



Prosocial option increases women's entry into competition

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Edited by Jose A. Scheinkman, Columbia University, New York, NY, and approved October 4, 2021 (received for review July 6, 2021)

We provide evidence that women enter competitions at the same rate as men when the incentive for winning includes the option to share part of the rewards with the losers (i.e., when the incentive system is socially oriented). Using an experiment (with $N = 238$ subjects from three laboratories), we find that about 16% more men than women choose to compete in the standard tournament; this gender gap is eliminated in the socially oriented incentive treatment. While men's choice to compete remains unchanged, at around 52% in both conditions, women increase their entry rate from 35% in the standard tournament to 60% when the incentive includes a socially oriented option.

female competitiveness | cooperation | gender wage gap | tournament | dictator game

Our research investigates one possible reason behind the finding that women display a lower desire to compete than men in laboratory experiments (1). We hypothesize that the gap in competitiveness generally found in tournament experiments derives from the one-dimensional, money-only payoff structure traditionally implemented. We design a treatment that varies the incentive for winning and demonstrate that the introduction of a socially oriented incentive closes the gender gap in competitiveness. The finding that women choose to compete less than they should relative to their abilities has been interpreted as evidence that women are less competitive than men, an idea advanced as an explanation for the pervasive gender wage gap. High-earning jobs offer superior, but less predictable, returns, and are arguably also more competitive. So, if women are less competitive than men, they are predicted to remain a minority in high-ranking economic positions. Individual preferences for competition, which may differ on the basis of sex, are important to investigate because of their implications for an individual's economic well-being, from career choice to salaries and promotions.

Our work is motivated by the idea that females—at least in certain contexts—can be as competitive as males, yet they exhibit it differently (see ref. 2 for a more detailed account). Here, we advance the hypothesis that women, rather than having a lower desire to compete, are motivated to respond to the prosocial nature of the incentives, as a reflection of their different evolutionary and cultural constraints.*

To men, the principal benefit to winning competitions and achieving high status, besides uncontested access to resources, is the greater reproductive opportunities that such resources afford (4, 5). For women, the benefits accrue differently: Power and status are important because of the benefits they provide to their offspring (6). This difference is noticeable in western traditional gender roles where men are viewed as securers of resources and women are viewed as distributors of those resources to members of the family (7). However, there are hidden costs to winning that women, specifically, face. For women, occupying powerful

positions in society does not seem to translate into attracting higher-quality men (8, 9). Women in high-executive positions and political appointments are more likely to get divorced than men (10), receive negative reactions from their spouses, and report lower marital satisfaction (11). For men, in addition to the reproductive benefits, high status secures male allies. For women, high status may alienate other women—hence, appearing less competitive may be a crucial element for securing allies (12, 13).

In summary, women benefit from high status but are aware of the unique costs associated with it. This suggests that women may be just as competitive as men, if the incentives involved reflect the social environment. Here, we focus on one such scenario in which the prize for winning a tournament includes a social dimension: Winners have the option to share some of the prize with one of the losers. This prosocial option, known to the participants ahead of the competition, may appeal to women who are motivated to gain control of the distribution of resources or to repair social connections postcompetition.

We employ a between-subject design in which subjects are randomly assigned to one of two treatments: Baseline or Dictator. Each treatment consists of three rounds of a real effort task, the matrix search, under varying payment schemes: a piece rate per correct answer (round 1), a mandatory tournament where all subjects experience the competitive environment (round 2), and a choice between being paid according the piece-rate scheme or the tournament scheme (round 3). This choice in the last round is our outcome variable.

In the piece-rate round of both treatments, participants earn a prize equal to \$2 per correct matrix, regardless of how well they perform relative to others. The tournament round is a winners-take-all contest similar to the standard design (1). In each session, participants are randomly matched in groups of four.[†] Within each group, the top two performers are winners, and the bottom two performers are losers. In Baseline, the prize for winners in the tournament is equal to \$4 per correct matrix; losers earn \$0. In Dictator, the prosocial tournament, the prize for winners is the same as in Baseline except that the winners have the option

Author contributions: A.C. and M.L.R. designed research, performed research, analyzed data, and wrote the paper.

The authors declare no competing interest.

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This article contains supporting information online at <https://www.pnas.org/lookup/suppl/doi:10.1073/pnas.2111943118/-DCSupplemental>.

Published November 1, 2021.

[†]In ref. 1, the participants knew that each group comprised two women and two men. In our setting, groups were formed randomly and anonymously, so the participants did not know the gender of those they were competing against, but they could expect a mix since each session was gender balanced (62% female on average). The random formation of groups resulted in 82% (51/62) mixed-gender groups and 18% (11/62) single-sex groups.

* Evidence suggests that, in matrilineal societies, there is no gender difference in competitiveness at any age, whereas, in patriarchal societies, women become less competitive than men around puberty (3).

to share some of those gains with one of the losers; losers earn \$0 plus what gets shared. Beliefs about their own capabilities relative to others were elicited by asking participants to guess their rank following the tournament, and risk preferences were elicited using the Eckel and Grossman measure (14) (SI Appendix).

Our main hypothesis is that the gender gap in choosing to compete in round 3 will close when the incentive is socially oriented as in the Dictator treatment, that is, when the tournament includes a prosocial option.

Results

Fig. 1 depicts our results by displaying the percentage of men and women who, under each treatment, opt to compete for a higher prize rather than settling on a piece-rate payment. Our results support the hypothesis that including a socially oriented incentive for an otherwise identical tournament closes the gender gap in competitiveness. First, the data in Baseline replicate the standard finding: The percentage of males choosing the tournament, 51%, is significantly higher than the percentage of females choosing the tournament, 34.8% ($N = 51$, $N = 69$, respectively; $P = 0.076$).[‡] Second, in Dictator, when the winners are given the option to share some of their prize with a loser, the entry gap closes: 52.5% men enter vs. 60.3% women ($N = 40$, $N = 78$, respectively; $P = 0.424$). Comparing entry rate by gender across treatments, we observe that women nearly double their entry rate into the tournament, from 34.8% in Baseline to 60.3% in Dictator ($P = 0.002$), while men's entry rates stay the same, 51% vs. 52.5% ($P = 0.887$).

How much of this effect is due to different abilities across genders, risk preferences, and beliefs about abilities (i.e., confidence)? The men in our sample performed better than the women in the piece-rate payment scheme implemented in round 1 in both treatments (Baseline: 5.75 vs. 4.61, $P = 0.021$; Dictator: 5.75 vs. 4.55, $P = 0.014$), suggesting that the task may be gendered. This bias makes our main result more difficult to observe and thus suggests that it is robust. While there is a gender difference in performance in the mandatory tournament (round 2) under Baseline (5.82 vs. 4.93; $P = 0.044$), the gap closes under Dictator (5.13 vs. 4.46; $P = 0.179$), a result that replicates and extends to a choice of entry protocol the findings in ref. 2. In terms

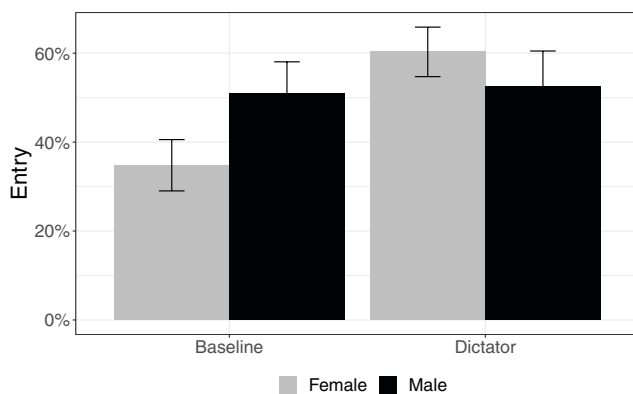


Fig. 1. Choice to compete. Bars represent the percentage of subjects choosing to compete under each treatment for men (black) and women (gray). Error bars represent mean \pm SE. In Baseline, women choose to compete at significantly lower rates than men (34.8% vs. 51%, t test $P = 0.076$). In Dictator, women choose to compete at rates not significantly different from men (60.3% vs. 52.5%, t test $P = 0.424$). While men's entry remains unchanged across treatments (t test $P = 0.887$), women's entry significantly increases in the socially oriented treatment (t test $P = 0.002$).

[‡]The reported P values are from two-sided t tests.

of risk preferences, women are more risk averse than men in both treatments ($P = 0.001$). Men and women exhibit similar levels of overconfidence measured as the difference between their guess and their actual rank: Baseline, 0.15 vs. 0.02 ($P = 0.540$); Dictator, -0.06 vs. -0.24 ($P = 0.372$). Table 1 reports Probit regression results on entry decisions. Model 2 shows that controlling for these differences in individual abilities (using performance in the mandatory round 2 tournament), risk preferences, and beliefs explains some of the gender gap in competitiveness, but leaves the interaction effect of gender and treatment reported in model 1 largely unchanged and equally significant.[§] Separately by sex, model 3 shows that the treatment does not impact men's entry decisions, while model 4 confirms that women increase their competitiveness with the socially oriented incentive by nearly 33%. There is no difference across laboratories (controlled for in all specifications).

Does the option to share get exercised more by women than by men? In round 2 (in Dictator), all subjects record ex ante how much, if any, of the prize they will share in the event that they win. Half or more commit to give a positive amount (62.5% men and 52.6% women, $P = 0.306$). In round 3, where the option to share is presented only after winning, fewer men exercise the option compared to round 2, while women exercise the option at a similar rate (41.7% men and 52.2% women, $P = 0.568$). However, the percent transferred does not differ across genders in either round 2 (men, 14.9%; women, 15.2%; $P = 0.933$) or round 3 (men 7.5% vs. women 11.1%; $P = 0.412$).[¶] This replicates previous work on dictator behavior where dictators have a property right over the pie (see ref. 15).

Table 1. Choice to compete

| | All (model 1) | All (model 2) | Male (model 3) | Female (model 4) |
|--------------------------|---------------------|---------------------|--------------------|---------------------|
| Female | -0.164** (0.067) | -0.071 (0.080) | | |
| Dictator | 0.026 (0.084) | 0.085 (0.092) | 0.069 (0.092) | 0.329*** (0.097) |
| Female \times Dictator | 0.236** (0.107) | 0.245** (0.106) | | |
| Score in round 2 | | 0.039** (0.016) | 0.029 (0.028) | 0.046** (0.017) |
| Risk tolerance | | 0.048*** (0.014) | 0.060** (0.025) | 0.047** (0.019) |
| Overconfidence | | 0.076*** (0.026) | 0.101* (0.055) | 0.055* (0.028) |
| Lab controls | Yes | Yes | Yes | Yes |
| N | 238 | 238 | 91 | 147 |
| Log likelihood | -159.6 | -151.6 | -59.12 | -90.65 |
| Mean dep var | 0.496 | 0.496 | 0.516 | 0.483 |

Probit analysis. Dependent variable = 1 if subject chooses to enter competition, zero otherwise. Marginal effects are reported. Robust SEs clustered at the session level are reported in parentheses. Lab Controls: Chapman and Simon Fraser (University of California, Santa Cruz base category). "Mean dep var" reports the average proportion of subjects choosing to compete.

* $P < 0.10$, ** $P < 0.05$, *** $P < 0.01$.

[§]Risk preferences have been suggested as a plausible mechanism behind the finding that women enter the competition in Dictator more often because, even if they lose, they are likely to receive a share of the winnings, effectively reducing the risk to entry. To test for a differential effect of risk preferences based on gender, we ran a specification that includes, in model 2, the interaction between Female and Risk tolerance, and find that this coefficient is nearly zero and not significant ($P = 0.877$); importantly, the interaction coefficient between Female and Dictator remains stable (0.243) and significant ($P = 0.022$).

[¶]A caveat is that the number of observations in round 3 is lower than in round 2 since only half of the participants are winners. While the experiment is sufficiently powered to test the main hypothesis, it is underpowered to restrict the analysis of behavior to just the winners in round 3.

The option to share, even if not fully exercised in this anonymous environment, still motivates women to compete.

Our results are compatible with several possible motivations: sharing seen as postcompetition repair and the option to share being prized for its own sake as control over distribution of resources. It is plausible that multiple factors are at play, and we address this in ongoing work. We extend to a choice environment the involuntary dictator treatments reported in ref. 2 where dictators are forced to share their prize in two prearranged distributions (one equivalent to the one observed here and the other 50%). If the motivation behind higher competitiveness is about control of the distribution of resources, women will not choose to compete as much in either of the involuntary treatments; but, if the motivation is about appearing less overtly competitive by making losers a little better off, then women should choose to compete in the involuntary treatments as much as in Dictator.

Discussion

Our work relates to previous evidence that women enter competitions more when prosocial components are present. In one study, mothers compete as much as fathers when the rewards could benefit their children (16). In experiments exploring team competition, the gender gap closes, with women preferring to compete as a team and men preferring to compete alone (17, 18). A key innovation of our research is that it precisely isolates the prosocial aspect: The pie sizes in Baseline and Dictator are determined in exactly the same way; the only difference is whether the winner has the option to divide that pie postcompetition.

We propose that women are not less competitive than men but are differentially sensitive to the social aspects of the environment. Women face trade-offs associated with earned high status that men do not face. Competitiveness in women reflects those personal and societal pressures, intertwining a desire to compete for resources with concerns about the distribution of those resources. For navigating cooperation and competition in the social world, sex matters.

Materials and Methods

All procedures were approved by the Rutgers University and the University of San Francisco Institutional Review Boards. See *SI Appendix* for detailed methods. We employed a between-subject design with two experimental conditions: Baseline ($N = 120$; 57.50% female) and Dictator ($N = 118$; 66.10% female), randomized at the session level. The participants were undergraduate students at Chapman University; University of California, Santa Cruz; and Simon Fraser University. We obtained signed consent and guaranteed complete anonymity. They earned a \$7 show-up payment and, on average, earned \$11.36 in the matrix search task and \$6.25 in the risk preference task.

Data Availability. The data and Stata do files have been deposited on the Open Science Framework (19).

ACKNOWLEDGMENTS. We thank Andras Molnar for programming assistance and Megan Luetje, Luba Petersen, and Shuchen Zhao for recruiting subjects. We thank two reviewers and the editor for extremely helpful comments and suggestions. We thank Thony Gillies for helpful feedback on our paper. This research was supported by a grant from the NSF to A.C. and M.L.R. (SES#1919535). The study has been preregistered (AsPredicted #61171).

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