**Title:** **Exploring gender differences in effort before competition**

**Short title:** Gender, effort, and competition

**Description:** Our proposed work will examine how much effort women choose to expend before entering a competition. We will recruit 3000 participants through Amazon Mechanical Turk who will be paid for their performance on timed arithmetic and matching tasks.

**Objectives:** In conducting our studies, we intend to extend previous findings suggesting that women prepare more than men by examining whether competition exacerbates gender differences in preparation.

**Background:** Competitions are increasingly prevalent in the global labor market (Lavy, 2004; Lemieux, MacLeod, & Parent, 2009) and the winners of competitions are disproportionately rewarded (Frank & Cook, 2010). Understanding individual differences in response to competitive situations may help address economic disparities across groups, like persistent gender differences in labor market outcomes (Altonji & Blank, 1999; Blau & Kahn, 2017).

**Design:** The first study involves random assignment to one of two conditions: participants will be paid based on a competitive tournament payment scheme or a non-competitive piece-rate payment scheme. In a second study, we will test a boundary condition of the gender effect on preparation by manipulating the gender performance beliefs about the task (claiming that either male participants or female participants in previous studies performed better on the task).

**Duration:** The study is expected to take each participant between 10-15 minutes. The study will start after approval and will run until all data are collected. This is expected to take approximately 2-3 months.

**Target population:** The target population will be adults on Amazon Mechanical Turk in the US.

**Subject recruitment:** Subjects will be recruited from Amazon Mechanical Turk by posting a HIT (human intelligence task) on the site. The listing will read “Participate in a brief study on individual and group decision making being conducted by researchers at the University of Pennsylvania. Study involves completing questions and completing a short task. Participants must be (a) adults on (b) Amazon Mechanical Turk) who (c) identify as American citizens. Takes approximately 10 minutes. You will earn $2.50 for your participation, with the potential to earn a bonus payment.”

**Compensation:** Participants will be paid $2.50 (in addition to bonus earnings) after completing the study. This rate is within the normal range for Amazon Mechanical Turk.

**Procedures:**

Upon clicking on the survey link from Amazon Mechanical Turk, the first part of the survey is where participants can provide their consent for participation. Once they click the next button, confirming their willingness to participate, they will be provided the instructions for the main task. The timed task will vary across studies, involving simple arithmetic or matching (e.g., letters to corresponding numbers). Then, participants will enter the part of the study where their bonus payment is contingent upon their performance. Here, we manipulate either participants’ payment scheme (Study 1) or their beliefs (Study 2). Immediately after the manipulation, participants will be given the opportunity to complete unlimited preparation, with the option to pause in case of any unexpected interruptions. Once they have finished their optional preparation, they will complete the main task. After completing the task, they will be told their score, but not other participants’ scores. Then, they will complete a measure of their confidence by guessing their relative performance and complete measures of perceptions of gender differences in preparation and performance, with the potential to earn a bonus ($0.10) if they guess correctly on one of the randomly selected questions. Additionally, they will complete a measure of their risk aversion. Finally, they will complete demographic questions, read a debriefing form, and receive their payment code. They will automatically be paid the guaranteed $2.50, and their bonus payment will be distributed after 7 business days.

**Analysis plan:** For our primary hypotheses, we will run a linear regression with the interaction between gender and condition, number of problems completed during the main task, and total amount of time chosen to pause the practice as the predictor variables and log-transformed time spent preparing as the outcome variable.

**Consent Process:** After clicking on the Mechanical Turk HIT, participants will be shown an informed consent form inviting them to participate in a voluntary study that they may quit at any time without penalty. This form will include a comment about the confidentiality of the data, the minimal risk it poses to the participant, and the compensation the participant will receive. See the attached document for more information.

Because the study is conducted online and poses minimal risk to the participant, we request that written consent not be required. Instead, by clicking on the link to the study, participants will be considered to consent to the study.

**Potential Study risks:** The study poses minimal risk to the participants.

**Potential Study Benefits:** The participants are paid for their participation. In addition, the knowledge from this study can help improve our understanding of the gender gap in willingness to compete. In doing so, the study will support interventions to reduce the gap.

**Risk/Benefit Assessment:** The study poses minimal risk to participants while benefiting society by advancing our knowledge about improving gender equality across institutions

**Study instruments:** For all studies, the basic structure is the same. After successfully completing the screening, participants will be incentivized to complete a timed task. They will be provided instructions for the task before they enter the round, where they will be told that they can earn bonuses depending on their performance, their choices, and the choices of other participants in the study. Their bonus payment will depend on how many correct answers they submit within the allotted time and their choice of a payment scheme. Under a piece-rate payment scheme, they will earn a fixed reward ($.10) for each correct answer. The other option, called the tournament payment scheme, offers a larger reward for each correct answer ($.2s0), but participants will only earn a reward if their score is higher than their randomly assigned partner. If they lose the tournament, they do not receive anything. Before completing the multiplication task, they will choose between the noncompetitive piece-rate payment scheme and the competitive tournament payment scheme and complete a multiplication task (Niederle & Vesterlund, 2011). Thus, the amount of their payment will depend on their performance and their choice to enter the piece-rate or tournament scheme. After reading the instructions for the task, participants will decide which payment scheme they want to submit their performance to. I will follow the typical operationalization of competitiveness in economics, where participants that opt into the tournament scheme are labeled as more competitive (Niederle & Vesterlund, 2011). After participants complete the task, they will answer a series of questionnaires that will be included in all analyses as control measures, including confidence in their relative performance, risk aversion, and perceptions of gender differences in performance and preferences. Finally, they will answer some demographic questions before being directed to a completion code to enter into Amazon MTurk for payment.

**Group modification:** The studies will involve various manipulations to determine how they affect gender differences in the choice to prepare. In Study 1, we will manipulate whether participants follow a competitive tournament payment scheme or a non-competitive piece-rate payment scheme before they choose to prepare. The second study will manipulate beliefs about gender differences in performance to determine whether this elicits gender differences in preparation before competition.

**Random assignment:** Participants will be randomly assigned to a condition upon entering each individual study.

**Administration:** Participants will be recruited online from Amazon Mechanical Turk. The studies will be administered until completed.

**Data management:** Data will be stored on personal computers of the study personnel as well as on cloud-based storage through the Open Science Framework. No personal identifying information will be collected.

**Abstract protocol:** 3000 participants will be recruited online to participate in two studies assessing individual and group decision making. We will manipulate competition and beliefs in various ways to examine the effect on gender differences in willingness to prepare. At the end of the rounds, participants will answer questions about confidence, risk, perceptions of gender differences in performance and preferences, and provide their demographic information. We are interested in whether the manipulations of beliefs and competition exacerbate gender differences in the choice to prepare.

**Primary outcome:** The primary outcome variable is log-scaled length of time spent preparing before the main task.

**Resources necessary for human research protection:** We will not need research staff to support the experiment.

**Accrual:** Participants will be recruited from Amazon Mechanical Turk, which is often used in psychology to complete studies. This pool allows for access to many participants, enough to meet our target sample size.

**Inclusion Criteria:** Participants must be (a) 18 years or older (b) identify as male or female and (c) American citizens.

**Exclusion criteria:** Participants will be excluded if they do not meet the inclusion criteria.

**Vulnerable populations:** The population is not vulnerable to coercion and routinely participate in similar tasks for similar pay.

**Confidentiality:** No personal identifying information connected to actual responses.

**Privacy:** No contact information will be collected during the study. Participants sign-up by clicking on the Qualtrics link that directs them to the experiment.

**Data disclosure:** Following emerging norms in the field, data will be posted to a public online repository. These data will not include any personal identifying information.

**Impairment:** Participants will not be tested for competency. All participants are expected to be competent to give consent.

**Monitoring:** Keana Richards will monitor collection. There are no planned interim or stopping points during data collection.