with at least 20 women in Form IV in the regions Tabora, Singida, Morogoro and Dodoma.[3] Among these schools, we randomly allocated 20 schools to receive entrepreneurship training, 20 schools to reproductive health training, 20 schools to receive both entrepreneurship training and reproductive health training, and 20 schools to the control group. The randomization was blocked by school-size (below or above 40 women in Form IV) and by region.

The interventions were introduced in August and September 2013. The immediate impact of the treatments was evaluated in a short-term follow up survey and lab-in-the field experiment conducted in October 2013 a few weeks after the training programs ended, and the data from the baseline round and the first follow-up round are used in the present study. Medium-term data was collected in September and October 2014, and long-term data was collected in 2016 and 2017.

In the pre-analysis plan, we specified that a main measure of whether the training modules had empowered the women would be the extent to which we observe a treatment effect on the willingness to compete in a lab-in-the-field experiment. The entrepreneurship training has several elements that might increase the willingness to compete, including a focus on building confidence and increasing the willingness to take risk. It is less clear how the reproductive health training would affect the willingness to compete, in particular since it highlighted the negative consequences of risky behavior in the health domain and thereby might cause the women to become more risk averse. In the main analysis, we focus on the effect of the entrepreneurship program on the willingness to take risk, where "Treated" refers to all the women assigned to receive the entrepreneurship training (both those assigned to the entrepreneurship training and those assigned to both training programs) and "Control" refers to all the women who weren't assigned to the entrepreneurship training (both those only assigned to the reproductive health training and those who were in the original control group). In Online Appendix D, we show that we observe the same patterns as in the main analysis when analyzing separately each of the four treatment arms.

[3]We considered schools that were on Femina Hip's lists, receiving their free magazines related to women empowerment and / or entrepreneurship, but we excluded schools that had already established Femina Hip clubs, which dealt with similar topics as the training programs. In addition, we did not include private schools in the study.

2.2. Sample

We interviewed 3 483 women at baseline. In the follow-up lab-in-the-field experiment, we reached 2916 of the women from baseline (86.7%), and there is no evidence of differential attrition between treatment and control ($p = 0.754$, see Appendix A). We exclude from the main analysis 16 women for whom we have missing information either from the baseline survey or the follow-up survey and 35 women who were in a girl-only school. Thus, the main analysis is conducted on a sample of 2865 women.

Table 1 shows the mean and standard deviation of the covariates from the baseline described in the pre-analysis plan. The first set of variables capture individual characteristics (*High cognition*, *Investment choice*, *Age* > 17), the second set of variables family characteristics (*Wealthy household*, *Business owner*, *Woman headed hh.*), and the third set of variables societal characteristics (*N Form IV girls*, *Remote*). There are some differences between treatment and control, but a joint F-test of significance cannot reject the null hypothesis of no difference. Our main results are robust to the inclusion of controls.

2.3. Lab-in-the-field competition experiment

In the lab-in-the-field competition experiment, we follow the approach of Niederle and Vesterlund (2007) to measure the willingness to compete. The participants are asked to solve a set of math questions in two rounds, Round 1 and Round 2. The specific task is to find the sum of four two-digit numbers. In each round, they work for two minutes on the task. In Round 1, the participants receive a piece-rate pay of 100 Tsh for each correct answer, while they can choose between a piece-rate pay or a competitive payment scheme in Round 2. The competitive payment scheme pays 300 Tsh if they perform at least as well as the average performance of the men at their school in Round 1 and zero if they had fewer correct answers than the men. At each school, we recruited five men who only took part in Round 1 of the experiment. The *willingness to compete* in Round 2 and the *earnings* from this round are our main outcomes in the analysis.

After Round 1, we elicited incentivized beliefs about their own performance in Round 1 (0-20), average performance of the women (0-20), and average performance of the men (0-20), where they on each of the three questions received Tsh 100 for a correct answer. We use these stated beliefs to measure *overconfidence*. Following the literature (Moore and Schatz, 2017), we make the distinction between *overestimation* — the difference between their belief about

Table 1: Baseline characteristics by treatment arm.

	All Sample	Control	Treated	
High cognition (%)	62.688	59.384	65.971	$^{+++}_{*}$
	(48.372)	(49.129)	(47.397)	
Investment choice (%)	47.574	46.709	48.434	
	(49.950)	(49.909)	(49.993)	
Age> 17 (%)	48.237	47.829	48.643	
	(49.978)	(49.970)	(49.999)	
Wealthy household (%)	54.904	56.232	53.584	
	(49.768)	(49.627)	(49.889)	
Business owner (%)	23.630	25.700	21.573	$^{+++}_{*}$
	(42.488)	(43.713)	(41.147)	
Woman headed hh. (%)	19.546	19.468	19.624	
	(39.663)	(39.609)	(39.729)	
N Form IV girls	59.418	56.371	62.445	$^{+++}$
	(17.312)	(15.426)	(18.517)	
Remote (%)	46.911	45.798	48.017	
	(49.913)	(49.841)	(49.978)	
Observations	2865	1428	1437	

The table reports average and standard deviation for pre-specified background variables. *High cognition* is an indicator equal to one if the subject scores above the median in the sample on a series of cognitive questions. *Investment choice* is an indicator equal to one if the subject chooses to invest less than half of her endowment in a hypothetical risky investment question. *Age ¿ 17* is an indicator equal to one if the subject is older than 17, the median age in the sample. *Wealthy household* is an indicator equal to one if the subject's index of wealth is above the median in the sample. The index of wealth is based on the ownership of a television, the frequency at which the household eats meat and the household's access to electricity. *Business owner* is an indicator equal to one if the household owns a business. *Woman headed hh.* is an indicator equal to one if the household head is a woman. *N Form IV girls* is the number of girls in form IV in that school. *Remote* is a indicator equal to one if the distance between the school and the district headquarters is above the median distance in the sample. Significant differences between the treatment arm and the control group at the significance level of $^{+}$ $p < 0.1$, $^{++}$ $p < 0.05$, $^{+++}$ $p < 0.01$ without clustering and * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ with clustering at the school level. F-statistic of joint significance equal to 17.35 (p-value < 0.01) (not clustered) and 1.57 (p-value $= 0.15$) (clustered).

own performance and their actual performance — and *overplacement* — the difference between their belief about own performance and their belief about the men performance. Finally, they answered a set of survey questions. In particular, they were asked about their general attitude towards risk (Dohmen et al., 2011), where 0 indicated *completely unwilling to take risks* and 10 indicated *completely willing to take risks*". They were paid their total earnings from the experiment in private at the end.

3. Results

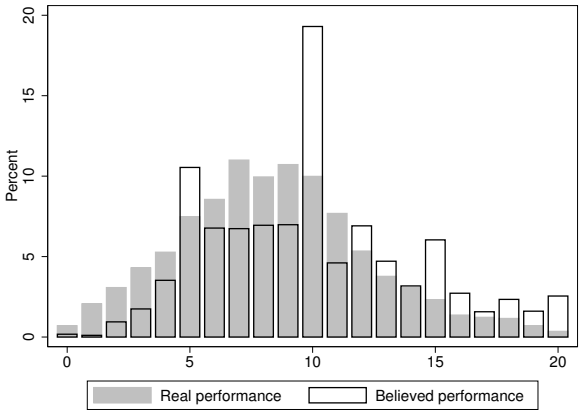
In this section, we first present descriptive findings on performance, beliefs, and competition behavior. We then study how the intervention has shaped the willingness to compete and earnings, and the confidence and risk preferences of the women.

3.1. Descriptive statistics

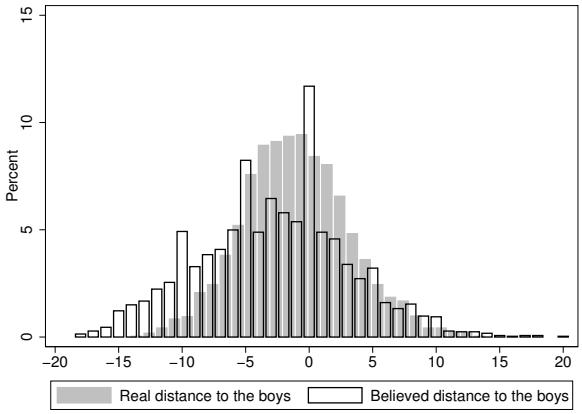
We first provide an overview of the main descriptive patterns for the full sample. In Round 1, the women worked on the task for a piece rate pay of 100 Tsh for each correct answer. In the upper left panel in Figure 1, we show the distribution of performance and beliefs about own performance in this round. On average, the women answered 8.42 questions correctly, but there is significant heterogeneity in performance, with a standard deviation of 3.87. They are overconfident and overestimate their own performance by almost 20% ($p < 0.001$). In the upper right panel of Figure 1, we compare the performance of the women to the performance of the men at their school. The men are on average better than the women on the task, 9.42 versus 8.42 correct answers ($p < 0.001$). However, importantly, we note that 40% of the women answer correctly at least as many questions as the men, which means that they would benefit economically from competing (if they perform equally well under competition).[4] We observe that the women have an underplacement bias, they believe on average to be 2.78 points below the men's average while they are actually 1 point below ($p < 0.001$).

In the bottom panels in Figure 1, we report the competition choice by performance and believed distance to the men. We observe in both cases a positive relationship. Women who perform better at the task and who are more optimistic about their performance relative to the men

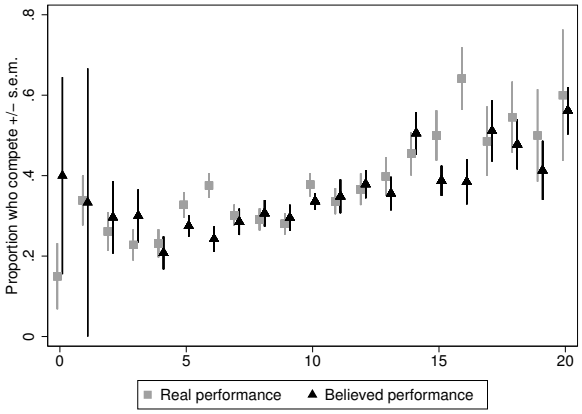
[4]See Gneezy et al. (2003); Gneezy and Rustichini (2004); Iriberri and Rey-Biel (2019); Shurchkov (2012) for experimental studies of the gender gap in performance in competitive environments.



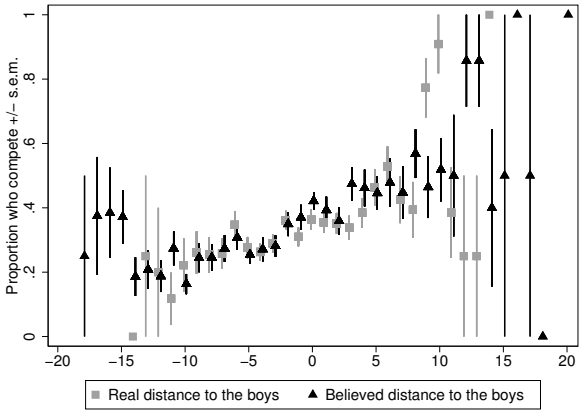
(a) Real and believed performance.



(b) Real and believed distance to the men.



(c) The choice to compete by real and believed performance.



(d) The choice to compete by real and believed distance to the men.

Note: Figure (a) shows the distribution of real performance and of believed performance. Figure (b) shows the distribution of the distance between real performance and the men's average, and of the distance between believed performance and the believed men's average. Figure (c) shows the proportion of people who choose to compete at each level of real performance and of believed performance. Figure (d) shows the proportion of people who choose to compete at each level of the distance between the real performance and the men's average, and of the distance between the believed performance and the believed men's average.

Figure 1: The distributions of real and believed performance and distance to the men's average.

are more likely to compete. We note that the willingness to compete is less precisely estimated at the extremes, which reflects that both the distribution of performance and the distribution of believed distance to the men mainly have mass in the interval [-10,10]. The bottom right panel of Figure 1 shows that many women who likely would have benefited economically from competing do not compete, and thereby suffer economically. Overall, 33.7% of the women decided to compete in the full sample, but 60% of the women who are at least as good as the men choose not to compete. This undercompetition is in line with the existing evidence on the gender gap in competition and motivates interventions that aim to increase the willingness to compete among high performing women. A main focus in the literature, and also in the present intervention, is on eliminating any underplacement bias among women, but, as shown in the bottom right panel, this is unlikely to be sufficient. Even among the women who believe that they are at least as good as the men do we observe significant undercompetition, with only 56% competing.

We further observe from the bottom right panel of Figure 1 that there is overcompetition among the low performing women. An intervention targeting the willingness to compete among women should therefore ideally reduce overcompetition among low performers and reduce undercompetition among high performers. In the present study, the removal of undercompetition among high performing women would increase their average earnings from Tsh 1134 to Tsh 3402, while the removal of the overcompetition among low performing women would increase their average earnings from Tsh 0 to Tsh 650.[5]

3.2. Treatment effects

We now turn to an analysis of how the entrepreneurship intervention affected the willingness to compete, beliefs about performance, and risk preferences.

In the main specification, we estimate the intention-to-treat estimates using the following robust least square regression equation:

$$Y_{i,j} = \alpha + \beta * T_j + \gamma * X_{i,j} + \epsilon_{i,j} \tag{1}$$

[5] In these calculations, a woman undercompetes if she decides not to compete but performed at least as well as the men in Round 1, while a woman overcompetes if she decides to compete and performed worse than the men in Round 1.

$Y_{i,j}$ is the outcome of interest for subject i from school j. T_j is equal to one if school j received the entrepreneurship treatment. $X_{i,j}$ is the vector of covariates listed in Table 1. We report normal standard errors and standard errors clustered at the school level. In Online Appendix C, D and E, we show the robustness of our results to a number of alternative regression specifications.

In Panel A of Table 2, we report regressions of the willingness to compete on the treatment indicator and background characteristics of the participants measured at the baseline. We observe from the first column that there is a positive treatment effect of the entrepreneurship intervention on the willingness to compete, the share of women competing increases from 31.4% in the control group to 36% in the treated group. The estimated effect on the willingness to compete is robust to the inclusion of background characteristics, as shown in column 2. It is highly significant if we use normal standard errors, but not if we cluster at the school level. We note that some of the background characteristics are predictive of the willingness to compete. In particular, high cognition, which is strongly correlated with performance, makes it more likely that a woman chooses competition, while a large number of women in class makes it less likely that she competes. In Panel B, we observe that the treatment effect on earnings is negative, but not statistically significant.

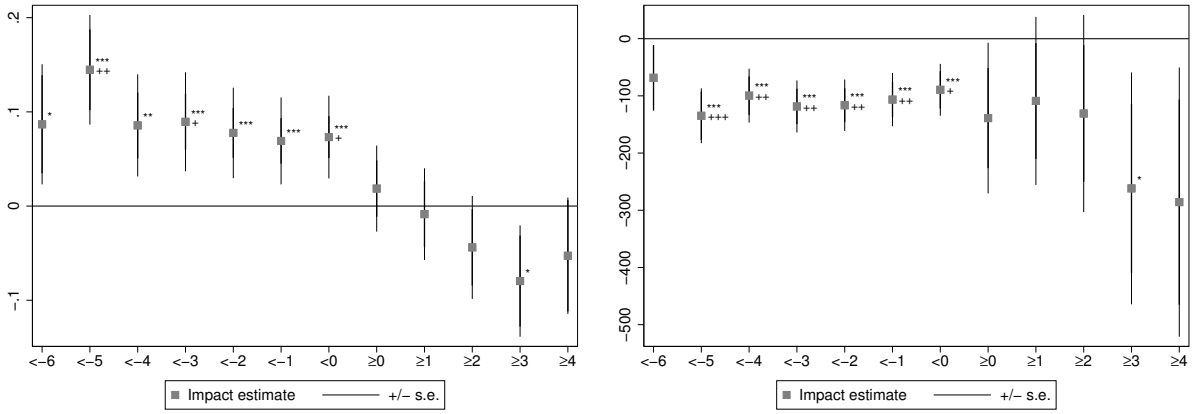
Table 2: Treatment effect on competitiveness and payoffs

	All sample				Low performer		High performer	
A. Chooses to compete:								
Treated	.046	(.018)***	.060	(.018)***	.075	(.022)***	.019	(.030)
		[.039]		[.038]		[.044]*		[.046]
High cognition (%)			.051	(.018)***	.017	(.022)	.085	(.031)***
				[.017]***		[.021]		[.029]***
Investment choice (%)			-.034	(.018)*	-.046	(.022)**	-.033	(.029)
				[.020]*		[.024]*		[.033]
Age>17 (%)			.014	(.018)	.018	(.022)	.023	(.030)
				[.019]		[.024]		[.026]
Wealthy household (%)			.011	(.019)	.017	(.024)	.004	(.032)
				[.024]		[.030]		[.036]
Bussines owner (%)			-.013	(.021)	.008	(.027)	-.050	(.036)
				[.025]		[.027]		[.038]
Woman headed hh. (%)			-.039	(.022)*	-.020	(.027)	-.062	(.036)*
				[.024]		[.030]		[.038]
N Form IV girls			-.281	(.054)***	-.329	(.063)***	-.132	(.100)
				[.118]**		[.131]**		[.144]
Remote (%)			.020	(.019)	.041	(.024)*	-.021	(.031)
				[.039]		[.044]		[.045]
Control mean	.314				.274		.381	
B. Payoffs:								
Treated	-30.172	(43.285)	-45.041	(43.396)	-90.988	(32.267)***	-139.166	(87.787)
		[82.108]		[80.817]		[45.063]**		[131.768]
Control mean	1017.437				631.521		1677.23	
Obs.	2865		2865		1728		1137	
Controls	No		Yes		Yes		Yes	

The table reports ordinary least square estimates of the treatment impact on the probability to compete (Panel A) and the payoffs earned (Panel B). Treated is an indicator taking the value one if the individual is in a treated school. The covariates are the variables presented in Table 1. The first two columns use the full sample, the next column the sample of low performers (with a performance lower than the men) and the last column the sample of high performers (with a performance larger or equal to the men). Robust standard errors are in parentheses, clustered standard errors in square brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

To shed light on whether the entrepreneurship intervention has affected low performing and high performing women differently, we also report separate regressions for the low performing women and for the high performing women.[6] In this table, low performers are defined as those who score

[6]There is a small difference in the performance of the men in the treated schools and in the control schools: 9 (treatment group) versus 9.9 (control group), $p = 0.07$. In Tables 12 and 13 in Online Appendix E, we show that this imbalance is not driving the results. The results remain robust when we remove the schools that are outliers in terms of the performance of the men (top/bottom 5%). For the remaining schools, the performance



(a) Probability to compete.

(b) Payoffs.

*Note: The figure shows the ordinary least square estimates of the treatment impact on the probability to compete (Figure a) and on the payoffs (Figure b), at different values of the distance between the individual performance and the average men performance. The shorter and thicker spikes represent the standard errors, the longer and thinner spikes are clustered at the school level. The estimates are significantly different from zero at the level of * 0.1, ** 0.05 and *** 0.01, and + 0.1, ++ 0.05 and +++ 0.01 with clustering.*

Figure 2: Impact on the probability to compete and the payoffs by real distance.

less than the men's average at their school in Round 1, while high performers score at least as much as the men's average. We observe that the intervention has contributed to adverse selection into competition. It has increased overcompetition among the low performing women by almost 30% (from 27.4% to 34.9%), while there is no evidence of any effect on the high performing women. In Panel B, we observe that there is a highly significant negative treatment effect on earnings for the low performing group, consistent with the treatment increasing overcompetition, while we do not find a significant effect on earnings for the high performing group.[7]

In Figure 2, we study the robustness of these patterns to different definitions of the low performing and high performing groups. In this figure, the horizontal axis represents the distance to the performance of the men in Round 1 and the vertical axis represents the estimated share of women competing. The estimate shown in Panel A for "< 0" corresponds to the estimated treatment effect reported in Panel A in Table 11 for the low performing women (0.075 percentage points), while the estimate shown for "$>= 0$" shows the corresponding estimate for the high performing women (0.019 percentage points). The figure shows that the results are robust to imposing stricter definition of low performers and high performers, only including those who answer correctly x fewer questions than the men ("$< -x$") in the low performing group and only those who answer correctly x more questions than the men ("$>= x$") in the high performing

of the men is balanced between the treated schools and the control schools. We do not find any treatment effect on the performance of the women: 8.38 (treatment group) versus 8.46 (control group), $p = 0.59$.

[7] The results on earnings are robust to transformed earnings using the inverse hyperbolic sine or an indicator for whether they have any earnings as the dependent variables, see Table 14 in Online Appendix F.

group. Also for these stricter definition, we find evidence of a positive treatment effect on the low performing women, but not on the high performing women. In fact, if anything, it appears that the intervention had a negative effect on the willingness to compete among the high performing women. In the right panel, we report the corresponding analysis for earnings, where we again observe that the findings are highly robust to stricter definitions of the low performing group and the high performing group.

In Table 3, we report results on whether the entrepreneurship intervention has affected the risk preferences and beliefs of the women, both for the full sample and separately for the low performing group and the high performing group. Overall, we find a strong positive effect of 0.28 standard deviation on their general willingness to take risk, which is present both in the low performing group and in the high performing group. We do not find any evidence of the intervention affecting the women's beliefs. The estimated effects on overestimation and overplacement are not statistically significant for the full sample, nor for any of the two subgroups, even though we note that the point estimates are positive for the low performing women. Importantly, we observe that the high performing women do not lack confidence, they overestimate their own performance and only marginally underplace themselves relative to the men.

Table 3: Treatment effects on risk aversion and confidence.

	All sample		Low performer		High performer	
			A. Risk aversion:			
Treated	1.001	(.117)***	1	(.153)***	.920	(.179)***
		[.179]***		[.194]***		[.226]***
Control mean	7.735		7.666		7.855	
			B. Confidence - Overestimation:			
Treated	.006	(.127)	.174	(.164)	.003	(.189)
		[.171]		[.218]		[.241]
Control mean	1.562		2.129		.594	
			C. Confidence - Overplacement			
Treated	.259	(.221)	.148	(.276)	-.022	(.326)
		[.480]		[.530]		[.569]
Control mean	-2.815		-4.30		-.277	
Obs.	2865		1728		1137	

The table reports ordinary least square estimates of the treatment impact on the willingness to take risks (Panel A) and on two measures of confidence: overestimation (Panel B) and overplacement (Panel C). Treated is an indicator taking the value one if the individual is in a treated school. All estimations include the covariates presented in Table 1. The first column uses the full sample, the next column the sample of low performers (with a performance lower than the men) and the last column the sample of high performers (with a performance larger or equal to the men). Robust standard errors are in parentheses, clustered standard errors in square brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Overall, we do not find evidence of the intervention having had a positive effect on the willingness to compete on the high performing women, even though it increased their willingness to take risk. Rather, the entrepreneurship intervention appears to have caused adverse selection into competition by increasing overcompetition among the low performing women, possibly as a result of the increased willingness to take risk.

4. An adverse selection mechanism

We here discuss a mechanism that may contribute to explaining why the program caused adverse selection into competition, and more generally highlights a key issue for interventions targeting the willingness to compete. The basic point is that any such intervention most easily moves individuals who are close to indifferent between competing and not competing, and these are not necessarily the high performers.

We illustrate this mechanism using a simple theoretical framework. Consider a situation where an individual has to choose between earning money in a competitive or non-competitive environment, where the task is to provide as many correct answers as possible, denoted by a. She is paid a piece-rate h per correct answer if she performs at least as well as the average performance of the men and wins the competition, 0 if she loses the competition, and l per correct answer if she chooses a non-competitive environment. Let us assume for simplicity that there is certainty about own performance, but uncertainty about the average performance of the men, b.[8] The distribution of beliefs about average performance of the men is given by the density function $g(\cdot)$ and the cumulative distribution function $G(\cdot)$, where $g(b)$ is the probability that the average performance is b and $G(b)$ is the probability that the average performance of men is not greater than b. An individual's belief about the probability of winning the competition is then given by $P(a) = G(b = a)$.

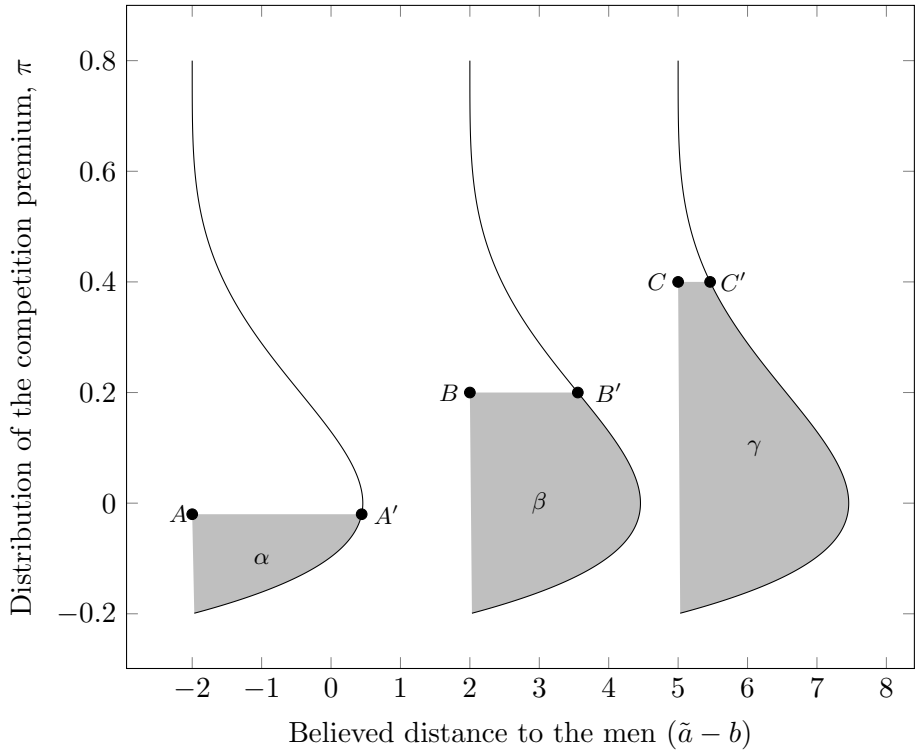
Let us assume that the individual chooses to compete if and only if:

$$P(a)ha \geq la + \pi, \tag{2}$$

where π is a competition premium parameter that captures any disutility from earning money in a competitive environment.[9] It may be seen as capturing a combination of risk preferences and competitiveness preferences. The individual is *competition loving* if this premium is strictly negative and *competition averse* if it is strictly positive. If $\pi = 0$, the individual is *competition neutral*, and she will compete if $P(a)ha \geq la$. We refer to π as the compete premium of individual i. We assume that the distribution of π is independent of beliefs about performance. Let π be distributed over the population with a cumulative distribution function $F(\cdot)$ and a density function $f(\cdot)$.

[8] We assume that the beliefs about own performance are the same in the competitive and the non-competitive environment.

[9] The mechanism could also be illustrated in a utility maximization framework with standard risk preferences, for example using an exponential utility function with risk aversion parameter r: $U(x) = x^r$. In this case the subject competes if $P(a)(ha)^r + (1 - P(a))0^r \geq (la)^r$ or $r \geq -\frac{\ln P(a)}{\ln(h/l)}$.



Note: The figure shows the theoretical effects of a change in the competition premium π on the proportion of people who choose to compete at different levels of believed distance between their performance and the men.

Figure 3: The treatment impacts at different levels of performance

We define $X(a)$ as the difference in expected payoffs from competing:

$$X(a) \equiv P(a)ha - la \tag{3}$$

It follows from (2) and (3) that a subject chooses to compete if and only if $X(a) \geq \pi$.

Under these assumption, the proportion of individuals with performance a who choose to compete is given by $F(X(a))$. If the effect of a treatment is to marginally shift downwards the distribution of π —for example by reducing risk aversion overall as in our study — then we should expect the treatment to change the proportion of subjects who compete at each performance level by $f(a)$. In other words, the treatment impact is largest when the (density) function $f(X(a))$ reaches its maximum. By definition that happens when $X(a)$ equals the mode of the distribution of π. Furthermore, if the density function $f(\cdot)$ is unimodal and strictly decreasing in the distance to its mode, the treatment impact strictly decreases with the distance between $X(a)$ and the mode of the distribution of π.

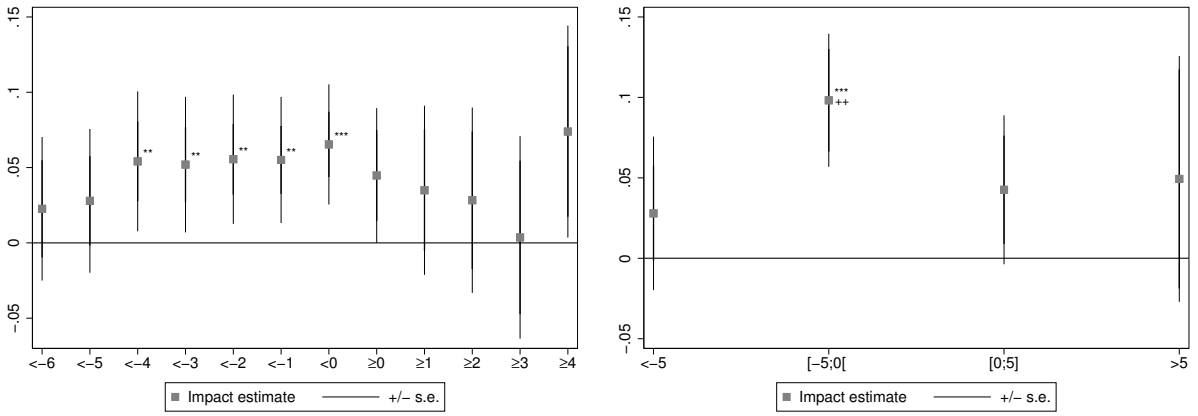
In Figure 3, we illustrate this mechanism for a specific distribution of π, where we show the

individual's believed distance between her performance and the men' average on the horizontal axis and the compete premium π on the vertical axis. It follows straightforwardly that the individual's believed distance between her performance and the men' average maps into a probability of winning the competition. To preserve the clarity of the figure, we draw the threshold and the distribution of π only at the distance of -2, +2 and +5. To illustrate, we assume that the threshold level of π under which people compete is equal to -0.02 when the distance is -2 (A), 0.2 when the distance is +2 (B) and 0.4 when the distance is +5 (C).

The three curves represent the distributions of π at the three distance levels. By assumption, the distributions of π are identical at all levels. The gray area α is the proportion of people with a believed distance of -2 who compete, the gray area β is the proportion of people with a distance of +2 who compete and the gray area γ is the proportion of people with a distance of +5 who compete. This illustration is consistent with patterns commonly observed in competition experiments (and also in the present study): some low performers compete (because they are competition loving), the proportion of individuals competing increases in performance, and some high performers do not compete (because they are competition averse).

In this example, if the treatment uniformly shifts the distribution of π downwards at all levels, the marginal treatment impact on the proportion of people who compete at the illustrated performance levels are given by the segments AA', BB', and CC'. Thus, we observe that the treatment has the largest impact on the low performers and the smallest impact on the high performers, in line with what we found in the present study. This finding is indeed sensitive to what we assume about the distribution of the competition premium, but it also highlights that it may be hard to move non-competing high performers. They do not compete because they are very competition averse, and few of them may therefore be close to indifferent between competing and not competing.

The model also highlights the importance of individual beliefs when studying the impact of any intervention of this kind. Individual beliefs are essential for understanding the competition decision and whether individuals perceive themselves close to indifferent between competing and not competing. In Figure 4, we provide estimates of how the treatment affected the low performers and high performers when we define these groups in terms of their stated beliefs about the distance to the average performance to the men (in contrast to Figure 2, which provides estimates based on the actual distance). The left panel illustrates these estimates for various cut offs for the low performers and high performers, while the right panel provides estimates based on a division of the sample into four groups based on their beliefs. The analysis shows a



Note: The figure shows the ordinary least square estimates of the treatment impact on the probability to compete (Figure a) and on the payoffs (Figure b), at different values of the believed *distance between the individual performance and the average men's performance. The shorter and thicker spikes represent the standard errors, the longer and thinner spikes are clustered at the school level. The estimates are significantly different from zero at the level of * 0.1, ** 0.05 and *** 0.01, and + 0.1, ++ 0.05 and +++ 0.01 with clustering.*

Figure 4: Impact on the probability to compete by believed distance.

strong impact of the treatment for the women who believe that they are slightly worse than the men, while we do not find any significant treatment effects for the women who believe they are better than the men or much worse than the men. This pattern is consistent with the outlined mechanism if the distribution of the competition premium is similar to what is illustrated in Figure 3. However, it should be noted that the differences in treatment effect across the different subgroups in Figure 2 are not statistically significant, and thus we should only take the analysis as suggestive evidence of this mechanism explaining the observed pattern.

5. Conclusion

In this paper, we have combined a large-scale randomized controlled trial and a lab-in the field experiment to study the impact of an empowerment program on women's willingness to compete. We find that the intervention has caused adverse selection into competition, with more low performing women competing. The program did not affect the willingness to compete among the high performers. We suggest that a plausible mechanism is that very few high performing women are close to indifferent between competing and not-competing, reflecting that they are highly competition averse.

The focus in the present study has been on whether women benefit economically from competing.

But why should society aim to move high performing women into competition if they strongly dislike a competitive environment? A possible answer is that competition preferences may reflect social norms in society that have discriminated against women (Andersen et al., 2013; Falk and Hermle, 2018; Hauge et al., 2020). There is for example evidence suggesting that parents are more likely to push boys into competition than girls (Tungodden, 2019), which suggests that girls are socialized into being competition averse (Gneezy et al., 2009). Socialization raises difficult normative questions about preference sovereignty, and an important avenue for future research is to provide a better understanding of the nature of competition preferences.

Another important question for future research is how to design institutions and interventions that take into account individual heterogeneity, and thereby contribute both to reducing undercompetition among high performing women and overcompetition among low performing women Niederle (2017). Society would benefit from closing the gender gap in labor markets and educational tracks that today are perceived as competitive and not attractive for many high performing women, but we should at the same time ensure that our policies and intervention do not encourage low performing women to enter into competitive domains in which they are likely to suffer economically.

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A. Attrition

We report in Table 4 the ordinary least square estimates of the treatment's impact on the probability to be included in the lab sample. We find that the attrition is not significantly correlated with the treatment.

Table 4: Attrition by treatment arm.

	(1) In the lab
Treated	0.008
	(0.013)
	[0.026]
Mean in control group	0.83
Observations	3478
R^2	0.000

The table reports ordinary least square estimates of the treatment impact on the probability to be surveyed in the lab. Treated is an indicator taking the value one if the individual is in a treated school. Robust standard errors are in parentheses, clustered standard errors in square brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

B. Treatment and performance

The task was unrelated to the treatment and we have no reason to believe that the treatment improves the subjects algebra ability. We nonetheless formally test the treatment impact on "perfromance in round 1", "guessed performance", "Guessed men's average" and "Men's performance" in Table 5. 5 shows that there is on average no significant differences between the treated and control individuals in terms of their performance in round 1, their beliefs about their own performance and their beliefs about the men's average. As mentioned earlier, there is an imbalance in "Men's performance" but as we discuss in Appendix E it cannot explain our results.

Table 5: Impact on performance measures

	(1)	(2)	(3)	(4)
	Performance in round 1	Guessed performance	Guessed men's average	Men's performance
Treated	-0.077	-0.108	-0.166	-0.940
	(0.145)	(0.156)	(0.177)	(0.446)**
	[0.349]	[0.319]	[0.542]	[0.497]*
Mean in control group	8.46	10.02	12.84	9.95
Observations	2865	2865	2865	395

The table reports ordinary least square estimates of the treatment impact on (1) the woman's performance in round 1, (2) her guessed own performance, (3) her guessed men's average and (4) the actual performance of the men. Treated is an indicator taking the value one if the individual is in a treated school. Robust standard errors are in parentheses, clustered standard errors in square brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

C. Full impact tables

In this appendix we report the complete estimations summarized in Tables 2 and 3.

Table 6: Treatment effect on competitiveness

	All sample				Low performer				High performer			
Treated	.050	(.020)***	.060	(.020)***	.050	(.020)**	.070	(.020)***	.030	(.030)	.020	(.030)
		[.040]		[.040]		[.050]		[.040]*		[.040]		[.050]
High cognition (%)			.050	(.020)***			.020	(.020)			.090	(.030)***
				[.020]***				[.020]				[.030]***
Investment choice (%)			-.030	(.020)*			-.050	(.020)**			-.030	(.030)
				[.020]*				[.020]*				[.030]
Age>17 (%)			.010	(.020)			.020	(.020)			.020	(.030)
				[.020]				[.020]				[.030]
Wealthy household (%)			.010	(.020)			.020	(.020)			.000	(.030)
				[.020]				[.030]				[.040]
Bussines owner (%)			-.010	(.020)			.010	(.030)			-.050	(.040)
				[.030]				[.030]				[.040]
Woman headed hh. (%)			-.040	(.020)*			-.020	(.030)			-.060	(.040)*
				[.020]				[.030]				[.040]
N Form IV girls			-.280	(.050)***			-.330	(.060)***			-.130	(.100)
				[.120]**				[.130]**				[.140]
Remote (%)			.020	(.020)			.040	(.020)*			-.020	(.030)
				[.040]				[.040]				[.040]
Obs.	2865		2865		1728		1728		1137		1137	
Controls	No		Yes		No		Yes		No		Yes	

The table reports ordinary least square estimates of the treatment impact on the probability to compete. Treated is an indicator taking the value one if the individual is in a treated school. The covariates are the variables presented in Table 1. The first two columns use the full sample, the next two columns the sample of low performers (with a performance lower than the men) and the last two columns the sample of high performers (with a performance larger or equal to the men). Robust standard errors are in parentheses, clustered standard errors in square brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 7: Treatment effect on payoffs

	All sample				Low performer				High performer			
Treated	-30.17	(43.29)	-45.04	(43.4)	-71.42	(31.93)**	-90.99	(32.27)***	-110.84	(86.23)	-139.17	(87.79)
		[82.11]		[80.82]		[48.96]		[45.06]**		[132.61]		[131.77]
High cognition (%)			316.64	(40.99)***			54.32	(31.78)*			468	(85.17)***
				[48.16]***				[36.15]				[88.3]***
Investment choice (%)			146.98	(43.17)***			51.55	(32.56)			107.55	(84.71)
				[46.62]***				[31.57]				[91.85]
Age>17 (%)			-152.01	(42.91)***			-58.36	(32.69)*			-113.08	(85.78)
				[51.23]***				[32.18]*				[78.83]
Wealthy household (%)			-22.94	(46.3)			9.94	(35.46)			5.17	(91.77)
				[63.1]				[37.88]				[111.4]
Bussines owner (%)			-15.67	(53.28)			-34.62	(39.25)			-13.04	(108.99)
				[54.01]				[34.94]				[102.18]
Woman headed hh. (%)			-35.88	(51.58)			1.24	(40.13)			-43.83	(101.96)
				[37.85]				[37.36]				[74.5]
N Form IV girls			-150.49	(126.75)			240.92	(96.59)**			-280.51	(292.99)
				[203.3]				[126.59]*				[331.42]
Remote (%)			29.55	(45.56)			-88.78	(34.9)**			34.01	(90.95)
				[80.53]				[46.64]*				[118.37]
Obs.	2865		2865		1728		1728		1137		1137	
Controls	No		Yes		No		Yes		No		Yes	

The table reports ordinary least square estimates of the treatment impact on the payoffs. Treated is an indicator taking the value one if the individual is in a treated school. The covariates are the variables presented in Table 1. The first two columns use the full sample, the next two columns the sample of low performers (with a performance lower than the men) and the last two columns the sample of high performers (with a performance larger or equal to the men). Robust standard errors are in parentheses, clustered standard errors in square brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 8: Treatment effect on risk aversion

	All sample				Low performer				High performer			
Treated	1.01	(.120)***	1	(.120)***	1.02	(.150)***	1	(.150)***	.980	(.180)***	.920	(.180)***
		[.180]***		[.180]***		[.210]***		[.190]***		[.220]***		[.230]***
High cognition (%)			.160	(.120)			-.030	(.160)			.430	(.210)**
				[.120]				[.170]				[.170]**
Investment choice (%)			.110	(.120)			.080	(.150)			.130	(.170)
				[.120]				[.170]				[.180]
Age>17 (%)			-.230	(.120)*			-.250	(.150)			-.120	(.180)
				[.120]*				[.160]				[.160]
Wealthy household (%)			.030	(.130)			.030	(.170)			.040	(.190)
				[.130]				[.170]				[.150]
Bussines owner (%)			.040	(.130)			.030	(.180)			.070	(.210)
				[.140]				[.160]				[.200]
Woman headed hh. (%)			.050	(.150)			.340	(.180)*			-.360	(.240)
				[.160]				[.180]*				[.300]
N Form IV girls			.200	(.320)			.100	(.400)			.590	(.520)
				[.480]				[.550]				[.520]
Remote (%)			-.590	(.120)***			-.720	(.170)***			-.410	(.180)**
				[.180]***				[.210]***				[.220]*
Obs.	2851		2851		1723		1723		1128		1128	
Controls	No		Yes		No		Yes		No		Yes	

The table reports ordinary least square estimates of the treatment impact on the willingness to take risks. Treated is an indicator taking the value one if the individual is in a treated school. The covariates are the variables presented in Table 1. The first two columns use the full sample, the next two columns the sample of low performers (with a performance lower than the men) and the last two columns the sample of high performers (with a performance larger or equal to the men). Robust standard errors are in parentheses, clustered standard errors in square brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: Treatment effect on overestimation

	All sample				Low performer				High performer			
Treated	-.030	(.130)	.010	(.130)	.160	(.160)	.170	(.160)	-.080	(.180)	.000	(.190)
		[.180]		[.170]		[.230]		[.220]		[.230]		[.240]
High cognition (%)			-.540	(.130)***			-.340	(.170)**			-.380	(.200)*
				[.130]***				[.180]*				[.190]**
Investment choice (%)			-.060	(.130)			.120	(.160)			-.010	(.180)
				[.140]				[.180]				[.200]
Age>17 (%)			.080	(.130)			-.010	(.170)			-.090	(.190)
				[.120]				[.150]				[.180]
Wealthy household (%)			.210	(.130)			.300	(.180)*			-.040	(.190)
				[.130]				[.170]*				[.210]
Bussines owner (%)			-.020	(.150)			-.100	(.190)			.160	(.220)
				[.140]				[.180]				[.240]
Woman headed hh. (%)			.210	(.160)			.340	(.200)*			-.090	(.230)
				[.150]				[.190]*				[.230]
N Form IV girls			-.040	(.410)			-.130	(.500)			-.930	(.640)
				[.640]				[.760]				[.690]
Remote (%)			.270	(.140)**			.450	(.180)**			.260	(.190)
				[.190]				[.240]*				[.220]
Obs.	2865		2865		1728		1728		1137		1137	
Controls	No		Yes		No		Yes		No		Yes	

The table reports ordinary least square estimates of the treatment impact on overestimation. Treated is an indicator taking the value one if the individual is in a treated school. The covariates are the variables presented in Table 1. The first two columns use the full sample, the next two columns the sample of low performers (with a performance lower than the men) and the last two columns the sample of high performers (with a performance larger or equal to the men). Robust standard errors are in parentheses, clustered standard errors in square brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 10: Treatment effect on overplacement

	All sample				Low performer				High performer			
Treated	.060	(.220)	.260	(.220)	-.030	(.280)	.150	(.280)	-.350	(.320)	-.020	(.330)
		[.550]		[.480]		[.570]		[.530]		[.630]		[.570]
High cognition (%)			.810	(.230)***			.230	(.280)			.700	(.340)**
				[.260]***				[.340]				[.420]*
Investment choice (%)			1.04	(.220)***			.960	(.280)***			.430	(.320)
				[.230]***				[.280]***				[.310]
Age>17 (%)			-.990	(.220)***			-.690	(.280)**			-.930	(.330)***
				[.260]***				[.290]**				[.320]***
Wealthy household (%)			.120	(.240)			.350	(.300)			.100	(.340)
				[.280]				[.320]				[.330]
Bussines owner (%)			-.010	(.270)			-.510	(.330)			.690	(.400)*
				[.260]				[.320]				[.410]*
Woman headed hh. (%)			.010	(.270)			.090	(.330)			-.010	(.390)
				[.260]				[.340]				[.320]
N Form IV girls			-4.35	(.660)***			-3.08	(.780)***			-4.85	(1.12)***
				[1.45]***				[1.38]**				[2.14]**
Remote (%)			.080	(.230)			.180	(.300)			-.720	(.340)**
				[.480]				[.560]				[.550]
Obs.	2865		2865		1728		1728		1137		1137	
Controls	No		Yes		No		Yes		No		Yes	

The table reports ordinary least square estimates of the treatment impact on overplacement. Treated is an indicator taking the value one if the individual is in a treated school. The covariates are the variables presented in Table 1. The first two columns use the full sample, the next two columns the sample of low performers (with a performance lower than the men) and the last two columns the sample of high performers (with a performance larger or equal to the men). Robust standard errors are in parentheses, clustered standard errors in square brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

D. Decomposition of the impacts by four treatment arms

In this section, instead of one binary variable indicating if a subject received the entrepreneurship treatment or not, we use three variables that indicate whether the subject received the entrepreneurship treatment only, the SRH treatment only, or both treatments. We show the treatments' impact on competitiveness and payoffs, risk aversion, overestimation and overplacement.

Table 11: Treatment effect on competitiveness, payoffs, risk aversion, overestimation and overplacement.

	All sample		Low performer		High performer	
A. Chooses to compete:						
Entrepreneurship	.063	(.025)**	.086	(.031)***	.018	(.043)
		[.047]		[.052]		[.061]
Entrepreneurship & SRH	.026	(.026)	.038	(.033)	-.011	(.040)
		[.043]		[.047]		[.057]
SRH	-.028	(.025)	-.015	(.030)	-.037	(.043)
		[.056]		[.055]		[.075]
B. Payoffs:						
Entrepreneurship	-144.598	(61.479)**	-79.498	(43.382)*	-233.875	(129.833)*
		[111.436]		[58.164]		[168.639]
Entrepreneurship & SRH	56.123	(64.674)	-28.399	(45.647)	-132.938	(118.369)
		[118.97]		[62.082]		[175.82]
SRH	-11.782	(62.581)	61.935	(47.024)	-83.563	(128.592)
		[119.827]		[62.372]		[212.092]
C. Risk aversion:						
Entrepreneurship	1.084	(.158)***	.994	(.203)***	1.169	(.255)***
		[.228]***		[.252]***		[.272]***
Entrepreneurship & SRH	.897	(.165)***	.823	(.227)***	.909	(.247)***
		[.234]***		[.275]***		[.272]***
SRH	-.009	(.187)	-.143	(.242)	.229	(.292)
		[.249]		[.269]		[.334]
D. Confidence - overestimation:						
Entrepreneurship	.233	(.178)	.295	(.231)	.067	(.258)
		[.220]		[.285]		[.298]
Entrepreneurship & SRH	-.073	(.178)	.013	(.239)	.235	(.251)
		[.212]		[.251]		[.285]
SRH	.171	(.178)	.015	(.228)	.349	(.269)
		[.270]		[.330]		[.367]
E. Confidence - overplacement:						
Entrepreneurship	.008	(.312)	.010	(.390)	.169	(.471)
		[.687]		[.797]		[.821]
Entrepreneurship & SRH	.599	(.310)*	.026	(.413)	.611	(.423)
		[.626]		[.716]		[.685]
SRH	.050	(.312)	-.255	(.390)	.966	(.454)**
		[.619]		[.701]		[.704]
Controls	Yes		Yes		Yes	
Obs.	2865		1728		1137	

The table reports ordinary least square estimates of the treatment impact on the probability to compete, the payoffs, the willingness to take risks, overestimation and overplacement. Entrepreneurship is an indicator taking the value one if the individual is in a school assigned to the entrepreneurship intervention. SRH is an indicator taking the value one if the individual is in a school assigned to the Sexual and reproductive health intervention. Entrepreneurship & SRH is an indicator taking the value one if the individual is in a school assigned to both interventions. The covariates are the variables presented in Table 1. The first column uses the full sample, the next column the sample of low performers (with a performance lower than the men) and the last column the sample of high performers (with a performance larger or equal to the men). Robust standard errors are in parentheses, clustered standard errors in square brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

E. Treatment impact in the winsorized sample

In Table 12 and 13, we estimate the treatment impact as in Tables 2 and 3 but without the bottom and top 5% of schools in terms of men' performance. In this sample there is no significant difference in men' performance between treatment arms, and we therefore use it to check whether our main findings could have been explained by the unbalanced men' averages. The tables show that the results remain almost unchanged.

Table 12: Treatment effect on competitiveness and payoffs - winsorized sample

	All sample				Low performer		High performer	
A. Chooses to compete:								
Treated	.054	(.018)***	.063	(.018)***	.077	(.023)***	.023	(.032)
		[.041]		[.040]		[.045]*		[.046]
High cognition (%)			.054	(.019)***	.018	(.023)	.088	(.033)***
				[.018]***		[.023]		[.032]***
Investment choice (%)			-.040	(.018)**	-.052	(.022)**	-.043	(.031)
				[.020]*		[.025]**		[.034]
Age>17 (%)			.019	(.019)	.024	(.023)	.032	(.032)
				[.019]		[.024]		[.028]
Wealthy household (%)			.009	(.020)	.019	(.024)	-.008	(.033)
				[.025]		[.029]		[.036]
Bussines owner (%)			-.003	(.022)	.007	(.027)	-.023	(.038)
				[.025]		[.028]		[.036]
Woman headed hh. (%)			-.046	(.023)**	-.020	(.028)	-.081	(.038)**
				[.025]*		[.031]		[.039]**
N Form IV girls			-.248	(.055)***	-.272	(.065)***	-.122	(.102)
				[.114]**		[.128]**		[.141]
Remote (%)			.025	(.020)	.042	(.024)*	-.010	(.033)
				[.041]		[.046]		[.046]
Control mean	.309				.261		.392	
B. Payoffs:								
Treated	-69.477	(45.142)	-76.482	(45.086)*	-108.208	(32.974)***	-133.021	(94.938)
		[85.942]		[84.004]		[46.192]**		[137.191]
Control mean	1036.894				648.982		1704.742	
Obs.	2652		2652		1638		1014	
Controls	No		Yes		Yes		Yes	

The table reports ordinary least square estimates of the treatment impact on the probability to compete (Panel A) and the payoffs earned (Panel B). Treated is an indicator taking the value one if the individual is in a treated school. The covariates are the variables presented in Table 1. The first two columns use the winsorized sample, the next column the sample of low performers (with a performance lower than the men) in the winsorized sample and the last column the sample of high performers (with a performance larger or equal to the men) in the winsorized sample. Robust standard errors are in parentheses, clustered standard errors in square brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 13: Treatment effects on risk aversion and confidence - winsorized sample.

	All sample		Low performer		High performer	
A. Risk aversion:						
Treated	.977	(.120)***	.986	(.156)***	.900	(.186)***
		[.185]***		[.197]***		[.243]***
Control mean	7.771		7.703		7.888	
B. Confidence - overestimation:						
Treated	.000	(.131)	.118	(.166)	-.024	(.198)
		[.179]		[.223]		[.252]
Control mean	1.548		2.134		.540	
C. Confidence - overplacement:						
Treated	.234	(.229)	.154	(.284)	.105	(.344)
		[.507]		[.550]		[.592]
Control mean	-2.82		-4.326		-.227	
Obs.	2652		1638		1014	

The table reports ordinary least square estimates of the treatment impact on the willingness to take risks (Panel A), overestimation (Panel B) and overplacement (Panel C). Treated is an indicator taking the value one if the individual is in a treated school. The covariates are the variables presented in Table 1. The first column uses the winsorized sample, the next column the sample of low performers (with a performance lower than the men) in the winsorized sample and the last column the sample of high performers (with a performance larger or equal to the men) in the winsorized sample. Robust standard errors are in parentheses, clustered standard errors in square brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

F. Robustness of the payoff measure

To test the robustness of the treatment effects on the payoffs, in Table 14, we estimate the treatment impact on the inverse hyperbolic sine transformation of the payoffs (IHST) and on a binary variable equal to one if the individual didn't earn anything in round 2.

Table 14: Treatment effect on payoffs: IHST & binary outcome

	All sample				Low performer		High performer	
				A. Payoffs IHST:				
Treated	-.205	(.117)*	-.298	(.119)**	-.555	(.157)***	-.181	(.165)
		[.246]		[.258]		[.296]*		[.226]
Control mean	6.059				5.474		7.06	
Obs.	2865		2865		1728		1137	
				B. Payoffs = zero:				
Treated	.031	(.015)**	.043	(.015)***	.075	(.022)***	.018	(.020)
		[.032]		[.033]		[.040]*		[.030]
Control mean	.193				.239		.114	
Obs.	2865		2865		1728		1137	
Controls	No		Yes		Yes		Yes	

The table reports ordinary least square estimates of the treatment impact on the inverse hyperbolic sine transformation *of the payoffs (Panel A) and on the probability to earn nothing (Panel B). Treated is an indicator taking the value one if the individual is in a treated school. The covariates are the variables presented in Table 1. The first two columns use the full sample, the next column the sample of low performers (with a performance lower than the men) and the last column the sample of high performers (with a performance larger or equal to the men). Robust standard errors are in parentheses, clustered standard errors in square brackets.* * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

G. Questionnaire - Not for publication

The questionnaire and the lab task were administered in the schools. Each subject was sitting at her desk and answering the questions on paper. Research assistants were guiding and supervising the exercise. The parts of the questionnaire relating to the competitiveness choices, and the measure of risk aversion, are reproduced below. The data collection was done in Swahili but we display the translated text here for tractability. The Swahili original text can be made available upon request.

G.1. Competitiveness measure

Part 9

9.1. Part 1

Instruction: This should be handed out as a separate sheet

We will now ask you some math questions. You will be given two minutes to work on this. Answer as many questions as you can. Start from the beginning, and work your way down, without skipping any questions.

1	11+7+10+3=	
2	6+5+8+12=	
3	18+2+17+20=	
4	6+5+20+20=	
5	4+6+16+4=	
6	15+17+16+17=	
7	2+15+6+16=	
8	20+5+7+2=	
9	9+9+3+3=	
10	10+15+6+19=	
11	19+15+14+13=	
12	8+8+4+5=	
13	20+18+12+18=	
14	20+3+6+16=	
15	8+2+20+8=	
16	5+6+9+19=	
17	13+7+13+15=	
18	1+15+5=15=	
19	17+13+4+19=	
20	6+15+7+11=	

9.2. Part 2

Instruction: This should be handed out as a separate sheet

We will now ask you another round of math questions. For each correct answer, we will pay you 100 Tsh. We will not pay you anything for incorrect answers. You will be given two minutes to work on this. Answer as many questions as you can. Start from the beginning, and work your way down, without skipping any questions.

1	14+8+11+2=	
2	12+4+11+1=	
3	14+13+18+3=	
4	12+18+18+2=	
5	4+14+7+8=	
6	16+4+2+16=	
7	3+9+4+10=	
8	6+3+8+10=	
9	8+2+20+11=	
10	2+8+19+6=	
11	7+15+20+3=	
12	9+12+20+7=	
13	2+19+17+13=	
14	10+18+12+7=	
15	14+5+12+1=	
16	15+10+20+9=	
17	14+16+12+6=	
18	7+4+3+6=	
19	7+10+20+17=	
20	15+14+17+2=	

9.2. Part 2

We will now ask you to guess how well you did when answering the last set of math questions (DO NOT COUNT THE FIRST ROUND). If you guess correctly, we will pay you 100 Tsh.

9.2.1 How many correct answers do you think that you had on the previous test (0-20)? (do not count the first round)

☐

9.2.2a How well do you think you did relative to the girls in your class in the previous round? (do not count the first round)

We will now ask you to guess how well you did relative to the other girls in your class. We here divide the girls into five groups, where the first group (80% - 100%) refers to the girls with the best performance and the fifth group (0% - 20%) refers to the girls with the worst performance. How was your performance compared to the girls? Tick off one. If you guess correctly, we will pay you 100 Tsh.

1	My performance was in the first group of the girls (80% -100%)	☐
2	My performance was in the second group of the girls (60% -80%)	☐
3	My performance was in the third group of the girls (40% - 60%)	☐
4	My performance was in the fourth group of the girls (20% - 40%)	☐
5	My performance was in the fifth group of the girls (0% - 20%)	☐

9.2.2b How well do you think you did relative to the boys in your school in the previous round? (do not count the first round)

We also asked some boys in your school to solve these questions. We will now ask you to guess how well you did relative to the boys. We here divide the boys into five groups, where the first group (80% - 100%) refers to the boys with the best performance and the fifth group (0% - 20%) refers to the boys with the worst performance. How was your performance compared to the boys? Tick off one. If you guess correctly, we will pay you 100 Tsh.

1	My performance was in the first group of the *boys* (80% -100%)	☐
2	My performance was in the second group of the *boys* (60% -80%)	☐
3	My performance was in the third group of the *boys* (40% - 60%)	☐
4	My performance was in the fourth group of the *boys* (20% - 40%)	☐
5	My performance was in the fifth group of the *boys* (0% - 20%)	☐

9.2.3 What was the average score

We will also ask you to guess the average score of the girls and the boys in your class, where you round off to the integer closest to your guess. If you guess correctly, we will pay you 100 Tsh.

The average score of the girls in my class (0-20) ☐

The average score of the boys in my class (0-20) ☐

9.2.4 Do you want to compete?

AGAINST BOYS

We will now ask you to answer another set of twenty math questions, of the same level of difficulty as you asked in the previous round. This time, however, you can choose how to be paid, where there are two possible compensation schemes. If you choose **Fixed payment**, *we will as in the previous round pay you 100 Tsh for each correct answer. If you choose* **Competitive payment**, *we will pay you 300 Tsh for each correct answer if you perform better than the average score of the boys (which you guessed above). If you perform worse than the average score of the boys, you will be paid 0 Tsh for each correct answer. Please choose one of the two compensation schemes below. Tick off one.*

A Fixed payment ☐

B Competitive payment ☐

9.3. Math questions – *Handed out separately*

1	8+4+11+10=	
2	16+7+1+6=	
3	14+15+8+18=	
4	4+9+8+18=	
5	6+15+5+13=	
6	5+16+8+3=	
7	2+15+20+11=	
8	10+20+8+6=	
9	11+6+8+6=	
10	18+7+3+16=	
11	14+7+2+14=	
12	15+14+17+10=	
13	9+12+6+2=	
14	10+3+2+6=	
15	1+5+6+12=	
16	6+8+14+14=	
17	6+6+17+18=	
18	9+3+10+11=	
19	15+19+16+14=	
20	15+19+7+1=	

G.2. Risk measure

How willing are you to take risks, in general? Respondents rate their willingness on a scale from 0 to 10.

H. Curriculum

Each of the trainings were made of eight modules. The entrepreneurship training, "*Build your life*", included:

1. We are girls, we can!
2. Being an entrepreneur.
3. Business ideas and different types of businesses to start.
4. Marketing and customer care.
5. Resources you will need.
6. Business, security and relationships.
7. How to think about money.
8. Planning your business and moving forward

and the sexual and reproductive health training, "*Protect your life*", included:

1. We are girls.
2. Coming of age.
3. Healthy relationships.
4. Let's talk about sex.
5. Staying safe: part I.
6. Staying safe: part II.
7. Violence against women.
8. Moving forward.

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