# Competition, Fear of Retaliation, and Concern for Others

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5/10/2013

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Abstract

Previous research has demonstrated that individuals behave more competitively when the number of competitors is small (i.e. the n-effect; Garcia & Tor, 2009). However, Vandegrift and Holaday (2012) found that this effect is not robust when competitive behavior has a negative impact on others. This paper seeks to determine the importance of fairness and fears of retaliation in constraining competitive behavior. In addition, this paper tests whether group size moderates each of these effects. In a 2x3 design, we asked participants whether or not they would take a higher bonus to work more hours (i.e. the "competitive" route), varying 1) whether or not competing reduced future earnings of coworkers, 2) how many coworkers were referenced or affected (3 or 39), and 3) whether or not the participant would continue working in the same location with the coworkers (and thus face potential retribution). Participants competed most when it had no impact on coworkers. When competing impacted coworkers' earnings, participants competed more in a larger reference group and when there was no possibility of retaliation. This suggests that holding the total impact constant, participants are more likely to compete when a large number of coworkers lose a small amount than when a small number of coworkers lose a large amount. Interestingly, fear of retaliation is unaffected by group size. While no main effect of gender was discovered, women were less likely than men to compete when retaliation would be possible, suggesting a moderator for gender differences in competitive behavior.

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It is human nature to compete with others for scarce resources, ranking, and even survival (Hirshleifer, 1978). In developed countries, individuals compete for job recognition, products compete for market share, and companies compete for the rights to merge with one another. For firms, this competitive behavior can take the form of aggressive pricing and advertising campaigns (Vilcassim, Kadiyali, & Chintagunta, 1999), product differentiation (Caves & Ghemawat, 2006), and other strategies. Because competitive firms are often driven by competitive individuals, the decisions of those individuals can shape the competitive landscape.

In many decision contexts, people compete by supplying varying amounts of effort in performance. Individuals who strive to succeed may work harder to compete against their coworkers, gaining prestige, financial gain, or other rewards. In these effort-based performance contexts, not all behavior is economically "rational" and many social and psychological factors come in to play. Whereas traditional economic theory assumes that people act rationally to maximize utility, ambient factors can influence choice. Recent work by Garcia, Tor, and Gonzalez (2006), along with other authors (e.g. Garcia, Tor, Bazerman & Miller, 2005), emphasizes the importance of the immediate environment and contextual factors on competitive decision making. Garcia and Tor (2009) accordingly discovered a phenomenon, the n-effect, by which competitors exhibit less effort as the number of opponents increases. As one example, the authors find that test takers performed better on the SAT when fewer other individuals were in the room, even after controlling for differences in ethnicity, income level, and quality of education (Garcia & Tor, 2009).

Other research has explored the seeming "irrationality" of some decision-making behavior. Indeed, researchers have found that considerations of fairness restrict competitive

decision-making (Kahneman Knetsch, & Thaler, 1986a), causing individuals to fail to maximize economic gains. They argue that people assess whether or not the end result of a competitive action is fair based on reference points. For example, a manager who pays his employees $10 per hour may only be considered fair if the wage rate in the previous year was lower or equal, but a reduction of wages is considered unfair and cruel, even if this reduction appropriately follows the market equilibrium wage rate. In this way, sticky wages can result such that market forces could reduce the real value of labor but wages would remain at previous levels, a complication of normal economic analysis. A variety of articles demonstrate that considerations of fairness have the power to constrain profit-seeking behavior in many different markets (e.g. Kahneman et al., 1986a; Kahneman, Knetsch, & Thaler, 1986b).

Several researchers (e.g. Folger, 1987; Greenberg, 1990; Sheppard, Lewicki, & Minton, 1992) propose that when managerial, coworker, or other organizational decisions seem unfair, affected employees can experience anger, outrage, and resentment. Further, these "hot" emotions can incite a desire for retribution and punishment of the guilty party (Sheppard et al., 1992). Therefore, an affected party that is offended by the unfairness of a decision may retaliate. Fear of this retaliation may prevent a decision-maker from making an optimal choice in a competitive context.

In this article, we hope to contribute to the integration of psychology and economics, as well as demonstrate the importance of developing a behavioral theory of competition. We aim to gauge the relative importance of fairness and retaliation concerns in constraining competitive behavior, exploring the impact of these factors on a specific context effect, the n-effect. We compare conditions where competitive actions lower the returns of others to a “no impact” baseline to show the pure effect of “impact.” To capture these differences and also vary the

number of competitors (to test the n-effect), we constructed a survey that varies these elements and the possibility of retaliation in a 2 x 3 design. We test for gender differences in the decision to compete because a series of articles have found men show more competitive behavior than women in various choice contexts (e.g. Gneezy, Niederle, and Rustichini, 2003; Niederle & Vesterlund, 2007; Vandegrift & Yavas, 2009).

We find that respondents almost always competed when competitive behavior had no impact on coworkers (the baseline conditions). When competing reduced coworkers' earnings, participants competed more in a larger reference group than a smaller reference group, and more when there was no possibility of retaliation as compared to when there was a possibility. While no main effect of gender was discovered, women were less likely than men to compete when retaliation would be possible, suggesting that women may be more concerned about potential retribution, which restricted their behavior.

## Literature Review

Most existing research in economics has focused on establishing a rigorous and precise model of rational competitive behavior. Indeed, work focused on the behavioral aspects of competition is far less exact (McNulty, 1968) or pervasive. However, in recent years, the field has begun to examine contextual and social factors which may affect competitive decision making. Fehr and Schmidt (1999) establish that the economic environment can determine whether cooperation-driven or competition-driven actors dominate equilibrium behavior, and whether people decide to exploit free-riding opportunities or punish free riders. On a more microeconomic level, competitors' individual relationships have been found to directly influence the competitive decisions they make (Kilduff, Elfenbein, & Staw, 2010). Research has found that participant decisions in the prisoner's dilemma are impacted by prior interactions with their

partners (Bettenhausen & Murnighan, 1991). Competing with a rival can also induce feelings of excitement and anxiety, which then promote more competitive actions. Beyond rivalry, factors like social facilitation, time pressure, and the uniqueness of being first all prompt competitive arousal and can lead to more aggressively competitive behavior (Ku, Malhotra, & Murnighan, 2005). Aggressive competitive behavior is also impacted by the following factors.

Social preferences have been modeled in the economic literature as altruism (e.g. Becker, 1974; Andreoni, 1989), inequality aversion (e.g. Bolton & Ockenfels, 2000; Fehr & Schmidt 1999), reciprocity (e.g. Charness & Rabin, 2002; Dufwenberg & Kirchsteiger, 2004), and several other important variables. While economics has recognized the importance of "inequality aversion," or fairness concerns, these variables have not been explored at length. Competitive behavior that has an impact on others may be subject to fairness concerns (Vandegrift & Holaday, 2012). In previous research, consumers have been found to retaliate against firms that engage in "unfair" business practices, defecting due to moral offense (Piron & Fernandez, 1995). In work conducted by Kahneman, Knetsch, and Thaler (1986), customers care about being treated fairly and treating others fairly, and are willing to resist unfair systems even at cost to them. In short, fairness considerations may prevent individuals from choosing the best selfish economic outcome, and will thus factor into our analyses.

Research has indicated that a competitive attack's visibility, the difficulty rivals might have in responding to it, or the centrality of the action to rivals can elicit a retaliatory response (Chen & Miller, 1994). In response to hostile actions, individuals are far more likely to retaliate than would be predicted by economic self-interest models (Fehr & Gachter, 2000). Retaliation in the workplace may come in the form of social exclusion from group activities, discomfort when working in groups, difficulty in finding help from coworkers, or fewer peer nominations for

worker recognition awards. These are just some of the many ways in which coworkers are able to retaliate against one another if they feel it is justified. Because of the ease with which retaliation can be executed, it is potentially quite salient to participants, and thus may play a major role in determining the degree to which people are willing to hurt others for their own economic gain. In this way, choosing a group-equity option may be motivated not necessarily by concerns about fairness but rather by concerns about retaliation.

**The N-Effect**

Ku, Malhotra, and Murninghan (2005) discovered that people are more likely to exceed their bidding limits when facing a small number of competing bidders. In tournament behavior, rivalry has similarly been discovered to cause actors to engage in more competitive behavior. Formally known as the n-effect, this phenomenon causes people to become less competitive as the number of others in the competition increases (Garcia & Tor, 2009). Holding expected success constant, respondents experience a decreased motivation to compete when the number of competitors rises. In their words, “Mere knowledge of the number of competitors can independently affect competitive motivation even when the chances of success remain constant” (Garcia & Tor, 2009, p. 871).

In a lab context, people attempting to finish in the top 20% of fastest quiz respondents finished significantly faster if they believed they were competing in a pool of 10 rather than 100 other people (Garcia & Tor, 2009). The authors also argue that the n-effect is strongest among people high in social-comparison orientation, and is in fact mediated by it. In a competitive setting, actors can compare their performance with that of other competitors, fueling the motivation to compete (Festinger, 1954). This active comparison would be stronger with fewer

others, because as group number increases, social comparisons become less viable. Indeed, the authors find that competitive motivation diminishes as social comparisons diminish.

**The Competitive-Arousal Model**

Beyond simply prompting more competitive behavior, a decrease in the number of competitors can also induce feelings of competitive arousal (Ku et al., 2005). More specifically, rivalry can lead to overbidding, and competitive arousal can partially mediate this relationship. With fewer other bidders, there is more competitive action and participants report feeling more "excited" and "anxious" (Ku et al. 2005). Presumably, it would be difficult to get people to feel this aroused in a lab setting when they are not actually competing in a real auction, but the authors still found this relationship in a lab setting, suggesting that even the simple *thought* of competition with a rival can rouse participants (Ku et al. 2005). Further, the Yerkes-Dodson theory (Yerkes & Dodson, 1908) proposes that high levels of arousal can be detrimental to performance. Ku, Malhotra, and Murnighan (2005) use these findings to build their competitive arousal model of decision making, by which many contextual factors fuel arousal, which then impairs decision making.

**Gender Differences in Preferences and Behavior**

Several articles demonstrate that men are more inclined toward competitive behavior than are women. Gneezy, Niederle, and Rustichini (2003) find that, as the competitiveness of the environment increases, men but not women experience a significant increase in performance. In a piece-rate compensation setting, however, women are equally effective as men, suggesting that the specific context of the competitive environment can either elicit or suppress gender differences. Gneezy and Rustichini (2004) proceeded to test the speed at which elementary school children ran a 40-meter race during their physical education class. Students first ran by

themselves, and then some ran in pairs. Boys improved considerably in the second competitive round, while girls ran slower when competing, suggesting that competition improves male but not female performance.

In a study exploring the *decision* to compete, Niederle and Vesterlund (2007) discover that men selected to compete in a tournament over a piece-rate compensation scheme twice as much as women, though this was not driven by performance differences or risk aversion. The authors find that men are more overconfident, and there are gender differences in competitive behavior preferences: women shy away from competition, and men embrace it. Building on the research behind rate of entry into tournament options by gender, Vandegrift and Yavas (2009) develop two tournament payment conditions. In the winner-take-all condition, only the best performer in the tournament round would receive payment; in the graduated tournament condition, the payment was divided among first, second, and third finishers. After controlling for skill at the task, the authors find men entered to the tournament at much higher rates, and were more likely to enter too frequently, although no gender differences existed for entry into the winner-take-all condition. The above studies paint a picture of women as less willing to compete in both economic tournament and average social (i.e. the physical education class) competitive environments.

Other studies have focused on the gender differences in preferences that may affect decisions and behaviors. Carol Gilligan (1982) found that women are more sensitive to social cues that determine appropriate behavior. In a meta-analysis, Croson and Gneezy (2009) find that the social preferences of women are more situationally specific, meaning that their social preferences are more affected by contextual affects. To explain this finding, they compare Eckel and Grossman (1998) and Bolton and Katok (1995) with Ben-Ner et al. (2004) and Houser and

Schunk (2007) and suggest that women's decisions are more context-specific than men's. In a three-party ultimatum game, Guth, Schmidt, and Sutter (2007) find that female participants are significantly more likely to propose a three-way equal split than are men, suggesting that it is due to altruism or inequity aversion (perhaps fairness concerns). Women are also found to be more inequality-averse in dictator games, with women more concerned about equalizing earnings between the parties and men more concerned with maximizing efficiency (Andreoni & Vesterlund, 2001). In the context of the present study, it will be important to explore whether women will be a) more sensitive to context effects and the experimental manipulations, and b) more concerned with equality and avoiding inequity.

**The Present Study**

The n-effect identified in Garcia and Tor (2009) and corroborated by Tor and Garcia (2010) may not arise in normal economic interactions. In markets, there tends to exist an inverse relationship between the number of involved actors and the impact that the competitive actions each have on the others (e.g. oligopolistic interdependence; Vandegrift & Holaday, 2012). For example, a manufacturer of plastic food storage containers operating in near-perfect competition would not much affect his competitors if he decided to act aggressively in the market. However, an aggressive pricing strategy instituted by one major national retailer could directly impact that company’s competitors. Because of these factors, we decided to align our design with Vandegrift and Holaday’s (2012) so that one competitor’s actions reduce the returns of another. We chose to address a form of “competing” that is less common in pure market literature but quite common in the lives of most people: coworker-related decisions in the workplace.

The present study seeks to answer the question of whether the n-effect can appear in a context where a competitor’s actions reduce the returns of another. Perhaps because of concerns

about fairness, Vandegrift and Holaday (2012) found that changing a lab task so that competitive behavior necessarily hurt other competitors eliminated evidence of the negate the n-effect. In reaction to this idea, there are many settings in which competitive behavior necessarily hurts other competitors, and individuals or groups still choose to compete. In an auction setting, competitive behavior necessarily hurts other bidders. That is, having participants overbid will necessarily reduce the "returns" of other bidders. Having rivals bid up the price back and forth (acting competitively) will make the final winner pay more than he would have if both had chosen a more cooperative path.

One alternative explanation for Vandegrift and Holaday's (2012) contradictory results could be simply that the task scenario did not incite feelings of arousal, as per the competitive arousal model. A second explanation could be that participants were not concerned about acting fairly, but instead feared retaliation. In the scenarios used in Vandegrift and Holaday (2012), it is unclear whether or not impacted coworkers would have the opportunity to retaliate against the decision maker. Participants could have imagined how they would feel as a coworker whose returns had been reduced as a result of another coworker's apparent greed, and this imagery may have fueled fear of retaliation by affected coworkers on future projects. Fear of retaliation could have motivated the decision not to compete, and this fear could have been heightened when there were fewer competitors, because having fewer competitors (coworkers) would likely mean you would interact more often with each, giving each more opportunities to seek revenge (or at least social retribution).

In the present study, I seek to examine whether fears of retaliation may prevent the decision to engage in a competitive action, and if removing the possibility of retaliation might elicit competitive behavior even when the action harms another. By the competitive-arousal

model, individuals who are more aroused are more likely to act in a competitive manner (Ku et al., 2005; Malhotra et al., 2008). Therefore, in the present study, I would look to integrate retaliatory behaviors with the competitive arousal model to discover if participants who are more "excited" and "anxious" (as operationalized by Ku et al., 2005) are more willing to select the competitive option. Three main hypotheses analyzed are: (a) whether the proportion of competitive choices will be higher in a smaller group of coworkers than a larger group, (b) whether competitive behavior will be constrained when it hurts competitors as compared to when it has no effect, and (c) whether the possibility of retaliation will decrease competitive behavior. We also seek to examine effects of gender and emotional arousal on the decision to compete.

## Data, Method, and Hypotheses

We designed an online survey to test whether concern for fairness, possibility of retaliation, or group size affected willingness to compete in an employment context. All undergraduate students over age 18 at The College of New Jersey were sent a link through Qualtrics software on Monday, March 18, 2013. The total applicant population was 6,384 students with the following demographics: 66% White, 6% Black or African America, 9% Asian, 10% Hispanic/Latino, and 8% other or unknown, with 56% of all students being female (The College of New Jersey: Student Body). A follow-up email was automatically sent to all non-respondents 6 days later (March 24), and the survey was closed on March 25, one week after it was first made available. The survey received 2,521 responses (39.47% response rate). Because gender and age were factored into analyses, a total of 501 participants who did not provide this information were dropped, leaving a remaining 2020 (31.64 % response rate). Their removal did not affect significance in any of the analyses presented below.

After agreeing to the informed consent statement, each respondent was given one of six scenarios (randomly assigned) and asked to make a choice between one competitive and one non-competitive action. On separate screens, participants were then asked why they chose the option they did, and what would be the value of the minimum bonus amount that would motivate them to select Option B (the competitive choice). Participants then completed 5 items (*1 = Strongly disagree; 7 = Strongly agree*) assessing their excitement, anxiety, and enjoyment about making this choice, as well as how they have been influenced by concerns about fairness and concerns about future interactions with coworkers. Because one question asked about anxiety levels, a follow-up question was presented asking participants which of the following best matched the way they use the word "anxious": nervous, worried, or eager (although this was not found to be significant in predicting the relevance of anxiety, so it is not addressed below). Finally, participants provided demographics items addressing gender, class level, age, and major.

The scenario was designed to specifically address three research questions. First, is the n-effect (Garcia & Tor, 2009) significant in a scenario where the actions of one competitor lower the returns of others, as constructed by Vandegrift and Holaday (2012)? Second, will competitive behavior be curbed when it hurts competitors as opposed to when it has no effect? Finally, does the possibility of retaliation by harmed competitors detract from willingness to compete? As noted in the introduction above, we modified the script used in Vandegrift and Holaday (2012). Participants were asked to imagine themselves as full-time employees having just finished a training course with a subset of coworkers. They were then told the number of coworkers in their group and whether or not they will be assigned to the same role and geographic location as their coworkers.

As a measure of competitive behavior, participants were next presented with a choice: Option A allowed them to split the bonus with coworkers (in the baseline condition, this is simply presented as "accepting" the value of the bonus equal to a fair split in the competitive condition), whereas Option B offered them a chance to work three additional hours per week and receive a larger portion of the bonus pool (in non-baseline conditions, this left less money for the other coworkers to split). We indicated that choosing Option B would make the participant one of the top earners in the office, removing the variation in proximity to a standard from the Vandegrift and Holaday script (2012). Details were added indicating that the bonus was offered as a reward for completing a training course. We added a mention of whether the participant would be assigned to the same or different role and location as his/her coworkers. To heighten the difference in group size and induce more overall competitive behavior, we changed the "small group" number to 3 and reduced the additional work requirement in Option B to three hours per week. The full text of the script and option choices can be seen in Appendix A. To indicate the differences across versions/conditions, the impact variations are shown in brackets and bold text while the retaliation variations are shown in brackets and italics. The italics, brackets, and bolding do not appear in the versions distributed to participants.

The six versions/experimental conditions were constructed in accordance with the 2 x 3 design in Appendix B below. In conditions 1 (N = 343) and 2 (N = 346), selecting Option B did not affect coworkers' bonuses. In conditions 3 (N = 347) and 4 (N = 329), selecting Option B reduced coworkers' bonuses, but the respondent would be moved to a different role and location than his/her hypothetical coworkers. In conditions 5 (N = 319) and 6 (N = 338), retaliation became possible, as Option B reduced coworkers' bonuses and all coworkers would be working in the same role and location.

*Hypothesis 1*: The n-effect will increase competitive behavior. Therefore, a higher proportion of respondents will select the competitive Option B in condition 1 (small group, no impact) than condition 2 (large group, no impact), condition 3 (small group, impact, no retaliation) than condition 4 (large group, impact, no retaliation), and condition 5 (small group, impact, retaliation) than condition 6 (large group, impact, retaliation).

*Hypothesis 2*: Competitive behavior will be reduced when it necessarily hurts competitors. Thus, the proportion of competitive choices (option B) should be higher in condition 1 (small group, no impact) than conditions 3 (small group, impact, no retaliation) and 5 (small group, impact, retaliation). Similarly, the proportion of option B selections should be higher in condition 2 (large group, no impact) than conditions 4 (large group, impact, no retaliation) and 6 (large group, impact, retaliation).

*Hypothesis 3:* The possibility of retaliation, reminders of guilt, or other future interactions with affected coworkers will decrease competitive behavior. Therefore, the proportion of competitive choices (option B) should be higher in condition 3 (small group, impact, no retaliation) than condition 5 (small group, impact, retaliation) and higher in condition 4 (large group, impact, no retaliation) than condition 6 (large group, impact, retaliation).

*Hypothesis 4*: Men will show more competitive behavior than women, selecting option B at higher rates than women overall. However, women will be more sensitive to the cues given in the scenario description, and will have larger changes in their selections as a result of the condition in which they are placed.

*Hypothesis 5*: Excited and anxious participants will be more likely to compete (by selecting option B) due to the competitive-arousal hypothesis.

## Results

**Result 1**

*We find that a change in the size of the competitive reference group does not affect competitive behavior (i.e., the n-effect) if competitive behavior does not hurt competitors.*

Hypothesis 1 suggests that the proportion of competitive choices (option B) should be higher in condition 1 (small group, no impact) than condition 2 (large group, no impact). However, our results show that respondents chose option B 84.84% of the time in condition 1 and 84.68% of the time in condition 2. A Pearson's chi-square test reveals no significant differences across conditions 1 and 2 ($\chi^2 = .003$, $p = 1.00$) and a probit analysis that controls for gender and age confirms this result (see Table 2, columns 2-4), demonstrating that there was no n-effect in the baseline conditions.

**Result 2**

*We find that when competitive behavior necessarily harms other competitors, participants are more willing to compete when in a larger reference group (contrary to the n-effect).*

Hypothesis 1 also suggests that the proportion of competitive choices (option B) should be higher in condition 3 (small group, impact, no retaliation) than condition 4 (large group, impact, no retaliation). However, our results show that respondents chose option B 44.96% of the time in condition 3 and 71.43% of the time in condition 4. Similarly, we expected that competitive choices should be higher in condition 5 (small group, impact, retaliation) than condition 6 (large group, impact, retaliation). However, our results show that respondents chose option B 35.11% of the time in condition 5 and 58.58% of the time in condition 6. Pearson's chi-square tests reveal a significantly higher proportion of choosing option B in condition 4 than condition 3 ($\chi^2 = 48.531$, $p < .01$) and in condition 6 than condition 5 ($\chi^2 = 36.276$, $p < .01$). A probit analysis that

controls for gender and age confirms this result (see Table 3, row 1). These results were also consistent across genders (see Tables 6 and 7, row 1).

**Result 3**

*We find that competitive behavior is reduced when it necessarily harms competitors as compared to when it has no effect on them.*

Hypothesis 2 suggests that competitive behavior will be constrained when it hurts competitors. Therefore, the proportion of competitive choices (option B) should be higher in condition 1 (small group, no impact) than conditions 3 (small group, impact, no retaliation) and 5 (small group, impact, retaliation). Similarly, the proportion of option B selections should be higher in condition 2 (large group, no impact) than conditions 4 (large group, impact, no retaliation) and 6 (large group, impact, retaliation). We find support in Pearson's chi-square tests that show option B chosen in condition 1 more than 3 ($\chi^2 = 120.263$, $p < .01$), 1 more than 5 ($\chi^2 = 171.622$, $p < .01$), 2 more than 4 ($\chi^2 = 17.389$, $p < .01$), and 2 more than 6 ($\chi^2 = 57.513$, $p < .01$). Further, a probit analysis that controls for gender and age reveals a significant main effect of impact (see Table 2, rows 2 and 3). This result is consistent across genders, as well (see Tables 4 and 5, rows 2 and 3).

**Result 4**

*We find that when coworkers harmed by competitive behavior will have the opportunity to retaliate, competitive behavior is reduced.*

Hypothesis 3 suggests that the possibility of retaliation, reminders of guilt, or other future interactions with affected coworkers will decrease competitive behavior. Therefore, the proportion of competitive choices (option B) should be higher in condition 3 (small group, impact, no retaliation) than condition 5 (small group, impact, retaliation) and higher in condition

4 (large group, impact, no retaliation) than condition 6 (large group, impact, retaliation). Indeed, participants chose option B 44.96% of the time in condition 3 but only 35.11% in condition 5, and 71.43% in condition 4 but only 58.58% in condition 6. Pearson's chi-square tests verify these findings, with participants choosing option B in condition 3 more than 5 ($\chi^2 = 6.702$, $p < .01$) and 4 more than 6 ($\chi^2 = 12.085$, $p < .01$). A probit analysis confirms this significant, negative main effect of the impact of retaliation on competitive choice (see Table 3, row 2). However, it is important to note that this result is only significant for women (see Result 6).

**Result 5**

*We find no main effect of gender differences; men did not consistently out-compete women.*

According to much of the competitive behavior literature, men tend to show more competitive behavior than women in most contexts. Therefore, we expected that men would choose option B more frequently than women. However, a Pearson's chi-square test demonstrates no main effect of gender. Males selected option B 270/771 times (35.02%) and females selected option B 467/1249 times (37.45%); this difference was not significant ($\chi^2 = 1.156$, $p = .28$).

**Result 6**

*We find that men competed significantly more than women in both the large group and small group retaliation conditions, and that retaliation only significantly reduced* female *competitive behavior.*

We anticipated that women would be more sensitive to the cues given in the scenario descriptions (i.e. whether it was a small or large group and whether or not there was a possibility of retaliation). However, we found no significant interaction between gender and group size. In a small group, women competed 54.03% and men competed 57.47% ($\chi^2 = 1.144$, $p = .28$); in a large group, men competed 72.51% and women competed 71.07% ($\chi^2 = .245$, $p = .62$). In the

impact, no retaliation conditions, there appears to be an interaction between gender and group size, such that men compete more than women in a small group (46.98% vs. 43.43%) and women compete more than men in a large group (73.46% vs. 67.80%). However, neither difference is statistically significant.

The interesting gender-relevant results come in the retaliation conditions. Here, men competed more than women in both the small group condition (41.23% vs. 31.71%; $\chi^2 = 2.915$, $p = .088$) and the large group condition (64.12% vs. 55.07%; $\chi^2 = 2.708$, $p = .099$). This suggests that women may be more concerned about potential retaliation than males. To explore this possibility, we dichotomized the variable "interacting," a measure of how concerned participants were about interacting with their coworkers in the future, into low (below the mean) and high (above the mean). After doing so, we found that women were indeed more highly concerned about "interacting" than men (57.01% vs. 50.84%), and these differences were statistically significant ($\chi^2 = 7.305$, $p < .01$). When exploring regressions of group size and the possibility of retaliation on male and female participants separately, retaliation was only a significant predictor for females (see Tables 6 and 7, row 2), meaning that the retaliation conditions were significant different from the no-retaliation conditions for only females. That is, the possibility of retaliation only reduced the competitive behavior of women.

**Result 7**

*We find that anxious participants are less likely to compete and excited participants are more likely to compete, lending mixed support to the competitive-arousal hypothesis.*

Hypothesis 5 suggests that excited and anxious participants will be more likely to compete (by selecting option B). We find that when controlling for effects of condition (effects of large group, impact, and retaliation), excitement significantly increases willingness to compete and

anxiety significantly decreases it (see Table 2, rows 8 and 9). It is important to note that the predictive power of anxiety disappears when factoring in concerns about fairness and about interacting with harmed coworkers in the future (see Table 2, columns 5 and 6).

**Result 8**

*We find that women were significantly more concerned about fairness, less excited about the decision to compete, and more anxious about the decision to compete, but these concerns did not affect their overall willingness to compete.*

We dichotomized the variables fairness, excitement, and anxiety by the same procedure as the variable "interacting" above. We find that more women are highly concerned about fairness (51.16%) than are men (42.93%), and this difference is significant ($\chi^2 = 12.935$, $p < .01$). We find also that more men are excited about being offered the decision to compete (71.08%) than are women (67.25%), and this difference is significant ($\chi^2 = 3.24$, $p = .07$). Further, more women were highly anxious about being offered the decision (60.05%) compared to men (48.64%), and this difference is also significant ($\chi^2 = 25.151$, $p < .01$). Despite these findings and the fact that excitement, anxiety, and fairness were all significant predictors of the decision to compete (see Table 2 column 6), we see that the only significant difference in the decision to compete comes in the retaliation condition. This suggests that while women may be more sensitive to the context, this does not necessarily affect their willingness to compete. This may explain our finding that men did not significantly out-compete women in most conditions.

## Conclusion

This article set out to discover whether the n-effect might arise in a context in which the competitive actions of one person can hurt another. The decision problem was adapted from Vandegrift and Holaday (2012), who allowed the competitive decision to require an effort choice

rather than a choice among distributional outcomes. We sought to discover whether considerations of fairness might constrain profit-seeking and economically optimal choice beyond the impact of a simple fear of retaliation. We manipulated whether or not competitive actions hurt others, the number of "others" involved in the scenario, and whether or not participants would be seeing these "others" at the workplace moving forward. We also test for differences in competitive behavior across men and women, because past work has found that men show more competitive behavior in a tournament pay scheme than do women.

Our results show that when competitive behavior did not harm others, participants chose to supply effort in almost every case, regardless of the number of other coworkers referenced. We found no n-effect in the baseline (no impact) condition, such that participants in both the large and small groups competed about 84% of the time. This suggests that participants did not base their decision on how many coworkers they would be compared to. In both scenarios, participants were told “choosing this option will make you one of the top earners in your office,” but it is apparent that being either the top out of four or the top out of forty had relatively no impact on decisions made. As such, one might immediately conclude that the n-effect identified by Garcia and Tor (2009) may not generalize to cases in which competitive behavior reduces the returns of others. However, our other results point to further needs for analysis.

We found that the pure effect of competitive behavior harming coworkers reduced the incidence of competitive behavior significantly. This is to be expected, because all else being equal, most noble people would prefer to impose no harm rather than harm on their coworkers. Further, we discovered that when competitive behavior harmed other people, participants competed more in the larger reference group (approximately 25% more, in both the retaliation and no retaliation conditions). This was consistent across genders. This finding has several

potential explanations. First, it could be that when participants were considering a larger group of coworkers, they may have anticipated not knowing each coworker as well. In a training session with 4 coworkers, it would make sense that the four would grow to know each other well over the course of fifteen weeks. A group of 40 may be less personalized, and coworkers would likely have a more professional rather than personal relationship due to the sheer impossibility of the same number of close interactions with all coworkers as in the 4-coworker condition. In this way, participants may have imagined caring less about harming people they did not know very personally, which may have driven the increase in competitive behavior for the 40-coworker condition compared to the 4-coworker condition. We can view these results through social contrasts, which Garcia and Tor use as the mediator in their analysis of the n-effect (2009). By their explanation, social comparisons become less important as group sizes increases. In this way, it is possible that our participants making guilt-ridden or fairness-concerning decisions may have felt less able to compare themselves to 40 group members than 4, driving this reverse n-effect.

An alternative explanation would require examining the allocation of funds under each choice. In the small group condition, the participant is deciding between receiving a $1500 bonus, leaving $1500 each for the remaining coworkers (option A) and competing by taking a $5,500 bonus, leaving $167 each for the remaining coworkers (option B). In the large group condition, the participant chooses between taking a $1500 bonus, leaving $1500 each for the remaining coworkers (option A) and competing by taking a $5,500 bonus, leaving $1400 each for the remaining coworkers (option B). We designed these numbers so that the participant's actual impact on the group as a whole remained the same ($5,500), affecting only the distribution of wages of the remaining coworkers. However, the *relative* impact on each coworker is different

in the small group and large group scenarios. In the small group, each coworker loses out on $1333 when the participant decides to compete ($1500 - $167); in the large group, each coworker loses out on only $100 when the participant decides to compete ($1500 - $1400). In reality, the total "damage" done by the participant in each group is quite similar: $3999 in the small group ($1333 * 3) and $3900 in the large group ($100 * 39). It appears as though each participant is examining only the impact on each individual, rather than the total damage done by the action. In summary, participants preferred to take a small amount from many coworkers than a large amount from a few coworkers. These findings suggest further research needs to explore the difference between the relative impact on each individual and the total impact to the group resulting from a competitive action.

We found that retaliation reduces competitive behavior both in the small and large group conditions. This result would be expected by most psychological literature, but may not be addressed in most economic writing. It is important to address a potential limitation in our operalization of retaliation. Our mode of manipulating retaliation was by adjusting whether or not the participant would be working in the same role and location as his/her coworkers after this decision. However, many other factors come into consideration under this manipulation. Participants concerned about fairness may have deemed it unfair to take a higher bonus when they would be working the same exact role as their coworkers (retaliation condition), but may have justified the action if they would be working in different roles (no retaliation condition). Further, it may not be exactly retaliation that participants are concerned about. It may be that working in the same location as harmed coworkers could remind them of their selfish choice (the competitive action), whereas being in a different location, they would be separated from their harmed coworkers. Therefore, we cannot be sure that it is "retaliation" we are measuring.

However, it is clear that the possibility of interacting with coworkers in the future (what we dub retaliation) did reduce competitive behavior. It is important to explain that this effect only occurred for females, and not for males. That is, men are not influenced by whether or not they will be interacting with their affected coworkers in the future, whereas women are.

We found in our sample that women were significantly more concerned about fairness, less excited about making a competitive choice, and more anxious about making a competitive choice. This may suggest that women form different types of coworker relationships that would influence their comfort with making a decision that would harm these coworkers. We also found that more anxious participants competed less often and more excited participants competed more often. The combination of these results might suggest a reformulation of the competitive arousal model to account for differences in construct between anxiety and excitement. Overall, we find evidence that behavioral and contextual factors can significantly impact competitive behavior, and recommend further exploration and integration of these factors into economic models of competitive behavior.

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Appendix A. Scenario Scripts

Imagine you work full-time at a firm (working Monday to Friday, 9 am to 5pm). You and **three** [39] coworkers share similar responsibilities and all of you have finished a 15-week training course. As a result of your training, your employer has allocated **special funds** [$6,000/ $60,000] to be awarded as a bonus to the group.

You and the other members of your training group will be assigned to *different* [similar] functional roles and *geographic locations* [the same geographic location]. It is therefore very *unlikely* [likely] that you will be interacting with these people in the future. You have just been offered a choice between the following alternatives:

Option A: Continue with your current work load and **receive a $1,500 bonus** [split the $6,000 bonus evenly among you and the other trainees ($1,500 each)/ split the $60,000 bonus evenly among you and the other trainees ($1,500 each)].

Option B: You will work an additional three hours every week for the upcoming year. However, you will receive **a $5,500 bonus** [$5,500 of the $6,000 bonus pool and the other trainees will split the remaining $500 (about $167 each)/ $5,500 of the $60,000 bonus pool and the other trainees will split the remaining $54,500 (about $1,400 each)]. Choosing this option will make you one of the top earners in your office.

| | **Baseline: No Impact** | **Impact, No Retaliation** | **Impact, Retaliation** |
|---|---|---|---|
| **3 coworkers** | 1 | 3 | 5 |
| **39 coworkers** | 2 | 4 | 6 |

Table 1A. Descriptive Statistics for Each Condition: (1 = Compete, 0 = Not Compete)

| **Cond #** | **Condition** | **Obs** | **Mean** | **Std. Dev.** | **Min.** | **Max.** |
|---|---|---|---|---|---|---|
| 1 | No Impact, 3 Co (control3) | 343 | .8483965 | .3591601 | 0 | 1 |
| 2 | No Imp, 39 Co (control39) | 346 | .8468208 | .3606817 | 0 | 1 |
| 3 | Imp, No Retal, 3 Co (nor3) | 347 | .4495677 | .4981684 | 0 | 1 |
| 4 | Imp, No Retal, 39 Co (nor39) | 329 | .7142857 | .4524421 | 0 | 1 |
| 5 | Impact, Retal, 3 Co (r3) | 319 | .3510972 | .4780632 | 0 | 1 |
| 6 | Impact, Retal, 39 Co (r39) | 338 | .5857988 | .4933139 | 0 | 1 |

Table 1B. Descriptive Statistics for Each Condition by Gender: (1 = Compete, 0 = Not Compete)

| **Cond #** | **Gender** | **Condition** | **Obs** | **Mean** | **Std. Dev.** | **Min.** | **Max.** |
|---|---|---|---|---|---|---|---|
| 1 | M | No Impact, 3 Co (control3) | 125 | .8480000 | .3604656 | 0 | 1 |
| 1 | F | No Impact, 3 Co (control3) | 218 | . 8486239 | . 359240 | 0 | 1 |
| 2 | M | No Imp, 39 Co (control39) | 135 | . 8518519 | . 3565699 | 0 | 1 |
| 2 | F | No Imp, 39 Co (control39) | 211 | . 8436019 | . 3640962 | 0 | 1 |
| 3 | M | Imp, No Retal, 3 Co (nor3) | 149 | . 4697987 | . 5007703 | 0 | 1 |
| 3 | F | Imp, No Retal, 3 Co (nor3) | 198 | .4343434 | . 4969269 | 0 | 1 |
| 4 | M | Imp, No Retal, 39 Co (nor39) | 118 | . 6779661 | . 4692485 | 0 | 1 |
| 4 | F | Imp, No Retal, 39 Co (nor39) | 211 | .7345972 | .4425975 | 0 | 1 |
| 5 | M | Impact, Retal, 3 Co (r3) | 114 | . 4122807 | . 4944185 | 0 | 1 |
| 5 | F | Impact, Retal, 3 Co (r3) | 205 | .3170732 | .4664753 | 0 | 1 |
| 6 | M | Impact, Retal, 39 Co (r39) | 131 | . 6412214 | . 4814833 | 0 | 1 |
| 6 | F | Impact, Retal, 39 Co (r39) | 207 | . 5507246 | . 4986262 | 0 | 1 |

Table 1C. Descriptive Statistics for All Other Variables:
(1 = Strongly Disagree, 7 = Strongly Agree; 1 = Male, 0 = Female)

| **Variable Name** | **Description** | **Obs** | **Mean** | **Std. Dev.** | **Min.** | **Max.** |
|---|---|---|---|---|---|---|
| exc | Excited about being given the choice | 1965 | 4.980153 | 1.52077 | 1 | 7 |
| anx | Anxious about being given the choice | 1964 | 4.244399 | 1.740221 | 1 | 7 |
| enjoy | Not enjoy making this choice (reverse coded) | 1962 | 3.949032 | 1.700842 | 1 | 7 |
| fair | Influenced by desire to be fair | 1963 | 4.311768 | 1.838427 | 1 | 7 |
| interacting | Influenced by concerns about future interactions | 1966 | 3.694812 | 1.844721 | 1 | 7 |
| gen | Gender | 2020 | .3816832 | .4859198 | 0 | 1 |
| yr | Current class level | 2020 | 2.561386 | 1.113959 | 1 | 4 |
| age | Age | 2020 | 20.44901 | 2.749195 | 1 | 59 |

Table 2. Probit Regression for the Decision to Compete: Full Sample

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| LG | .4734403 (.0604487)*** | -.0066775 (.1163335) | -.0084197 (.1165409) | .0477735 (.1311239) | .0266103 (.1481601) | .0388954 (.1501617) |
| INR | -.8275156 (.0774486)*** | -1.155366 (.1065789)*** | -1.161942 (.1068376)*** | -.8284024 (.1194016)*** | -.5085524 (.1279958)*** | -.4840187 (.127511)*** |
| IR | -1.11821 (.0782659)*** | -1.410054 (.109592)*** | -1.409352 (.1097174)*** | -1.211518 (.1193077)*** | -.8991498 (.1281834 )*** | -.7819905 (.1295586)*** |
| INR*LG | | .6999071 (.1528216)*** | .7096119 (.1532253)*** | .5779823 (.1720562)*** | .4703977 (.1880511)** | .459732 (.190218)** |
| IR*LG | | .6057885 (.1531656)*** | .6053528 (.1533349)*** | .5193775 (.1685604)*** | .4482235 (.1842619)** | .4216115 (.186218)** |
| gen | | | .083852 (.0625159) | -.0102324 (.0687424) | -.1258764 (.0757274)* | -.1291193 (.0761844 )* |
| age | | | -.0163666 (.0106627) | -.0126364 (.0119478) | -.0142462 (.0114239) | -.0143984 (.0121769) |
| anx | | | | -.0838021 (.0213127)*** | -.00523 (.023386) | .0297208 (.0250081) |
| exc | | | | .4018979 (.0253643)*** | .4041882 (.0278068 )*** | .4108465 (.0282788)*** |
| fair | | | | | -.3704542 (.0243409)*** | -.3187364 (.0256755)*** |
| interacting | | | | | | -.1351389 (.0241782)*** |
| | | | | | | |
| Pseudo $R^2$ | 0.1121 | 0.1209 | 0.1225 | 0.2731 | .3878 | .3999 |
| Wald $chi^2$ | 241.07 | 299.47 | 301.94 | 508.79 | 526.23 | 523.90 |
| N | 2020 | 2020 | 2020 | 1961 | 1958 | 1958 |

Table 3. Probit Regression for the Decision to Compete: Condition 3-6

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| LG | .646665 (.0704794)*** | .6941624 (.0997761)*** | .7050566 (.1002207*** | .6234538 (.1139966)*** |
| IR | -.2983378 (.0704778)*** | -.2515856 (.0988402)** | -.242041 (.09904)** | -.3947821 (.1089754)*** |
| IR*LG | | -.0950513 (.1410107) | -.1085659 (.1414901) | -.0554759 (.1566241) |
| gen | | | .1114408 (.0729329) | -.0189213 (.0807678) |
| age | | | -.0188099 (.0128234) | -.0102721 (.0146909) |
| anx | | | | -.0871886 (.0248693)*** |
| exc | | | | .4279402 (.0303975)*** |
| | | | | |
| Pseudo $R^2$ | 0.0545 | 0.0547 | 0.0572 | 0.2441 |
| Wald $chi^2$ | 97.68 | 97.87 | 101.38 | 309.36 |
| N | 1331 | 1331 | 1331 | 1303 |

Table 4. Probit Regression for the Decision to Compete: Full Sample, Female Only

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| LG | .5034965 (.0775864)*** | -.0182078 (.1470812) | -.0190848 (.1472235) | .0938718 (.1614002) |
| INR | -.8117025 (.0992929)*** | -1.192907 (.1369685)*** | -1.198229 (.1371567)*** | -.8012711 (.151382)*** |
| IR | -1.210704 (.0996073)*** | -1.503479 (.1381007)*** | -1.503363 (.1382601)*** | -1.245948 (.1492015)*** |
| INR*LG | | .8103111 (.1955967)*** | .8155662 (.1957849)*** | .6564721 (.2164344)*** |
| IR*LG | | .6215992 (.1939144)*** | .6203164 (.1940559)*** | .4844356 (.2116717)** |
| age | | | -.017019 (.0125288) | -.0128828 (.0144628) |
| anx | | | | -.106303 (.0282096)*** |
| exc | | | | .3920703 (.0328967)*** |
| | | | | |
| Pseudo $R^2$ | 0.1264 | 0.1375 | 0.1386 | 0.2847 |
| Wald $chi^2$ | 167.74 | 211.05 | 212.34 | 344.14 |
| N | 1249 | 1249 | 1249 | 1211 |

Table 5. Probit Regression for the Decision to Compete: Full Sample, Male Only

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| LG | .4192048<br>(.0970306)*** | .0117461<br>(.1903442) | .0133667<br>(.1905137) | -.0196344<br>(.2245947) |
| INR | -.8560007<br>(.1242246)*** | -1.106692<br>.1707974)*** | -1.101446<br>(.1709245)*** | -.8739476<br>(.1983638)*** |
| IR | -.9643983<br>(.1270935)*** | -1.249575<br>(.1808498)*** | -1.247085<br>(.181002)*** | -1.144185<br>(.2009846)*** |
| INR*LG | | .5296992<br>(.2457521)** | .528143<br>(.2457523)** | .4321427<br>(.2841837) |
| IR*LG | | .5716614<br>(.2507383)** | .5715502<br>(.251009)** | .5633941<br>(.2804308)** |
| age | | | -.01467<br>(.0206218) | -.0112333<br>(.0205099) |
| anx | | | | -.0541947<br>(.0326179)* |
| exc | | | | .4198373<br>(.0406896)*** |
| | | | | |
| Pseudo $R^2$ | 0.0936 | 0.0998 | 0.1003 | 0.2609 |
| Wald $chi^2$ | 77.35 | 93.48 | 93.77 | 173.71 |
| N | 771 | 771 | 771 | 750 |

Table 6. Probit Regression for the Decision to Compete: Conditions 3-6, Female

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| LG | .6997025 (.0902983)*** | .7994042 (.1291516)*** | .8041585 (.1291988)*** | .747212 (.1449713)*** |
| IR | -.4019982 (.0902702)*** | -.3032714 (.1280789)** | -.2974541 (.1282029)** | -.4457175 (.1418847)*** |
| IR*LG | | -.1960128 (.1807117) | -.2030318 (.1807812) | -.1672844 (.1989939) |
| age | | | -.0180446 (.0156963) | -.0052582 (.017852) |
| anx | | | | -.1190565 (.0327133)*** |
| exc | | | | .3863768 (.0373009)*** |
| | | | | |
| Pseudo $R^2$ | 0.0710 | 0.0720 | 0.0733 | 0.2436 |
| Wald $chi^2$ | 77.50 | 78.38 | 79.58 | 204.58 |
| N | 820 | 820 | 820 | 803 |

Table 7. Probit Regression for the Decision to Compete: Conditions 3-6, Male

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| LG | .555989 (.1137259)*** | .5301319 (.1584005)*** | .530305 (.1581126)*** | .4007025 (.1847863)** |
| IR | -.1205474 (.1136172) | -.1459061 (.1569714) | -.1496163 (.1571208) | -.29661 (.1718605)* |
| IR*LG | | .0532755 (.22748) | .0552824 (.2276705) | .1444329 (.2548552) |
| age | | | -.0197603 (.0218637) | -.0218042 (.0214775) |
| anx | | | | -.0428589 (.0384092) |
| exc | | | | .505657 (.0538982)*** |
| | | | | |
| Pseudo $R^2$ | 0.0349 | 0.0350 | 0.0361 | 0.2602 |
| Wald $chi^2$ | 24.19 | 24.27 | 25.05 | 113.11 |
| N | 511 | 511 | 511 | 500 |

*** = p < .01, ** = p < .05, * = p<.10

Figure 1. Choosing to Compete (Selecting Option B)

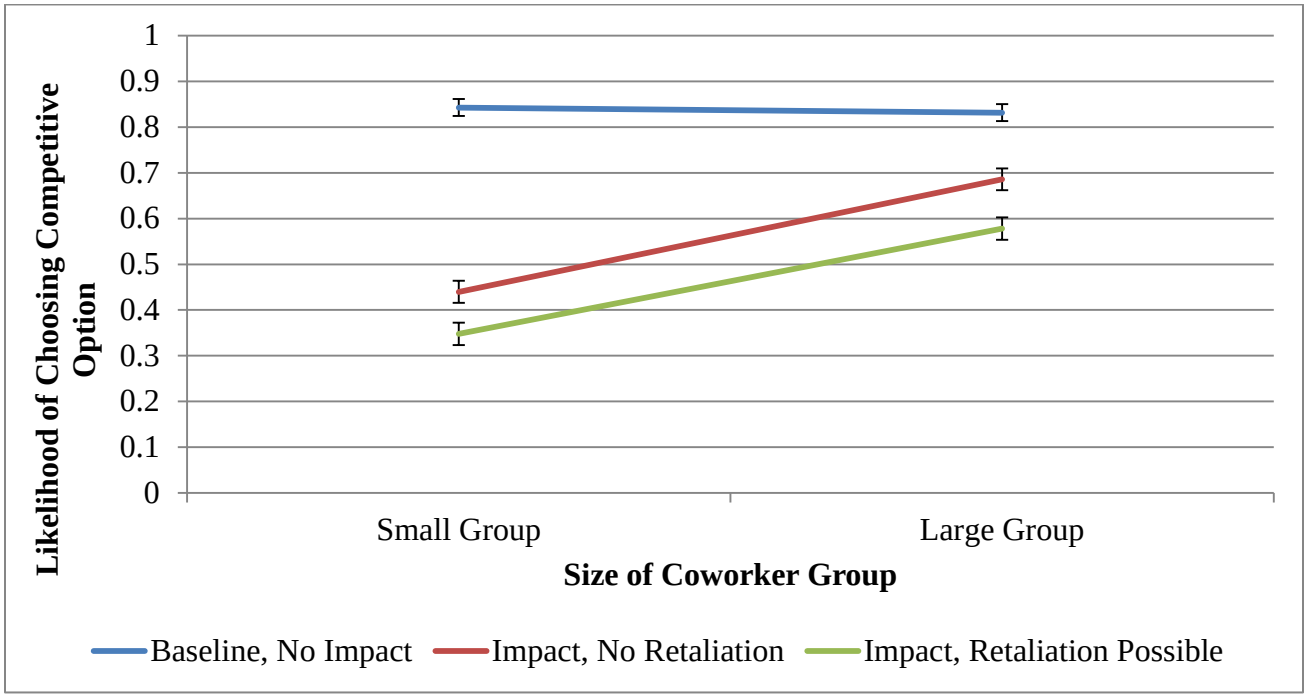

Figure 2. Choosing to Compete (Selecting Option B) by Gender