Gender and Self-Selection Into a Competitive Environment:

Are Women More Overconfident Than Men?

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Abstract

Using a large running race in Sweden, this study shows that there are male-dominated environments in which the selection of women who participate are more likely to be confident/competitive and that, within this group, performance improves equally for both genders.

Keywords: Overconfidence, Competitiveness, Gender Differences

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1 Introduction

There is a growing literature on gender differences in competitiveness, confidence and risk behavior.[1] The consensus in these studies is that women, on average, are less competitive, less confident and more risk averse than men. Average differences do not necessarily imply systematic gender differences in all settings. It is possible, for example, that women active in traditional male environments are as, or even more, competitive and confident as the men in these environments.[2]

In this paper, we use a large running competition in Sweden, with a unique placement strategy, in order to test gender differences in competitiveness and confidence. Using a running competition where men and women participate together provides a unique opportunity to estimate such differences in a competitive male-dominated setting. Recently, Gneezy and Rustichini (2004) test how gender differences in performance are affected by competition using a running test among compulsory school children.[3] They find that, on average, competition improves the performance of young male runners but not young female runners. In contrast, our study focuses on a selection of women who by virtue of participating in a male dominated sporting event, are likely to be highly competitive.

2 The midnight race

The Midnight Race (*Midnattsloppet*) is a 10,000 meter race held annually (since 1982) in Stockholm, Sweden.[4] In 2006 more than 12,000 runners participated, approximately 1 percent of which can be classified as elite competitive runners.[5]

Before 2006, runners in this race were placed into start groups according to earlier results or, if first time runners, in the last start group. In 2006 however, the policy for group placement changed. All participants were now given the opportunity to self-select into start groups based on individual assessment of running times for a 10 km race. Six start groups were available with explicit

[1] See Croson and Gneezy (2004) for an overview.

[2] There are for example a number of studies, primarily on financial markets, that show that women who choose to be in competitive environments perform as well as men. For an overview of these studies, see Croson and Gneezy (2004).

[3] The running test was administered in a regularly scheduled physical education class.

[4] In 2006, around 200,000 spectators lined the route to cheer on the runners. For information about the race, see http://www.midnattsloppet.com.

[5] Midnattsloppet 2006 was a qualifying race for the European Championships.

time intervals, where start group 1 was the fastest group, start group 2 the next fastest and so on.[6]

We focus on a sub-sample of runners who participated in both the 2005 and 2006 race, i.e., on runners who should have a clear idea of their individual running ability by virtue of having run the same course the year before. Using the placement strategy described above, we define two measures of what we denote as overconfidence. One measures whether women to a larger extent than men self-select into faster start groups than what is motivated by their final results in the same race (2006). The other measures whether women to a larger extent than men self-select into faster start groups in 2006 than motivated by the final results of the preceding year's race (2005). Notice that we do not separate between overconfident and (over) competitive behaviour. Individuals may self-select into faster start groups due to overconfidence in individual ability or due to highly competitive behavior, i.e., the desire to challenge oneself or race against faster runners by self-selection into faster start groups.

Our sample consists of 3,202 runners who made the start group decision and finished the race in 2006 and competed in 2005, 26 percent of which are female.[7]

Table 1 shows descriptive statistics by gender. Approximately 53 percent of women are overconfident using the first definition, i.e., choose a faster start group (lower time) than individual final results. The corresponding figure for men is 47 percent. Using the second measure, 47 percent of women and 40 percent of men are overconfident. These unadjusted gender differences are significant (See Table 2, Column 1). Female runners are also, however, on average younger and more likely to be in slower start groups. A portion of the overconfidence gap may be due to these differences.

[6]

Start group (expected time in minutes)	# runners (share female)
1 ($\leq$45)	668 (.04)
2 (45$<$ t $\leq$50)	773 (.16)
3 (50$<$ t $\leq$55)	697 (.29)
4 (55$<$ t $\leq$60)	561 (.43)
5 (60$<$ t $\leq$70)	414 (.48)
6 (t$>$70)	89 (.37)

[7] In total there were 8,957 runners who made the start group decision and finished the race in 2006, 32 percent of which were female. Runners who did not choose a start group are excluded from the analysis. In addition, the elite runners who were automatically placed in a closed start group in front of the other open start groups were excluded from the analysis.

3 Results

Linear probability models using the first measure of overconfidence controlling for age do not significantly alter gender differences in overconfidence. Female runners are associated with a significant 7 percentage point higher probability of overconfidence relative to men. In addition, age is found to be positively associated to overconfidence probabilities (See Table 2, Column 2).

Estimations (not shown) on differences in overconfidence between start groups indicate that the likelihood of being overconfident is smallest in the slowest start groups, i.e., in start groups 5 and 6. Runners in start group 5 (group 6) are associated with an approximately 12 (43) percentage point lower likelihood of being overconfident than runners in start group 1.[8] At the same time, female runners are significantly more likely to be found in these slower start groups. As shown in Table 2, Column 3, controlling for a full set of start group dummies in estimation increases gender differences in overconfidence noticeably. Female runners are now associated with a significant 12 percentage point higher probability of overconfidence relative to men.

As female runners are on average slower than male runners, we include in estimation a control for finishing times in 2005, i.e., for a measure of proven running ability on the same course in the previous year (Column 4). This decreases the gender overconfidence gap considerably. Female runners are however still associated with a significant 5 percentage point higher overconfidence probability in comparison to similarly skilled male runners.

Linear probability models using the second definition of overconfidence (self-selection into faster start groups in 2006 than motivated by results in 2005) indicate that female runners are six percent more likely than male runners to be overconfident.[9]

The final question to answer then is if overconfidence affects performance. That is to say do female runners who self-select into faster start groups than motivated by results in 2005 improve their performance in 2006? If this is the case, overconfident behavior can be seen as rational. Several studies have shown that as the competitiveness of an environment increases, the performance of men increases relative to that of women (Gneezy et al., 2003; 2004). We regress the difference in results (speed) between 2006 and 2005 on a dummy variable for the second measure of overconfidence. This measures how perfor-

[8]Significant gender differences in overconfidence are however found within each start group.

[9]Controlling for age does not alter this result.

mance changes for the overconfident runners in comparison to the other runners. Our results show that confidence pays off in terms of performance. On average, overconfident runners improve their times by 2.17 minutes more than the other runners. It is important to note however, that there are no gender differences in improved performance among the selection of runners characterised by overconfident/competitive behavior.

4 Conclusions

Many studies show that women on average are more likely to shy away from competition. If competitive behaviour pays off in the labour market such behaviour may help to explain gender gaps in income and social position. Average differences do not however imply that systematic gender differences in preferences exist in all settings. It is possible, for example, that women who are in traditionally male environments are as, or even more, competitive as men in these environments.

In this paper we have used a large running race in Sweden to study how women who choose to compete in a male-dominated setting behave and how this behavior affects performance. In 2006, participants were given the opportunity to self-select into start groups based on individual assessment of running times. Overconfidence behavior is measured as self-selection into start groups with lower time intervals than what final results in the same race (or in the previous year's race) motivate.

The results reported here can be seen as a complement to the results reported by Gneezy and Rustichini (2004) who find that competition improves performance in a running test for school-aged boys, but not for the girls in the same class. We argue that it is also important to study gender differences in non-representative settings. Our study shows that there are environments (male-dominated) in which the selection of women who participate are more likely to be confident/competitive and that, within this group, performance improves equally for both genders. This is important as gender differences in labor outcomes may be underestimated in selective environments, such as among executives. Earlier studies on the gender wage gap, for example, have found a glass-ceiling for women in the upper part of the income/wage distribution (see e.g., Albrecht *et al.*, 2003). One interpretation of a glass ceiling is that women have greater difficulties than men in obtaining higher positions for observationally equivalent qualifications due to unobservable differences in

competitiveness. If there are women in male settings who are as competitive as men, as implied by our results, women who compete for higher positions may be evaluated on average female behaviour and therefore statistically discriminated from reaching higher positions.

References

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Tables

Table 1. Means for Midnight race runners (standard deviation in parentheses).

	Females	Males
Age	41 (11)	43 (12)
Finish time 2006	60.6 (8.6)	53.3 (9.0)
Finish time 2005	60.0 (7.9)	52.9 (8.3)
Over confident 1	.532	.466
Over confident 2	.466	.405
Runners	822	2,380

Notes: *Overconfident 1* is a dummy variable taking the value 1 if an individual selected faster start groups than motivated by their final results in the same race (2006). *Overconfident 2* is a dummy variable taking the value 1 if an individual selected into faster start groups in 2006 than motivated by the final results of the preceding year's race (2005).

Table 2. Linear Probability Models On Overconfidence (standard errors in parentheses). *Observations*$= 3,202$.

	1	2	3	4
Female	0.066***	0.073***	0.123***	0.050***
	(0.020)	(0.020)	(0.021)	(0.020)
Age	–	0.004***	0.006***	0.004***
		(0.000)	(0.001)	(0.001)
Time '05	–	–	–	0.038***
		–	–	(0.002)
Start group dummy	no	no	yes	yes

Notes:
i) Estimations are based on the first overconfidence measure (Overconfident 1).
ii) *** denote a significant difference from zero at the 1 percent level.
ii) Standard errors are robust to any form of heteroscedasticity.