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Willingness to Compete in Dirty Competitions

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Abstract

Competitive environments often leave room for "dirty" practices such as sabotage, retaliation, or dishonesty. We use an online experiment to document aggregate levels and individual differences in the willingness to engage in dirty competition and in the willingness to enter competitions where the opponent may play dirty. We then use the experimental data to validate a set of survey questions that capture willingness to engage in dirty competition above general willingness to compete. We elicit these questions in a representative survey panel and show that willingness to engage in dirty competition is a strong predictor of holding a management or supervisory position and of working in the private – versus the public – sector, but also of worse self-esteem, worse social relationships, and increased feelings of guilt and shame. Men, younger people, and lower-educated people are on average more willing to engage in dirty competition.

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1 Introduction

A substantial body of research has examined individual differences in the propensity to engage in competition within laboratory settings, as well as the extent to which this trait can predict career choices and professional success. Willingness to compete — whether assessed through incentivized decision-making tasks or survey-based measures — has been shown to correlate with pursuing more ambitious educational pathways, selecting into different career fields, and achieving higher earnings (Buser, Niederle, and Oosterbeek 2014; Buser, Niederle, and Oosterbeek 2024; Reuben, Sapienza, and Zingales 2024). Most of this literature ignores the fact that workplace competitions are not always clean. Competitors may engage in sabotage, misrepresent their performance, or retaliate against one another. The inclination to participate in such potentially dirty contests, and even the potential willingness to engage in dirty play oneself, could play a significant role in economic success beyond someone's general tendency to compete.

We explore the economic importance of willingness to engage in dirty competitions by combining an online experiment with representative survey data. In the online experiment, participants choose whether to enter two-player real-effort competitions, where they, their opponent, or both parties have the opportunity to engage in dirty play. We consider three dirty actions: sabotaging the opponent's performance, retaliating by destroying half of the opponent's earnings in the event of a loss, and misrepresenting one's own performance. Prior to the experiment, we collect extensive personality data through a questionnaire, which includes newly developed items designed to measure willingness to engage in dirty competition and aversion to (potential) dirty play by others.

30-40 percent of participants opt to increase their chances of winning by sabotaging their opponent or misrepresenting their own performance. Around 20 percent choose to retaliate after losing by destroying half of their opponent's earnings, without any monetary benefit to themselves. Entry into competitions where the decision maker can play dirty is comparable to entry into clean competitions, with many people entering but foregoing the option to play dirty. However, participants are less inclined to enter competitions where their opponent has the option to engage in dirty play.

Beyond documenting aggregate patterns, we are interested in heterogeneity across individuals in their willingness to engage in dirty competition and how this relates to life outcomes. Our new survey items significantly predict willingness to play dirty as well as willingness to enter competitions where the opponent can play dirty, even when controlling for willingness to enter the clean competitions in the experiment and for survey measures of general willingness to compete. We then elicit these survey items in the LISS panel, a representative Dutch survey panel. We find that a willingness to engage in dirty competition is a significant predictor of holding a supervisory or management role and working in the private sector

rather than the public sector, even when controlling for general competitiveness. However, this inclination is also linked to negative outcomes, such as lower self-esteem, strained social relations, and heightened feelings of shame and guilt. Men, younger individuals, people with lower levels of education, and non-Western immigrants are, on average, more inclined to engage in dirty competition.

Previous experiments have demonstrated that many individuals, though far from all, are willing to sabotage their opponents to gain an advantage in competitive settings (Charness, Masclet, and Villeval 2014; Chen 2003; Harbring and Irlenbusch 2011). Other studies have found that many people are willing to lie for personal gain (Gneezy 2005; Sutter 2009; Cappelen, Sørensen, and Tungodden 2013; Kajackaite and Gneezy 2017; Cartwright and Menezes 2014; Cao, Li, and Niu 2022), and some individuals even engage in the destruction of others' earnings without receiving any monetary benefit in return (Abbink and Sadrieh 2009; Fehr and Gächter 2002; Zizzo and Oswald 2001; Müller, Schwieren, and Spitzer 2022). The study most closely related to our research is by Buser, Cappelen, and Tungodden (2024), who examine people's willingness to compete against others in settings with varying exogenously imposed fairness concerns. Their main finding is that most people – including the majority of individuals who enter fair competitions – are willing to compete against opponents who have been exogenously disadvantaged or are known to be weaker.

The wider literature on willingness to compete encompasses both laboratory and field experiments, revealing significant individual heterogeneity in competitive behavior. This literature, starting with Gneezy, Niederle, and Rustichini (2003) and Niederle and Vesterlund (2007), has in particular focused on documenting gender differences in competitiveness. In the widely-used experimental design introduced by Niederle and Vesterlund (2007), participants complete a real-effort task and choose between a non-competitive piece-rate payment scheme and a competitive tournament scheme. Typically, studies find that women are significantly less likely to enter the tournament, conditional on performance (and sometimes measures of confidence and risk preferences).[1] These experimental results have inspired follow-up studies that link individual measures of willingness to compete to educational and occupational outcomes. Buser, Niederle, and Oosterbeek (2014) and Buser, Peter, and Wolter (2017) and Buser, Peter, and Wolter (2022) show that an incentivized measure of competitiveness predicts picking more prestigious and math-heavy specializations for Dutch and Swiss secondary-school students. Other studies have shown that willingness to compete predicts

[1]See Niederle and Vesterlund (2011) for a review of this literature and Markowsky and Beblo (2022) for a meta analysis. Studies that document gender differences in willingness to compete in the field include Flory, Leibbrandt, and List (2015) and Buser, Assem, and Dolder (2023). Some studies find that women are less likely to engage in sabotage (Dato and Nieken 2014, Dato and Nieken 2020, Buser, Cappelen, and Tungodden 2024) or lie for their own gain (Ward and Beck 1990; Dreber and Johannesson 2008; Houser et al. 2016; Erat and Gneezy 2012; Nieken and Dato 2016; Grosch and Rau 2017; Kennedy and Kray 2022). On the other hand, Buser, Cappelen, and Tungodden (2024) find that women are just as likely as men to compete against a much weaker opponent.

salaries and occupational sorting (Reuben, Sapienza, and Zingales 2024; Buser, Niederle, and Oosterbeek 2024).[2]

2 Study Design

2.1 Experimental design

We study willingness to enter dirty competitions through an online laboratory experiment conducted on the Prolific[3] platform, comprising three rounds. Participants initially complete a personality questionnaire (described in the following section) and subsequently twice solve a real-effort task. One of these two rounds is randomly chosen for payment. The first round is a baseline round in which all participants are paid for their performance according to a competitive winner-takes-all payment scheme. Prior to performing the task again in the second round, participants are asked to choose between the competitive tournament scheme and a non-competitive payment scheme. They make this decision under several different conditions with varying opportunities to engage in dirty play, one of which is randomly applied to their second task performance.

The real-effort task consists of 3*3 boards with nine different two-digit numbers. The goal is to find the two numbers (out of the nine) that jointly add up to a target number that is shown next to the board. Each round consists of 10 of these games. Participants can select numbers by clicking on them. Once clicked, a number turns green. They can click the number again to deselect it. After selecting two numbers, participants press a button to submit their answer and continue to the next task. If the answer is incorrect, participants must keep trying until they find the correct combination. Prior to the first round, participants can familiarize themselves with the interface through three non-incentivized practice tasks.

[2]See Lozano, Ranehill, and Reuben (2022) for a survey of this literature.

[3]`www.prolific.co`

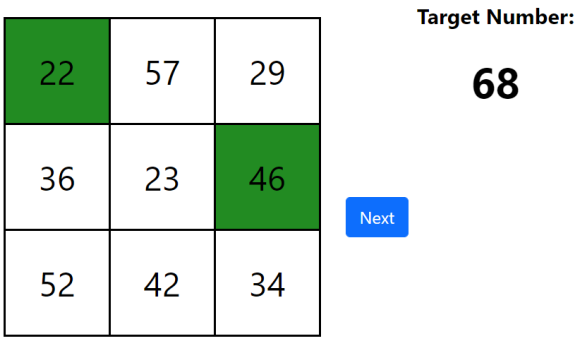


Figure 1: Example Task

After reading the instructions and completing the practice tasks, round 1 begins. Each participant is randomly and anonymously paired with another participant. They enter a first-past-the-post tournament where they compete on time. The player that solves the ten games faster wins the competition and receives \$8. The loser receives nothing. The performance in this round serves as our baseline performance measure. Although participants are informed of their own time spent in each round, their relative performance compared to other participants is not disclosed to them.

In the second round, each participant is assigned a role: active player or passive player. Active players are given the option to either compete against an opponent who is picked from among the passive players or perform the task under an individual payment scheme. In the competitive scheme, the rules are identical to the first round, with the faster player winning \$8 and the loser receiving nothing. If the active player chooses the individual scheme, they earn \$4 with certainty for finishing the 10 tasks, no matter how long they take. Passive players do not have the option to choose their payment scheme. They are paired with an active player who chooses to compete.[4]

Active players make the decision of whether to compete under seven conditions, which vary in whether there is the opportunity to sabotage or retaliate, as well as in who has the opportunity (nobody, the active player, the passive player, or both). One of the seven conditions is randomly chosen ex-post and determines the payment for the round. "Sabotage" consists of adding 30 seconds to an opponent's time in order to improve one's own chance of winning. Sabotage is costly: if a participant chooses to sabotage their opponent's performance and

[4]Two-thirds of participants are assigned to the role of active and one-third to the role of passive player. The random matching of passive players to active players who choose competition is done ex-post. In case the number of active players who choose to compete was lower than the number of passive players we were going to match leftover passive players to an already-matched active player for the purpose of the passive player's earnings (without this impacting the active player's earnings). In case the number of active players who choose to compete was higher than the number of passive players we were going to recruit additional passive players. This second scenario did not occur. This sampling procedure was pre-registered (see Appendix A).

subsequently wins the competition, they earn $1 less than if they had won without sabotage. "Retaliation" refers to the option for participants to reduce their opponent's earnings by half if their opponent wins the competition. Participants make their sabotage and retaliation decisions at the same time they make the entry decision (and therefore before they perform the second-round task). Note that this means that active players can choose to enter the competition without playing dirty.

To summarize, active players make seven decisions between an individual payment and a winner-takes-all tournament. In the conditions where they have the opportunity to sabotage or retaliate, they choose between three options: individual payment, competition without sabotage or retaliation, and competition with sabotage or retaliation. In the conditions where they do not have the opportunity to engage in dirty play, they choose between two options: individual payment or competition. The seven conditions are presented in a randomized order. While passive players do not make a choice on whether to compete, in some of the conditions they need to decide whether to use the option to sabotage or retaliate.

The seven conditions in round 2:

Clean Competition: No sabotage or retaliation options for either player.
Active-Sabotage: Sabotage option for active players only.
Passive-Sabotage: Sabotage option for passive players only.
Both-Sabotage: Sabotage option for both players.
Active-Retaliation: Retaliation option for active players only.
Passive-Retaliation: Retaliation option for passive players only.
Both-Retaliation: Retaliation option for both players.

In the third and final round, we introduce a third way of playing dirty: lying about one's true performance. In this round, participants do not need to perform the task another time. Instead, they need to decide on whether to enter a competition based on their baseline performance from round 1. They make this choice under 4 different conditions, which vary according to who has the opportunity to misrepresent their performance and thereby enhance their chance of winning: nobody, the active player, the passive player, or both players. As in the second round, participants experience the four conditions in a random order. The third-round payment is paid as a bonus payment on top of the earnings from round 1 or 2. The competition pays $2 for the winner and $0 for the loser, and the individual payment consists of $1. Participants who choose to lie are reminded of the number of seconds they spent in round 1 and can then enter any number of seconds they want in a text box, with this reported time being used to determine the winner.

The four conditions in round 3:

Clean Competition: No lie option for either player.
Active-Lie: Lie option for active players only.
Passive-Lie: Lie option for passive players only.
Both-Lie: Lie option for both players.

We also inquired about participants' beliefs regarding their own relative performance. After completing the baseline performance, we asked participants to assess their performance relative to the last ten participants who completed the experiment. Immediately following this, they had to predict their performance in the upcoming second round compared to the previous ten participants.The belief-related questions are incentivized with an additional \$0.50 for guessing correctly.[5] We provide a graphical overview of the experiment in Appendix B to clarify the timeline and aid readers in following the sequence of events.

The analysis plan was pre-registered in the AEA RCT Registry (see Appendix A). The experiment was programmed with oTree (Chen, Schonger, and Wickens 2016) and conducted online using Prolific in April 2023. We collected choices from 300 participants who are students residing in the US. Of these, 200 participants were assigned the role of active players, while 100 were designated as passive players. Participants who provided at least two incorrect answers to comprehension questions (61 participants, 40 active and 21 passive players) were excluded from the study[6]. The experiment took about 25 minutes. Average earnings are €12,5, including a participation fee of €7.

2.2 Pre-experiment questionnaire

The main purpose of the pre-experiment questionnaire is to elicit a number of survey items that are aimed at capturing individual differences in the willingness to play dirty in competitions as well as in aversion to rule-breaking by others. We elicit agreement with these statements on a seven-point scale where the value 1 means "not at all" and the value 7 means

[5]Participants were presented with eight belief questions in total, and one question was randomly selected for payment. Apart from beliefs about their own relative performance, we also asked participants about their beliefs regarding the choices of other players at several instances during the experiment. During the second and third rounds, in conditions where participants' opponents had the option to engage in dirty play (sabotage, retaliation or lying), we asked participants to estimate the number of individuals out of the last ten participants who opted for such behavior. Due to a programming error, however, the option "0" – that is, none of the other players opted for dirty play – was not shown. This mechanically biases the stated beliefs upward and we therefore use the belief data only sparsely in the paper.

[6]This sample restriction was pre-registered (see Appendix A).

"very much". Following the experiment, we conducted a survey on a nationally representative Dutch survey panel – the LISS[7] panel – that allows us to link the new survey measures to survey data on labor market outcomes and well-being as well as a wide range of other psychological traits. Section 2.3 describes the LISS survey.

Willingness to engage in dirty play:

Q1: In competition, almost anything is justified to win.

Q2: In competition, winning is everything.

Q3: I dislike losing so much that I will do anything not to lose.

Aversion to rule breaking:

Q4: I cannot stand it if others don't play by the rules.

Q5: The thought of others treating me unfairly is very painful to me.

Q6: I always play by the rules.

Q7: I only participate in competitions if I know in advance that they are fair.

Principal component analysis largely confirms that the survey items can be reduced to these two factors, both in the laboratory data and in the survey data (see Appendix C). We investigate the relationship between these "new" preference measures – willingness to play dirty and aversion to dirty play – and life outcomes in two steps. First, we use the experimental data to validate the questions by investigating whether they predict willingness to enter potentially dirty competitions and willingness to engage in dirty play oneself. Second, we use the LISS panel survey data to link the preference measures to demographic characteristics and relevant life outcomes.

In the pre-experiment questionnaire, the survey items are embedded in a wider personality questionnaire that also elicits the short 15-item Big Five Inventory (Lang et al. 2011) together with four social preference questions from Falk et al. (2023) and the short 12-item dark triad questionnaire (Jonason and Webster 2010). The dark triad traits consist of machiavellianism (a tendency to manipulate and exploit others), psychopathy (lack of empathy and remorse), and narcissism (excessive self-love and entitlement). We include four additional items from Buser and Oosterbeek (2023) that capture different aspects of general willingness to compete. The first two of these measure enjoyment of competition: "I enjoy competing against others" and "I find competitive situations unpleasant". The other two measure desire to win: "It is important for me to outperform others" and "I find losing very painful".[8] Finally, we add the Dohmen et al. (2011) single-item measure of attitudes toward risk.

[7] `www.lissdata.nl`

[8] Buser and Oosterbeek (2023) find that although enjoyment of competition and desire to win are strongly correlated with each other – and with the single-item competitiveness measure of Buser, Niederle, and Oosterbeek (2024) – they sometimes predict different outcomes in multivariate regressions. In particular, while both aspects of competitiveness predict higher income, enjoyment of competition also predicts increased wellbeing while the opposite is true for desire to win.

2.3 LISS panel survey

Along with our experiment, we collected survey data on the representative LISS survey panel to examine how the newly developed survey measures are associated with demographic background and life outcomes. Our analyses link the dirty-competition survey items to the rich data contained in the core LISS questionnaires. On top of demographic characteristics (age, gender, immigrant status, religiousness, and education level), we focus on three outcome categories: labor market outcomes, psychological and social outcomes, and emotions.

People who are more willing to engage in dirty competition may do better in climbing the hierarchy in corporate environments, but also sort into different careers in the first place. To capture this, we look at income, job satisfaction, holding a supervisory or management position, and working in the private versus the public sector.[9]

Engaging in dirty competition may also lead to a worse self-image and be corrosive for social relations. To capture this, we consider measures of life satisfaction, optimism, self-esteem, and the quality and quantity of social connections. Life-satisfaction is measured by the five-item Diener et al. (1985) satisfaction with life scale, optimism is measured by the six-question optimism scale of the Scheier, Carver, and Bridges (1994) life orientation test, self-esteem is measured by 10-item Rosenberg (1965) self-esteem scale, and social connectedness is measured by the number of close contacts (0-5) listed by the respondent[10] and the single-item "inclusion of others in the self scale" (Aron, Aron, and Smollan 1992).

Finally, we assess the emotional toll of dirty competition by linking our survey items to self-assessed feelings of guilt, shame, pride, strength, and hostility. Respondents are asked to state in how far they feel these emotions "right now, that is, at the present moment".

The outcome variables are measured in the core LISS questionnaires. These are elicited yearly spread over different months, enabling us to replace missing observations with observations from preceding years. In the case of supervisory and management positions, we look at all available observations and check whether the respondent ever held such a position. We restrict our sample to individuals aged 26 and over who have presumably completed their education (see Appendix D for a descriptive analysis of the outcome variables.).

[9]Income is measured as gross monthly income in Euros, job satisfaction is measured as the answer to the question "How satisfied are you with your current work?", the supervisory and management position indicators are binary indicators for a respondent having indicated holding a supervisory or upper management position in any of the survey rounds they participated in, and working in the public (vs the private) sector is a binary indicator for a respondent indicating they work in the public sector in the most recent survey round they participated in.

[10]Respondents are asked to do the following: "Most people discuss important things with other people. If you look back on the last six months, with whom did you discuss important things? Please enter their first names below (to a maximum of 5)."

3 Results

We present the results in three steps. First, we show the aggregate choices of participants in the online experiment across experimental conditions. Second, we use the within-subject nature of the experimental data to validate our dirty-competition survey items. And third, we use the LISS panel data to document correlations between the survey items and life outcomes.

3.1 Online Experiment

Figure 2 describes the raw data from the experiment, showing the proportion of active players who choose to compete in each of the 11 experimental conditions across rounds 2 and 3, plus the proportion of active and passive players who choose to sabotage, retaliate or lie in each condition.

Baseline willingness to compete is high in our sample, with 72% of active players competing in the clean condition in round 2 ("Baseline 1" in the graph). The observed propensity to compete is similar in the scenarios where only the active players have the opportunity to sabotage (69%) or retaliate (66%). That is, the number of participants who are attracted into competing by the possibility of playing dirty is roughly balanced by the number of participants who compete in the clean condition but not when they have the option to sabotage or retaliate. Perhaps more surprisingly, competition entry by active players is similar also in the conditions where both players can sabotage (64%) or retaliate (58%). Willingness to compete is lower, however, when only the passive player can sabotage (39%) or retaliate (36%).

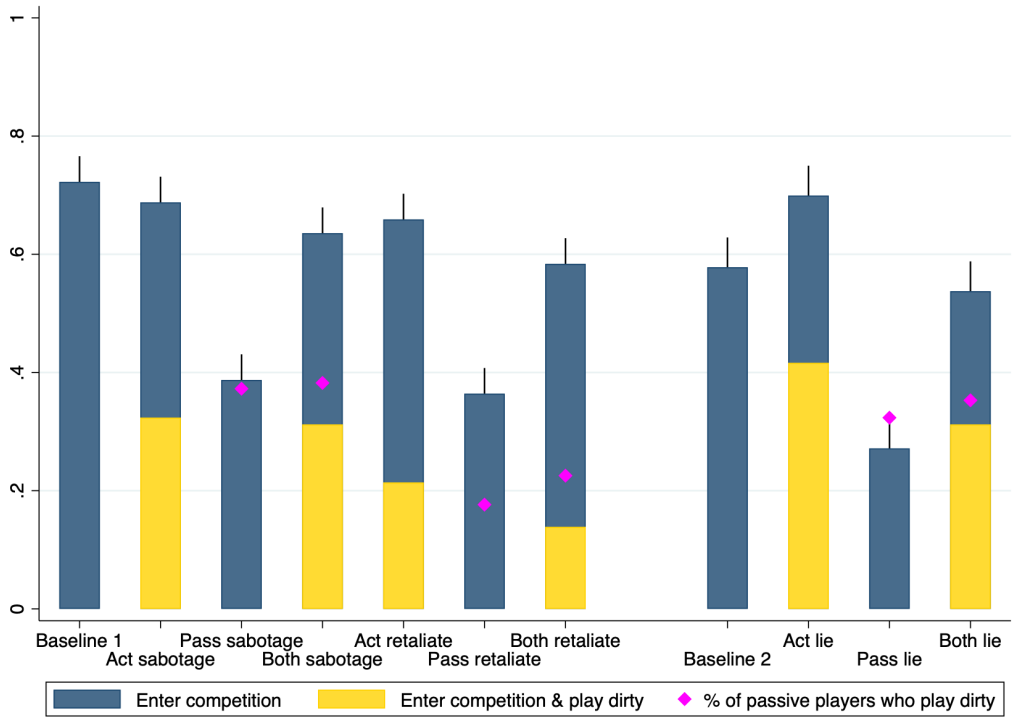
In round 3, where active players had to decide whether to enter their first-round performance into a tournament to potentially earn a bonus payment, 58% enter their round 1 performance into the tournament in the clean baseline condition ("Baseline 2" in the graph). The possibility to lie about their performance increases this proportion to 70%. 54% enter when both players have the option to lie and 27% enter when only the passive player can lie.

Table 7 in Appendix E shows the results from OLS regressions of tournament entry on condition dummies controlling for individual fixed effects for all active players. The results confirm that the differences shown in Figure 2 and discussed above are precisely estimated and highly statistically significant. In the same table, we present separate regressions for active players who chose to compete and those who opted for individual payment in the clean baseline conditions. This allows us to see how many active players who compete in the clean baseline conditions stop doing so when the opponent can play dirty or when they themselves are offered the different dirty play options[11], as well as how many active players

[11]Keep in mind that active players always have the option to compete without sabotaging or retaliating.

who do not compete in the clean baseline conditions are enticed to do so when they have the option to play dirty.

Figure 2: Competition Entry Decisions and Rate of Dirty Play Across Different Conditions



Note: This figure illustrates the competition entry rates for active players across different conditions. Baseline 1 and Baseline 2 represent entry rates in clean competitions during the second and third rounds, respectively. The blue bars show the proportion of active players who entered the competition without engaging in dirty play, while the yellow bars show the share of active players who entered the competition and played dirty. The dots represent the percentage of passive players who engaged in dirty play under each condition. Error bars show 95-percent confidence intervals obtained from regressions of a competition dummy on decision scenario dummies controlling for individual fixed effects.

Figure 2 also shows the proportions of both active and passive players who chose to engage in dirty play. The propensity to sabotage or lie – which enhance the chance of winning the competition at the expense of the opponent's chance – ranges between 30-40% for both active and passive players. The rate of retaliation – which does not enhance the chance of winning and therefore amounts to gratuitous revenge – is lower, close to 20%. The data therefore also show that across conditions, a large proportion of participants choose to compete cleanly, even in conditions where their opponent has the option to play dirty too.

Taking advantage of the within-subject nature of our experimental data, we can gain

Nevertheless, some participants who compete in the clean baseline condition choose not to compete when they have the option to sabotage or retaliate.

further insight into individual differences in willingness to engage in dirty competition by analyzing the frequency with which each active player chooses to enter competitions and play dirty across the various conditions in our experiment. These frequencies are visualized in the histograms in Appendix F. Across the three conditions where only active players have the option to play dirty — Active-Sabotage, Active-Retaliate, and Active-Lie — 80% of active players compete at least once and 57% compete three times. However, 47% of active players never play dirty and only 11% use all three occasions to play dirty. The picture is very similar for the three conditions where both active and passive players can choose to play dirty. Even among passive players, who have no choice whether to compete, 47% use none of the three options to play dirty in the conditions where the active player does not have the option (and only 6% use all three options), and 47% use none of the three options to play dirty in the conditions where both players can play dirty (and only 11% use all three options).

Overall, the choices of active and passive players reveal that many participants are reluctant to play dirty even in the anonymous setting of an online experiment while a minority uses all occasions to do so. In the following sections, we will show that this heterogeneity can be partially captured by our new survey items and is predictive of life outcomes in our representative survey data.

3.2 New survey items

Our experimental results document considerable differences across participants in their willingness to engage in dirty play, as well as their willingness to enter competitions where the opponent can play dirty. To bridge the gap between our experimental setting and the labor market, we will now check whether our new survey items can capture some of this heterogeneity, with the aim of then linking them to life outcomes in our representative survey data.

The pre-experiment survey contained seven dirty-play questions. We applied principal component analysis (PCA) to reduce dimensionality, identifying two distinct factors (see Section 2). The first is a "dirty play" component which loads heavily on the following items: 1) In competition, winning is everything; 2) I dislike losing so much that I will do anything not to lose; 3) In competition, almost anything is justified to win. The second is an "aversion" factor, which loads heavily on the following items: 4) I always play by the rules; 5) I cannot stand it if others don't play by the rules; 6) The thought of others treating me unfairly is very painful to me; 7) I only participate in competitions if I know in advance that they are fair.

We expected that the first set of questions would predict active players' propensity to enter competitions where dirty play is an option and both active and passive players' likelihood

of using this option. Similarly, we anticipated that the second set would predict a reduced tendency for both active and passive players to engage in dirty play, as well as active players' likelihood of avoiding competitions where the opponent has the option to play dirty.

Table 1 shows results from (multinomial) logit regressions of the active players' choice in each experimental condition on the two principal components and their believed probability that passive players play dirty.[12] All regressions control for the active player's choice in the clean baseline condition and the average of the four items in the pre-experiment questionnaire that measure general willingness to compete. The regressions therefore show whether the two principal components that summarize the new questionnaire items predict dirty competition choices above general willingness to compete.

The regression results show that the first – "dirty play" – component consistently predicts entry of active players into competitions where they themselves or both players can play dirty, as well as actually making use of dirty play. The results for the second – "aversion" – component are less consistent but typically go in the expected direction of predicting a lower propensity to enter and play dirty. Contrary to our expectations, the aversion component does not negatively predict entry into competitions where the passive player has the option to play dirty, but – again not anticipated by us – active players high on the dirty play component are more likely to enter such competitions.

We also find some interesting but unanticipated correlations between beliefs and willingness to compete. Active players who think it more likely that passive players play dirty are no less likely to enter competitions where the passive player has that option, but are significantly more likely to play dirty themselves. This could be because the belief that most others are willing to engage in dirty play legitimizes doing so too (Andreoni and Sanchez 2014), or even because the belief is chosen in a self-serving way to justify dirty play that the active players wish to engage in in the first place (Di Tella et al. 2015).

Table 1 also shows analogous logit results for passive players, who have no choice whether to compete and for whom we can therefore observe dirty play decisions independent of willingness to compete. Passive players who score higher on the dirty play component are consistently more likely to engage in dirty play across the experimental conditions. The aversion component only predicts refraining from dirty play in the lying conditions. That is, passive players who score themselves as more averse to rule breaking are no less likely to sabotage or retaliate, but are less likely to lie to increase their chance of winning.

[12] After making their choice in conditions where the passive player has the option to play dirty, active players are asked to estimate how many out of the previous 10 passive participants in the experiment played dirty. In the conditions where only the active player can play dirty, we control for their belief about what passive players do when only they can play dirty. Keep in mind the programming error mentioned in Section 2 due to which participants only saw the options 1 to 10, but not 0.

Table 1: Correlation Between the Survey Measures and the Experimental Choices

(Active Players)	(1) Active Sabotage	(2) Passive Sabotage	(3) Both Sabotage	(4) Active Retaliation	(5) Passive Retaiationl	(6) Both Retaliation	(7) Active Lie	(8) Passive Lie	(9) Both Lie
Enter and Play Clean									
PC Dirty Play	0.486**	0.269	0.394*	0.123	0.603***	-0.008	0.409*	0.418**	0.360
	(0.232)	(0.177)	(0.229)	(0.240)	(0.189)	(0.177)	(0.218)	(0.186)	(0.223)
PC Aversion	-0.378**	0.113	-0.083	-0.010	0.012	0.167	-0.293	-0.133	-0.178
	(0.192)	(0.157)	(0.193)	(0.215)	(0.167)	(0.175)	(0.198)	(0.167)	(0.206)
P(Dirty Play Opponent)	0.060	0.050	-0.035	0.037	0.031	-0.095	-0.124	0.013	0.155
	(0.105)	(0.069)	(0.110)	(0.094)	(0.067)	(0.080)	(0.095)	(0.064)	(0.122)
Enter and Play Dirty									
PC Dirty Play	0.704***		0.647***	0.675**		0.907***	0.569***		0.487**
	(0.244)		(0.227)	(0.274)		(0.336)	(0.173)		(0.210)
PC Aversion	-0.469**		-0.231	0.026		-0.178	-0.335*		-0.104
	(0.219)		(0.234)	(0.251)		(0.272)	(0.180)		(0.184)
P(Dirty Play Opponent)	0.268**		0.451***	0.290**		0.421***	0.136		0.598***
	(0.117)		(0.134)	(0.114)		(0.139)	(0.092)		(0.117)
Observations	173	173	173	173	173	173	173	173	173
(Passive Players)		(1) Passive Sabotage	(2) Both Sabotage		(3) Passive Retaliation	(4) Both Retaliation		(5) Passive Lie	(6) Both Lie
main									
PC Dirty Play		0.441**	0.514**		0.569***	0.648***		0.242	0.341*
		(0.188)	(0.201)		(0.211)	(0.229)		(0.178)	(0.197)
PC Aversion		0.169	0.087		-0.073	-0.001		-0.313*	-0.347**
		(0.172)	(0.170)		(0.197)	(0.204)		(0.170)	(0.174)
Observations		102	102		102	102		102	102

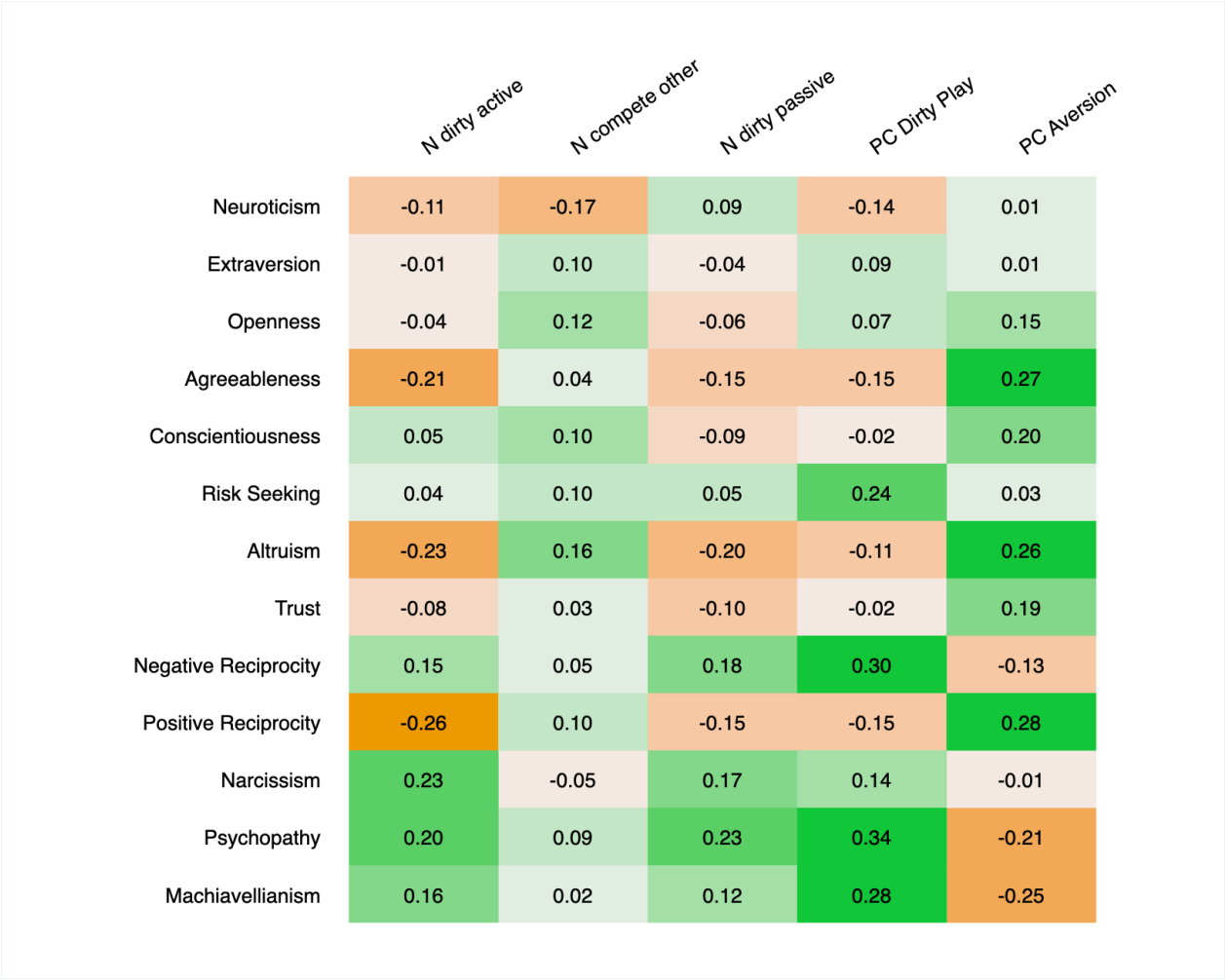
Note: The upper panel presents the relationship between the two principal components that summarize the survey items, and entering the competition while playing cleanly or entering the competition while playing dirty across different conditions for active players. The coefficients are obtained from multinomial logit regressions. "PC Dirty Play" and "PC Aversion" are the two principal components. "P(Dirty Play Opponent" is the belief about opponents' propensity to engage in dirty play. All regressions additionally control for the active player's choice in the clean baseline condition and the average of the questionnaire measures of general willingness to compete. The lower panel presents the relationship between the two survey components and the dirty play choices of passive players across different conditions. The coefficients are obtained from logit regressions. Standard errors are shown in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Along with our new survey items, the pre-experiment questionnaire elicited a range of other, more standard personality traits and preferences. In Figure 3, we show how willingness to engage in dirty competition correlates with these traits. We consider five indicators: the number of dirty choices by active players (i.e., the number of times they entered competition and played dirty; this variable runs from 0 to 6), the number of times active players entered competition when only the passive player could play dirty (this variable runs from 0 to 3), number of dirty choices by passive players (this variable runs from 0 to 6), and the two principal components that summarize the new survey items. We control for general willingness to compete by first regressing the number of dirty choices by active players and

the number of times they entered competitions when only the passive player could play dirty on the number of times they competed in the two clean baseline conditions and then using the residuals. Similarly, we regress the two principal components on our measures of general willingness to compete (enjoyment of competition and desire to win) and then use the residuals. In this way, we aim to obtain indicators of willingness to engage in dirty competition above general willingness to compete.

Dirty play by active and passive players, as well as scoring high on the dirty-play principal component, correlates most heavily with scoring high on the "dark" personality traits and negative reciprocity, and scoring low on altruism and agreeableness. The opposite is true for people who score high on the aversion principal component. These people additionally also score high on conscientiousness, trust and positive reciprocity. Willingness to compete when others can play dirty most strongly correlates with higher altruism and lower neuroticism. These correlations give an indication of the personality of people who are attracted by competitive environments where dirty behavior is perceived to be permitted.

Figure 3: Personality traits, willingness to enter dirty competitions, and play dirty



Note: This figure presents conditional correlations of indicators for willingness to engage in dirty competition and personality traits. The indicators (on the x-axis) include the number of dirty choices (0-6) by active players (Column 1), the frequency of competition entry under conditions where only the passive player could play dirty (0-3), the number of dirty choices by passive players (0-6), and the two principal components that summarize the survey items. The correlations are conditional on general willingness to compete: we first regress each indicator on the questionnaire measures of general willingness to compete and (for active players) competition entry in the clean baseline conditions. We then use the residuals from these regressions to calculate the correlations.

3.3 LISS panel data

In this section, we use our survey data to answer two questions: how is willingness to engage in dirty competition distributed across the population and how does it correlate with life outcomes. Intuitively, willingness to play dirty can be individually advantageous for moving up the corporate hierarchy, leading to more prestigious positions and higher income. People who are willing to take advantage of opportunities to play dirty might also sort into careers where competition plays a bigger role. On the other hand, engaging in acts of sabotage or

deceit could also lead to worse social relationships, lower self-esteem, or feelings of guilt. We elicit our survey items in the LISS panel, a representative Dutch survey panel, which allows us to link them to extensive data from the core LISS questionnaires that cover all of these outcomes.

The full distribution of the two principal components that summarize the answers to the dirty-competition questionnaire items is shown in Appendix C. While the distribution of aversion to dirty play is roughly symmetric, the distribution of willingness to play dirty is right-skewed, with a lot of mass at the lower end and a long tail of people who score highly.

Table 2 presents results from regressions of the two principal components on demographic indicators. Men and younger individuals are more inclined to engage in dirty competition and exhibit lower aversion to rule-breaking. Non-Western migrants score themselves higher on willingness to participate in dirty competition, whereas religious individuals demonstrate greater aversion to rule-breaking. Furthermore, there is a strong relationship between level of education and the dirty play component, but not the aversion component. Compared to people with no tertiary education, individuals with higher education levels are less likely to engage in dirty competition. This is true for people who hold a vocational degree but even more strongly for people who hold a college – higher professional or university – degree.

Table 2: Individual Characteristics and The Two Principal Components

	(1)	(2)
	PC Dirty Play	PC Aversion
Female	-0.382***	0.156***
	(0.029)	(0.030)
Age	-0.005***	0.007***
	(0.001)	(0.001)
Western	0.078	-0.066
	(0.050)	(0.052)
Nonwestern	0.427***	-0.036
	(0.055)	(0.057)
Religiosity	0.008	0.070***
	(0.014)	(0.015)
Vocational	-0.100***	0.019
	(0.038)	(0.039)
Higher professional	-0.236***	-0.031
	(0.037)	(0.038)
University	-0.355***	0.070
	(0.047)	(0.048)
Observations	4366	4366

Note: This table presents coefficients from OLS regressions of the two principal components that summarize the survey items on individual characteristics. The baseline education level is "no secondary education". Standard errors are shown in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

In Table 3, we link the two principal components to life outcomes. In the upper panel, we look at labor market outcomes, including income, job satisfaction, and binary indicators for ever having held a supervisory position, for ever having held a higher management position, and for working in the public sector. All regressions control for age, gender, education level, and immigration background. We show results without and with the detailed Buser and Oosterbeek (2023) measures of willingness to compete as controls. Conditional on general willingness to compete, people who are willing to engage in dirty competition do not earn more money and report similar levels of job satisfaction. However, they are more likely to advance to supervisory or management positions and are less likely to work in the public sector. Conversely, those who are averse to rule breaking are less likely to hold management positions and have higher job satisfaction.

In the middle panel, we investigate whether a tendency to engage in dirty play correlates with poorer social relationships and self-image. While willingness to play dirty does not predict lower overall life satisfaction, it is associated with lower optimism, reduced self-esteem, having fewer close contacts, and feeling less close to others. In contrast, individuals who are averse to rule-breaking tend to have higher self-esteem and better social relationships.

Table 3: Dirty Play Survey: Relationships with Labor Market Outcomes, Psychological and Social Outcomes, and Current Emotions

(a) Dirty Play Survey and Labor Market Outcome

	(1) Income	(2) Income	(3) Job sat	(4) Job sat	(5) Supervisor	(6) Supervisor	(7) Management	(8) Management	(9) Public	(10) Public
PC dirty play	64.955**	-28.688	-0.027	-0.067	0.052***	0.030***	0.026***	0.013**	-0.036***	-0.030***
	(32.050)	(34.972)	(0.037)	(0.042)	(0.008)	(0.009)	(0.006)	(0.006)	(0.010)	(0.011)
PC aversion	-17.260	-26.350	0.080**	0.097**	-0.017**	-0.019**	-0.012**	-0.013**	-0.015	-0.013
	(30.595)	(30.798)	(0.037)	(0.038)	(0.008)	(0.008)	(0.006)	(0.006)	(0.009)	(0.010)
Competitiveness	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	3099	3099	1756	1756	3279	3279	3279	3279	2701	2701

Note: This table presents coefficients from OLS regressions of labor market outcomes on the two principal components that summarize the survey items. "Income" means gross monthly income, "Job sat" measures how satisfied people are with their work on a 0-10 scale, "Supervisor" and "Management" are binary indicators for ever having indicated holding a supervisory or management position, "Public" is a binary indicator for currently working in the public sector. The sample includes individuals over the age of 25. The regressions control for age dummies, gender, immigration status dummies, and education level dummies. Results are presented both with and without controls for general willingness to compete. Standard errors are shown in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

(b) Dirty Play Survey and Psychological and Social Outcomes

	(1) Life sat	(2) Life sat	(3) Optimism	(4) Optimism	(5) Selfesteem	(6) Selfesteem	(7) Nr friends	(8) Nr friends	(9) Closeness	(10) Closeness
PC dirty play	0.016	-0.026	-0.023**	-0.055***	-0.065***	-0.105***	-0.081**	-0.106***	-0.043	-0.096***
	(0.020)	(0.022)	(0.011)	(0.012)	(0.018)	(0.020)	(0.033)	(0.036)	(0.028)	(0.031)
PC aversion	-0.020	-0.005	-0.024**	-0.016	0.055***	0.072***	0.117***	0.116***	0.115***	0.128***
	(0.020)	(0.020)	(0.011)	(0.011)	(0.018)	(0.017)	(0.031)	(0.032)	(0.027)	(0.027)
Competitiveness	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	3282	3282	3282	3282	3282	3282	3277	3277	3282	3282

Note: This table presents coefficients from OLS regressions of psychological and social outcomes on the two principal components that summarize the survey items. "Life sat" is the average of five life-satisfaction related questions that are answered on a 1-7 scale, "Optimism" is average of the six items in the optimism scale and is measured on a scale of 1-5, "Selfesteem" is the average of the 10 items in the self-esteem scale and is measured on a scale of 1-7. "Nr friends" is the number of close contacts (0-5) listed by the respondent, and "Closeness" is the answer to the single-item "Inclusion of Others in the Self scale" (1-7). The sample includes individuals over the age of 25. The regressions control for age dummies, gender, immigration status dummies, and education level dummies. Results are presented both with and without controls for general willingness to compete. Standard errors are shown in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

(c) Dirty Play Survey and Current Emotions

	(1) Guilty	(2) Guilty	(3) Ashamed	(4) Ashamed	(5) Proud	(6) Proud	(7) Strong	(8) Strong	(9) Hostile	(10) Hostile
PC dirty play	0.187***	0.184***	0.205***	0.189***	0.144***	0.046	0.109***	0.018	0.205***	0.192***
	(0.023)	(0.025)	(0.023)	(0.025)	(0.027)	(0.030)	(0.024)	(0.026)	(0.021)	(0.023)
PC aversion	-0.072***	-0.081***	-0.031	-0.044*	0.104***	0.112***	0.048**	0.058**	-0.042**	-0.050**
	(0.022)	(0.022)	(0.022)	(0.022)	(0.026)	(0.026)	(0.023)	(0.023)	(0.020)	(0.020)
Competitiveness	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	3282	3282	3282	3282	3282	3282	3282	3282	3282	3282

Note: This table presents coefficients from OLS regressions of current (at the time of filling out the survey) emotions on the two principal components that summarize the survey items. The five outcomes are the extent to which respondents felt guilty, ashamed, proud, strong, and hostile "right now, that is, at the present moment" on a scale of 1-7. The sample includes individuals over the age of 25. The regressions control for age dummies, gender, immigration status dummies, and education level dummies. Results are presented both with and without controls for general willingness to compete. Standard errors are shown in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

In the lower panel, we regress the principal components on indicators of current emotions. The personality questionnaire of the LISS panel asks respondents to state in how far they feel a range of emotions "right now, that is, at the present moment". Remarkably, people who score higher on the dirty play component feel significantly more guilty, ashamed or hostile at the very moment they are filling in the survey, while people who score higher on the aversion component feel less guilty and hostile. People who score higher on the dirty play component feel more proud and strong, but these correlations disappear when we control for general willingness to compete. People who score higher on the aversion component also feel stronger and more proud, and these correlations are robust to controlling for general competitiveness.

4 Conclusion

This study explores the economic relevance of individual differences in the willingness to engage in dirty competition. A large literature has documented heterogeneity in people's willingness to enter competitions in the lab and the correlates of these individual differences in the field, showing that competitive people tend to be more economically successful. Most of this literature abstracts from the fact that workplace competitions are not always clean. For instance, colleagues may engage in sabotage, misrepresent their performance, or retaliate against those who surpass them. We know from past experimental studies that many people are willing to engage in such actions, taking advantage of opportunities to sabotage competitors, lie for their own gain, or even gratuitously destroy the earnings of others. In this paper, we explore individual differences in the willingness to enter competitions where such dirty play is possible and show that these differences predict life and career outcomes. We do this by combining data from an online experiment with data from a nationally representative survey panel.

In our experiment, participants perform a real-effort task and decide between entering a competition and a fixed payment under a number of within-subject conditions that vary in whether players can engage in dirty behavior – sabotaging, lying, or retaliating – and who can do so – the decision maker, the potential opponent, or both. This allows us to observe people's willingness to enter potentially dirty competitions and to engage in dirty behavior under controlled conditions. We find that a substantial proportion of participants are willing to engage in dirty behavior. Across conditions, 30-40% of participants enhance their chances of winning by sabotaging their opponent or lying about their performance. But note that this also means that in each condition, a majority of participants refrain from playing dirty, either by not entering the competition or by competing cleanly. Fewer participants, around 20%, retaliate ex-post by destroying the winner's earnings without any monetary benefit

to themselves. The unilateral possibility for the opponent to play dirty strongly reduces competition entry.

We show that these experimental choices can be partially captured by new survey items aimed at eliciting willingness to play dirty in competitions and aversion to dirty play by others. Eliciting these items in a representative survey panel, we show that willingness to engage in dirty competition varies with demographic factors – women, higher-educated people, and older people are less willing to engage in dirty competition – and predicts life outcomes, even after controlling for general willingness to compete. People with a higher willingness to engage in dirty competition (and lower aversion to dirty play by others) are more likely to work in a management position and less likely to work in the public sector. While this indicates that a willingness to play dirty may be individually profitable, leading to upward mobility in corporate environments, it also seems to come at a social and psychological cost. People with a higher willingness to engage in dirty competition have fewer close contacts and lower self-esteem, and are more likely to experience feelings of guilt and shame.

Finally, we show that both the experimental choices and the questionnaire measures of willingness to engage in dirty competition are related to people's personality traits and economic preferences. People with a tendency of engaging in dirty competition score higher on the dark triad traits (meaning they are more uncaring, manipulative and self-focused) and negative reciprocity, and lower on prosociality and agreeableness.

Our results add to the behavioral literature on individual differences in willingness to compete and are relevant from a human capital and human resource management perspective. In terms of individual preferences, we learn that people differ in their willingness to engage in dirty competition and this preference is partially independent from general willingness to compete under clean conditions. Many people are willing to forgo expected earnings in order to avoid dirty play, while others are even willing to engage in retaliation against winners with no monetary benefit to themselves. People also differ in their reaction to the possibility of others playing dirty.

From a human capital perspective, we learn that willingness to engage in dirty competition is related to career sorting even above general willingness to compete. People who are more willing to engage in dirty competition are attracted to private sector (vs public sector) careers and are more likely to move up into supervisory or management positions. However, they also have worse social relationships and are more likely to experience feelings of guilt and shame.

From a human resource management perspective, the correlations between willings to engage in dirty competition and other personality traits provide a rich picture of which kind of people are attracted to competitive workplaces that are perceived as (potentially) dirty environments. Extrapolating our results to the workplace, such organizations likely attract

people who have a "dark" personality – high on psychopathy, narcissism, manipulativeness and propensity to take revenge, low on altruism, positive reciprocity and agreeableness. From a management perspective, it therefore seems important to counter (false) perceptions of the acceptance of dirty behavior, as well as making sure such behavior is disincentivized. The fact that the public sector attracts people who are less willing to engage in dirty competition indicates that work that provides status through being perceived as socially meaningful rather than through high earnings or a position of power attracts different individuals. Finally, our experimental results provide indications on how people behave in competitive workplaces that do not effectively police dirty actions, with many people being willing to take advantage of the opportunity.

Regarding the question of whether willingness to play dirty is rewarded by society, our results provide a nuanced picture. Even conditional on general willingness to compete, willingness to engage in dirty competition is positively correlated with holding a supervisory or upper management position, indicating that it helps people move up the hierarchy. On the other hand, willingness to engage in dirty competition does not predict higher income once general willingness to compete is taken into account, indicating that people who are averse to dirty competition find equally well-paid positions in other settings. Moreover, people who engage in dirty competition seem to suffer both socially and psychologically, having worse social relationships and low self-esteem.

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Appendix A: Pre-Analysis Plan

In this section, we present the pre-analysis plan as registered in the AEA registry at `https://www.socialscienceregistry.org/trials/11266`. It is important to note that the pre-analysis plan applies only to the analysis of the online laboratory experiment and not to the nationally representative survey.

The study has four aims:

a) Study how the possibility of playing dirty in a competition affects individuals' willingness to participate in the competition.

b) Study how individuals with different personality traits react to dirty competitions, both in terms of willingness to enter them and in terms of taking advantage of the possibility to play dirty.

c) Study how individuals' beliefs about other people's willingness to play dirty in competitions affect their own willingness to compete. In particular, we will investigate whether people overestimate or underestimate the true rate of dirty play in the experiment.

d) Study gender differences in willingness to participate dirty competitions.

e) Validate new survey questions related to participants' willingness to enter dirty competitions and to play dirty.

Experimental Design:

The experimental design consists of three rounds. In the first round, participants are grouped in pairs and perform a set of 10 simple addition tasks in a competitive setting. Their time in this round serves as a baseline performance measure. In the second round, participants are assigned to active or passive roles and asked to perform another set of 10 simple addition tasks. Active players are given the option to either compete against an opponent who is picked from among the passive players or perform the task under an individual payment scheme. In the competition scheme, the winner receives \$8, and the loser receives nothing. If they choose the individual scheme, active players will earn \$4 with certainty for finishing the 10 tasks. Passive players do not have the option to choose between the two payment schemes. They will always compete against an active player who chooses to compete.

There are seven conditions in the second round, which vary according to the presence of sabotage or destroy options for active or passive players. The term "sabotage" refers to the action of adding 30 seconds to an opponent's time in order to improve one's own chance of winning. However, there is a cost associated with sabotage. If a participant

chooses to sabotage their opponent's performance and subsequently wins the competition, they will earn $1 less than if they had won without sabotage. "Destroy" refers to the option for participants to reduce half of their opponent's earnings if their opponent wins the competition. Participants make their sabotage and destroy decisions before they perform the task for the second time. The possibility to sabotage or destroy is only available in the competition scheme, and not in the individual payment scheme.

The seven conditions are as follows:

1) No sabotage or destroy options for either player.

2) Sabotage option for active player only.

3) Sabotage option for passive player only.

4) Sabotage option for both players.

5) Destroy option for active player only.

6) Destroy option for passive player only.

7) Destroy option for both players.

Participants see the seven conditions in a random order, with active players making decisions under each condition regarding whether to compete and whether to sabotage or destroy if presented with the option, while passive players only make decisions about whether to sabotage or destroy if presented with the option. In the third round, participants' performance in the first round is considered, and they are presented with four different conditions. The four conditions in this round involve the option to lie about one's performance.

1) No lie option for either player.

2) Lie option for active player only.

3) Lie option for passive player only.

4) Lie option for both players.

Similar to the second round, participants experience all four conditions in a random order. Active players are given the option to enter the competition ($2 for the winner and $0 for the loser) or perform the task individually (individual payment of $1), and to lie about their first-round performance if presented with the option, while passive players only decide whether to lie or not if the option is presented to them. Participants who choose to lie are asked to enter their time spent, and their reported time spent is used to determine the winner.

Sample Restrictions

For this experiment, we will recruit 300 participants through an online platform (Prolific). Each participant will be assigned to either an active or passive role. Of the 300 participants, 200 will be assigned the active role, while the remaining 100 will be assigned the passive role. Active players decide whether to enter a competition or not whereas passive players are assigned to an active player who chooses to compete. We anticipate that no more than 50 percent of active players will enter the competition and will therefore recruit half as many passives as active players.

In case that the number of active players who choose to compete is higher than the number of passive players we have recruited, we will recruit additional passive players. Conversely, if the number of passive players exceeds the number of active players who choose to compete, we will randomly assign surplus passive players to active players that already have a passive player assigned. This second assignment then determines the payment of the surplus passive player but has not impact on the payment of the active player. While passive players do not make a choice on whether to compete, in some experimental conditions they need to decide whether to use the option to play dirty. We will use these choices made by passive players to determine the true rate of dirty play absent selection into competition.

For our main analysis, we will exclude participants based on the following criteria:

1) Dropping out of the experiment partway through.

2) Taking a longer break (>30 minutes) at some point during the experiment.

3) People who do not pass the attention checks.

4) People who give at least two times incorrect answers to comprehension questions.

   We will present robustness checks that include the participants mentioned in criterion (2) and (4) in an appendix. In addition, for analyses that use the personality traits that are elicited in the pre-experiment questionnaire we will exclude participants based on the following criteria:

5) Participants who selected the same option (e.g., the minimum value) on all questions on a particular questionnaire page. Here too, we will report analyses relaxing this restriction in an appendix.

Analysis:

1) **Study how the possibility of playing dirty in a competition influences the individuals' willingness to compete. We look at individuals' decisions for each conditions separately.** All participants experience all conditions, enabling

us to use within-subject analyses, using regressions with individual fixed effects and standard errors clustered at the individual level. This study is exploratory, but there are specific questions and patterns that we are interested in exploring:

1. The main aim of the study is to compare rates of competition entry of active players across the 11 experimental conditions. We will compare conditions 2 and 5 with condition 1, and conditions 9 with condition 8 to examine whether individuals are more or less willing to enter competitions when they – but not their opponents – have the possibility to play dirty. Furthermore, we will compare conditions 3 and 6 with condition 1, and condition 10 with condition 8 to investigate how participants react when there is a possibility for their opponents to play dirty. Lastly, we will compare conditions 4 and 7 with condition 1, and condition 11 with condition 8 to explore whether individuals are encouraged or discouraged to enter competitions when both players have the possibility to play dirty.
2. We will also run these analyses separately for those who do and those who do not compete in the first condition. In the case of those who enter the "clean" competition, we want to know whether the possibility that their opponent might play dirty themselves discourages them from competing. In the case of those who do not enter the "clean" competition, we want to know whether the possibility to play dirty themselves encourages them to enter.

2) Study how different personalities react to the dirty competition: Before the start of the experiment, we will administer a questionnaire that assesses various personality traits on a Likert scale, including the big five traits, the dark triad traits, risk-seeking, social preferences, enjoyment of competition and desire to win. Additionally, we will include seven new questionnaire items that specifically elicit attitudes towards playing dirty. We will validate these new items by examining their ability to predict competition entry under the different conditions as well as willingness to engage in dirty play. We will then regress competition choices under all conditions on the questionnaire measures at the subject level. This is an exploratory component of our study. However, we have several expectations, which we outline below:

1. Desire to win should be a stronger predictor of playing dirty in competitions than enjoyment of competition.
2. Dark traits (i.e., psychopathy, narcissism, and Machiavellianism) should be positively associated with willingness to enter dirty competitions and to play dirty.
3. Social preference traits should predict willingness to play dirty and enter dirty competitions in the following ways:

a) Individuals who are more altruistic, trustworthy, and exhibit positive reciprocity should be less willing to enter dirty competitions and play dirty in those competitions.

b) Individuals who exhibit negative reciprocity should be more willing to enter dirty competitions and play dirty in those competitions.

3) **Study how beliefs about other people's dirty behavior impact individuals' willingness to compete.** Our study will involve questioning individuals about their perceptions of their opponent's attitudes towards playing dirty (i.e., passive players' behavior). We will then regress competition choices, under all conditions, on these belief measures to examine how beliefs may explain behavior in dirty competitions. Specifically, we are interested in determining whether individuals tend to overestimate or underestimate the true rate of dirty play and how their beliefs influence their competition entry decisions.

4) **Study gender differences in willingness to enter dirty competitions.** Our study aims to examine gender differences in competition entry decisions and dirty play rates. There is a significant body of literature documenting gender differences in willingness to compete in clean competitions. We will explore these differences in the context of dirty competition. Specifically, we aim to investigate the following research questions:

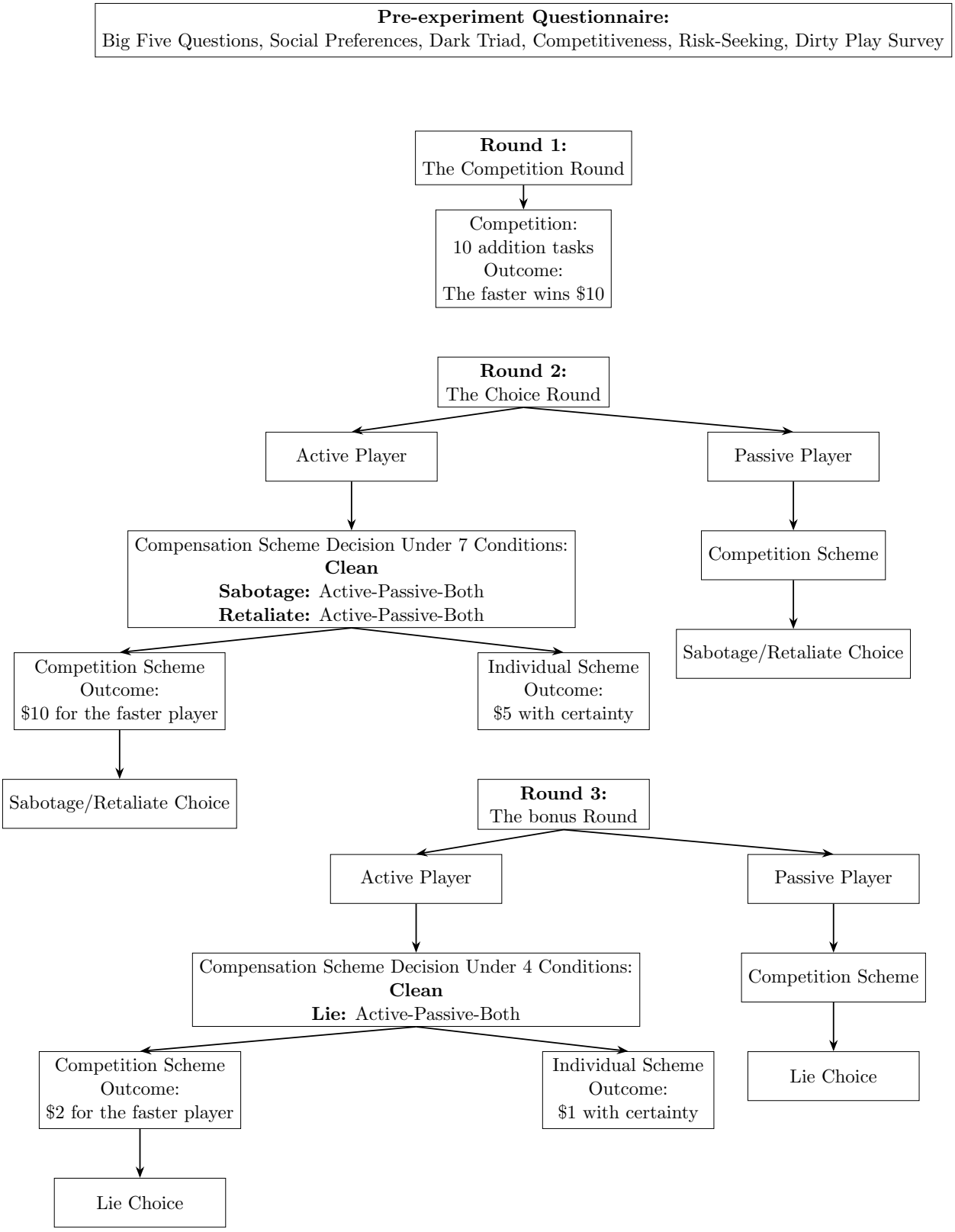
a) Does the possibility of opponents playing dirty exacerbate the gender difference in willingness to compete?

b) If this is the case, is this because women have different beliefs about the behavior of their opponents?

c) We will also check whether results from previous studies that women are less likely to play dirty replicate in our data.

Appendix B: Overview of the experiment

Figure 4: An Overview of The Experiment



Appendix C: Principal Component Analysis

Table 4: Principal Component Analysis (Experimental Results)

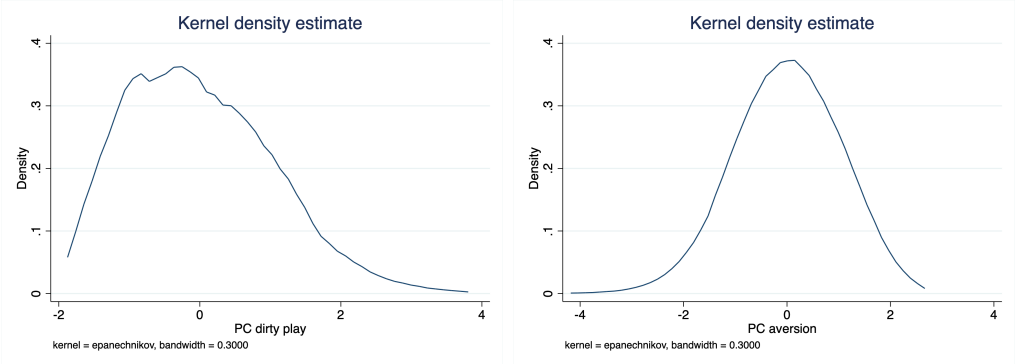
Variable	Component 1	Component 2	Unexplained
Q1: Anything is justified to win	0.5339		0.3843
Q2: Winning is everything	0.5361		0.3708
Q3: Do anything not to lose	0.5565		0.3061
Q4: Cannot stand others don't play by the rules		0.6559	0.3671
Q5: Treating me unfairly is painful to me		0.2638	0.8906
Q6: Always play by the rules		0.6256	0.4124
Q7: Know in advance that the competition is fair	0.3271	0.3168	0.5497

Note: This table presents the results of the Principal Component Analysis (PCA) applied to the seven survey item data from the experiment. Component 1 corresponds to the "dirty play" factor, while Component 2 corresponds to the "aversion" factor.

Table 5: Principal Component Analysis (LISS Results)

Variable	Component 1	Component 2	Unexplained
Q1: Anything is justified to win	0.5676		0.3118
Q2: Winning is everything	0.5910		0.2552
Q3: Do anything not to lose	0.5671		0.3093
Q4: Cannot stand others don't play by the rules		0.5116	0.4695
Q5: Treating me unfairly is painful to me		0.4826	0.5230
Q6: Always play by the rules		0.5181	0.4539
Q7: Know in advance that the competition is fair		0.4766	0.5274

Note: This table presents the results of the Principal Component Analysis (PCA) applied to the seven survey item data from the LISS panel data. Component 1 corresponds to the "dirty Play" factor, while Component 2 corresponds to the "aversion" factor.



(a) Dirty play component (b) Aversion component

Figure 5: Distribution of individual scores on the two components of the dirty play survey.

Appendix D: Descriptive Statistics

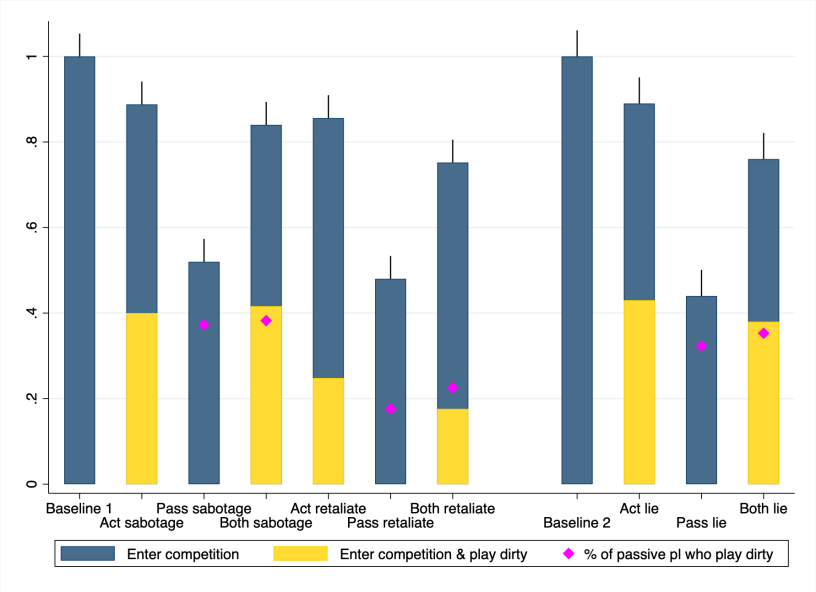
Table 6: Descriptive Statistics

	N	Mean	SD	Min	Max
Income	5352	2988.01	2120.63	0	23442.62
Job Satisfaction	2549	7.51	1.54	0	10
Management	4500	0.12	0.33	0	1
Supervisor	4500	0.27	0.44	0	1
Public Sector	3725	0.34	0.47	0	1
Life Satisfaction	4561	5.08	1.11	1	7
Optimism	4557	3.44	0.62	1	5
Self Esteem	4559	5.51	1.04	1	7
Number of Friends	5243	2.89	1.81	0	5
Closeness	4558	4.46	1.54	1	7
Guilty	4557	1.95	1.31	1	7
Ashamed	4557	2.01	1.34	1	7
Proud	4557	4.65	1.51	1	7
Strong	4557	4.74	1.33	1	7
Hostile	4557	1.71	1.16	1	7

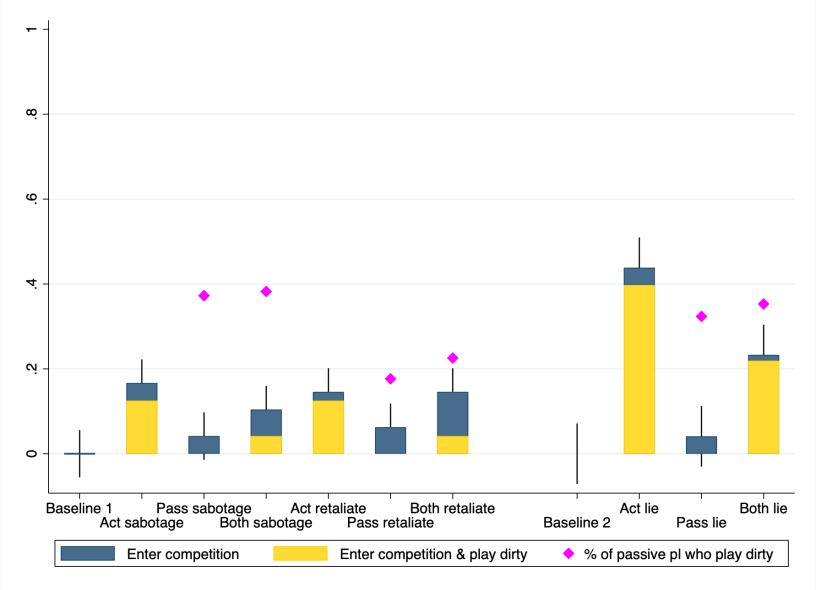
Note: This table shows summary statistics for labor market outcomes, well-being and social outcomes, and emotions for individuals aged 25 and older in the sample.

Appendix E: Tournament Entry Rates Across Different Conditions

Figure 6: Competition Entry Decisions and Dirty Play Rates Across Different Conditions



(a) Competition entry decisions of those who choose to compete in the clean competitions



(b) Competition entry decisions of those who choose not to compete in the clean competitions

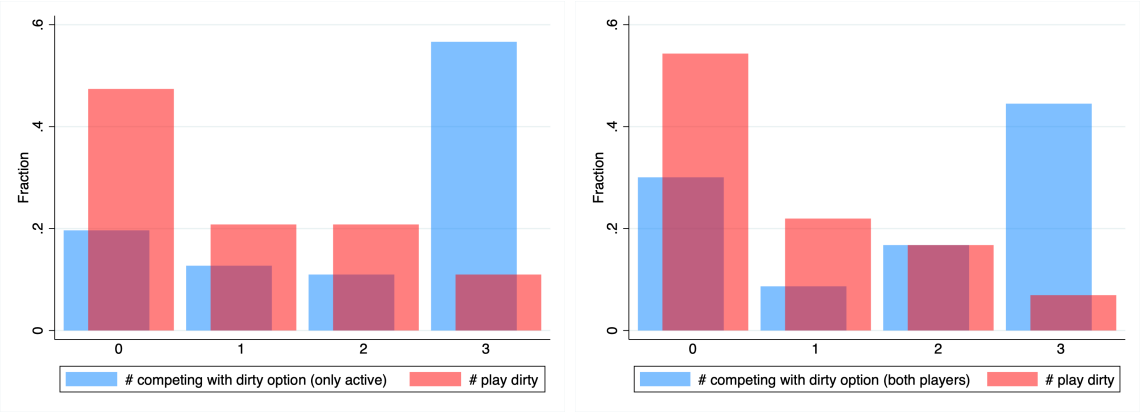
Note: This figure illustrates the competition entry rates for active players across different conditions. Baseline 1 and Baseline 2 represent entry rates in clean competitions during the second and third rounds, respectively. Panel (a) shows the entry rates for the active players who choose to compete in baselines 1 and 2, while panel b shows the same results for the active players who choose not to compete in the clean baselines. The blue bars show the proportion of active players who entered the competition without engaging in dirty play, while the yellow bars show the share of active players who entered the competition and played dirty. The dots represent the percentage of passive players who engaged in dirty play under each condition. Error bars show 95-percent confidence intervals obtained from regressions of a competition dummy on decision scenario dummies controlling for individual fixed effects.

Table 7: Competition Entry Regressions Across Different Conditions

	(1) All		(2) Competition		(3) Individual	
	Round 2	Round 3	Round 2	Round 3	Round 2	Round 3
Active Sabotage	-0.0347	—	-0.112**	—	0.167***	—
	(-1.11)		(-2.91)		(4.16)	
Passive Sabotage	-0.335***	—	-0.480***	—	0.0417	—
	(-10.71)		(-12.47)		(1.04)	
Both Sabotage	-0.0867**	—	-0.160***	—	0.104**	—
	(-2.77)		(-4.16)		(2.60)	
Active Retaliation	-0.0636*	—	-0.144***	—	0.146***	—
	(-2.03)		(-3.74)		(3.64)	
Passive Retaliation	-0.358***	—	-0.520***	—	0.0625	—
	(-11.45)		(-13.51)		(1.56)	
Both Retaliation	-0.139***	—	-0.248***	—	0.146***	—
	(-4.43)		(-6.44)		(3.64)	
Constant	0.723***	—	1***	—	0	—
	(32.63)		(36.73)		(0.00)	
Active Lie	—	0.121***	—	-0.110*	—	0.438***
		(3.34)		(-2.51)		(8.57)
Passive Lie	—	-0.306***	—	-0.560***	—	0.0411
		(-8.43)		(-12.76)		(0.80)
Both Lie	—	-0.0405	—	-0.240***	—	0.233***
		(-1.11)		(-5.47)		(4.55)
Constant	—	0.578***	—	1***	—	0
		(22.51)		(32.21)		(0.00)
N	1211	692	875	400	336	292

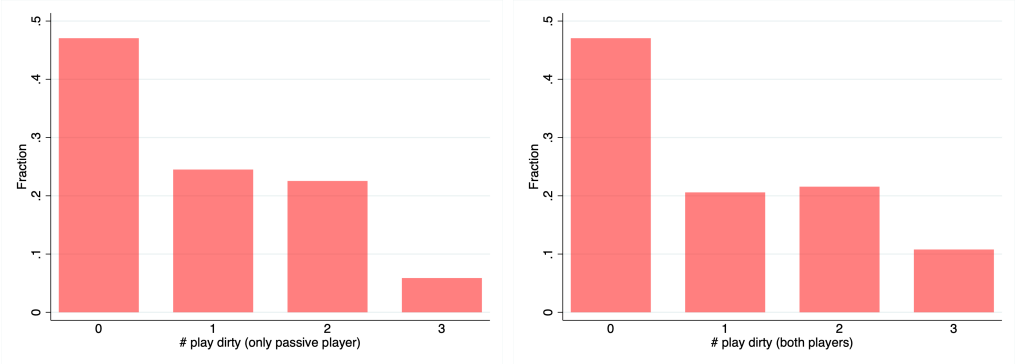
Note: This table reports the willingness to compete across different conditions over rounds 2 and 3 for all active players, those who choose to compete in the clean competitions (Competition), and those who choose not to compete in the clean competitions (Individual). The coefficients are obtained from OLS regressions with a competition dummy as the dependent variable on condition dummies, controlling for individual fixed effects. Standard errors are shown in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Appendix F: Frequency of Competition Entry And Dirty Play Choices



(a) (b)

Figure 7: This figure depicts the frequency of competition entry and dirty play among active players across conditions: panel a where only active players can engage in dirty play, and panel b where both active and passive players have the option to engage in dirty play. Blue bars represent the frequency of active players entering competitions under dirty conditions, while red bars show the frequency of dirty plays by active players. In both panels, the three possible conditions are categorized based on whether active players play dirty in all three conditions, two out of three, one out of three, or none of the dirty conditions.



(a) (b)

Figure 8: This figure depicts the frequency of dirty play among passive players across conditions where in panel (a) only passive players can engage in dirty play and panel b both active and passive players have the option to engage in dirty play. Red bars show the frequency of dirty plays by passive players. In both panels, the three possible conditions are categorized based on whether passive players play dirty in all three conditions, two out of three, one out of three, or none of the dirty conditions.

Appendix G: Experimental Instructions

Welcome!

Thank you for joining our experiment.

You will be paid a completion fee for completing the experiment and you can earn more money during the experiment depending on your choices and performance.

On the next page you will be asked to answer some attention check questions. After you answer these questions you will get started with the experiment.

Note that you have only two chances to give the correct answers to the questions. If you fail the two chances you cannot continue with the experiment.

Next

Attention check

Click on the most accurate statement:

- I am a giraffe.
- I am a human.
- I am a robot.

How many "S" are in the word "MISSISSIPPI?

Please select "Strongly agree" to show that you are paying attention to this question.

- Strongly disagree
- Disagree
- Agree
- Strongly agree

Which of the following is a vegetable?

- Egg
- Salmon
- Broccoli
- Pizza
- Milk

Next

On the next page, you will answer some questions about your personality.

Your answers to these questions are very important for our research. So, please answer the questions carefully. After that, you will be informed about how the experiment works.

Next

How do you see yourself:

Please tick a box on the scale, where the value 1 means "not at all" and the value 7 means "very much" for each question below.

Q1: In competition, almost anything is justified to win.

Q2: I see myself as someone who gets nervous easily.

Q3: It is important for me to outperform others.

Q4: I tend to manipulate others to get my way.

Q5: I see myself as someone who does things efficiently.

Q6: I tend to want others to admire me.

Q7: I always play by the rules.

Q8: I see myself as someone who is outgoing and sociable.

Q9: I find losing very painful.

Q10: I cannot stand it if others don't play by the rules.

Q11: I see myself as someone who is sometimes rude to others.

Q12: The thought of others treating me unfairly is very painful to me.

Q13: I assume that people have only the best intentions.

Q14: I only participate in competitions if I know in advance that they are fair.

Q15: I tend to exploit others towards my own end.

Q16: I see myself as someone who is reserved.

Q17: I see myself as someone who has an active imagination.

Q18: I see myself as someone who does a thorough job.

Q19: I see myself as someone who is original, comes up with new ideas.

Q20: I am willing to give to good causes without expecting anything in return.

Q21: I see myself as someone who remains calm in tense situations.

Q22: I tend to not be too concerned with morality or the morality of my actions.

Q23: I see myself as someone who is considerate and kind to almost anyone.

Q24: I see myself as someone who values artistic, aesthetic experiences.

Q25: I have used flattery to get my way.

Q26: I have used deceit or lied to get my way.

Q27: I tend to be cynical.

Q28: In competition, winning is everything.

Q29: I enjoy competing against others.

Q30: I tend to seek prestige or status.

Q31: I tend to be callous or insensitive.

Q32: I find competitive situations unpleasant.

Q33: If I am treated very unjustly, I will take revenge at the first occasion, even if there is a cost to do so.

Q34: I see myself as someone who tends to be lazy.

Q35: I tend to lack remorse.

Q36: I tend to expect special favors from others.

Q37: I see myself as someone who worries a lot.

Q38: I see myself as someone who has a forgiving nature.

Q39: When someone does me a favor, I am willing to return it.

Q40: I see myself as someone who is willing to take risks.

Q41: I see myself as someone who is talkative.

Q42: I tend to want others to pay attention to me.

Q43: I dislike losing so much that I will do anything not to lose.

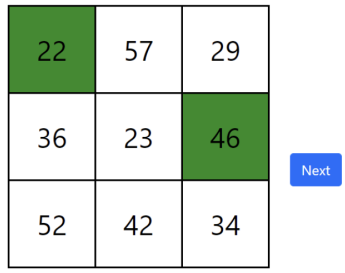
Seven options were given for each question: “1”, “2”, “3”, “4”, “5”, “6”, “7”

Task

In this experiment, you are going to be asked to twice solve a set of 10 simple addition tasks (an example is shown below).

You need to find the two numbers that sum up to the number shown to the right of the table. The numbers are different for each task.

On the next page, you can practice the task three times. You will then receive further instructions and information on how you will be paid for your performance in the task.



Target Number:

68

Next

Next

The procedure

This experiment has three rounds. The first **two rounds** consist of 10 tasks, and you can earn money for your performance.

At the end of the experiment, the computer will randomly choose one of these two rounds (round 1 or round 2), and you will receive your earnings in that round.

The **third round** is a bonus round. You do not need to do any tasks in this round. What you earn in the third round is on top of your payment in the randomly selected round before (round 1 or round 2).

How you are paid is different in each round.

We will explain how you are paid in the **first round** on the next page.

Next

Round 1

In the first round, you will be randomly paired with another participant in the experiment. You will enter a competition with this other participant. You both will solve 10 of the simple addition tasks you just practiced. Whoever finishes the ten tasks faster will win and earn US$8. The slower participant will lose and earn nothing.

You will not immediately find out whether you won or lost. Your earnings will be communicated at a later stage.

On the next page, you start the first round competition.

Let's get started.

Next

Task

Find and click the two numbers that sum up to the number shown on the right.

Game 1 of 10

19	45	16
17	39	15
38	31	35

Target Number:

64

Next

You finished the 10 tasks in **46.0 seconds**.

Next

Now, we would like to know how well you think you did in the task compared to other people. We want you to guess how well you did, compared to the last ten people who participated in this experiment.

If your guess is correct, you will receive $0.50 extra.

What is your best guess?

- ○ I performed worse than all 10 previous participants.
- ○ I performed better than 1 and worse than 9 of them.
- ◉ I performed better than 2 and worse than 8 of them.
- ○ I performed better than 3 and worse than 7 of them.
- ○ I performed better than 4 and worse than 6 of them.
- ○ I performed better than 5 and worse than 5 of them.
- ○ I performed better than 6 and worse than 4 of them.
- ○ I performed better than 7 and worse than 3 of them.
- ○ I performed better than 8 and worse than 2 of them.
- ○ I performed better than 9 and worse than 1 of them.
- ○ I performed better than all 10 previous participants.

Next

You have completed the first round.

Before you start the second round, we want you to guess how well you think **you will do** in the next round compared to the last 10 people who participated in this experiment.

If your guess is correct, you will receive $0.50 extra.

What is your best guess?

- ○ I will perform worse than all 10 previous participants.
- ○ I will perform better than 1 and worse than 9 of them.
- ○ I will perform better than 2 and worse than 8 of them.
- ◉ I will perform better than 3 and worse than 7 of them.
- ○ I will perform better than 4 and worse than 6 of them.
- ○ I will perform better than 5 and worse than 5 of them.
- ○ I will perform better than 6 and worse than 4 of them.
- ○ I will perform better than 7 and worse than 3 of them.
- ○ I will perform better than 8 and worse than 2 of them.
- ○ I will perform better than 9 and worse than 1 of them.
- ○ I will perform better than all 10 previous participants.

Please click on the next button to start the next round.

Next

Round 2

This is the second round. In this round, you will make decisions about how you would like to be paid for your performance in the ten tasks. There are two payment schemes, competition and individual. The two schemes are as follows:

Individual scheme:

Under the individual scheme, you receive US$4 for completing the 10 tasks, no matter how long it takes.

Competition scheme:

Under the competition scheme, you are paid in the same way as in the first round. You compete against another participant. The faster player earns US$8 and the slower player earns nothing.

Your choice has no impact on the payment scheme of your opponent. If you choose not to compete, he/she will compete against somebody else.

You will decide between these two payment schemes under 7 different conditions, which will be explained on the next screen.

Next

Conditions

In this round, the game will be played under one of seven different conditions. We will ask you to decide between the individual scheme and the competition scheme for each of these conditions before you know which one applies. Later, the computer will randomly choose one condition and your decision for that condition will be implemented.

The conditions differ from each other in the following ways:

- In some conditions, there is an option for one or both participants to **sabotage** the performance of the opponent. Sabotage means that, **in case you choose the competition scheme**, you and/or the other participant **can decide to increase the probability of winning by adding 30 seconds to the opponent's time.**

Notice that sabotage has a cost. In case you sabotage your opponent by adding 30 seconds to their time, you will be paid US$7 if you win the competition instead of the US$8 you receive if you win without sabotage.

- In some conditions, there is an option for one or both participants to **destroy** half of the other participant's earnings in case the other participant wins. This means that, **in case you choose the competition scheme**, you and/or the other participant will be asked to **decide before you perform the tasks whether to reduce the opponent's $8 earnings to $4** in case the opponent wins the competition.

The individual payment scheme is the same under all conditions. Each participant receives $4 simply for finishing the 10 tasks and there is **no possibility to sabotage or destroy.**

Comprehension question:

Which statements below are correct? Select all that apply.

- [x] Sabotage means adding 30 seconds to the opponent's time spent on the task.
- [ ] If the saboteur wins, she earns $9 instead of $8 without sabotage.
- [ ] I can only choose to destroy my opponent's earnings after the winner has been declared.
- [ ] The term 'destroy' refers to the ability to make my opponent the loser, even if they had initially won the competition.
- [x] I can choose to sabotage or destroy only if I choose the competition scheme.
- [ ] I have the option to sabotage or destroy in both competition and individual schemes.
- [x] Destroy means that if my opponent wins I can reduce her/his earning from $8 to $4.
- [ ] The winner in the competition scheme earns $8 and the loser earns $4.
- [ ] In the individual scheme, every participant will earn $8.

Next

Conditions

Here you can see all the **seven conditions**. We will ask you to make your decision on the following screens.

No sabotage/ No destroy:

There is no option to sabotage and no option to destroy for either player.

Sabotage option for you only:

Only you can decide to sabotage your opponent's performance.

Sabotage option for your opponent only:

Only your opponent can decide to sabotage you.

Sabotage option for both of you:

Both you and your opponent can decide to sabotage each other.

Destroy option for you only:

Only you have the option to destroy half of your opponent's earnings in case he/she wins.

Destroy option for your opponent only:

Only your opponent has the option to destroy half of your earnings in case you win.

Destroy option for both of you:

Both you and your opponent have the option to destroy half of the other's earnings in case the other wins.

On the following screens the seven conditions will be shown to you one by one in a random order. Then, you can make your decision for each of them.

Next

Condition 1 of 7: Destroy Option for Both of You

Under the "destroy option for both of you" condition, if you choose the competition scheme, **both you and your opponent** have the option to destroy **half** of the other's earnings in case the other wins.

What is your choice if this condition applies?

Now we would like to know your belief about other people's behavior. Out of the last 10 people who were assigned to the role of opponent how many of them you think chose to destroy under this condition? If your guess is correct, you will receive $0.50 extra.

- 10 out of 10 chose to destroy.
- 9 out of 10 chose to destroy.
- 8 out of 10 chose to destroy.
- 7 out of 10 chose to destroy.
- 6 out of 10 chose to destroy.
- 5 out of 10 chose to destroy.
- 4 out of 10 chose to destroy.
- 3 out of 10 chose to destroy.
- 2 out of 10 chose to destroy.
- 1 out of 10 chose to destroy.

Next

Condition 2 of 7: Sabotage Option for Your Opponent Only

Under the "sabotage option for your opponent only" condition, if you choose the competition scheme, **your opponent** can decide to sabotage you. **You do not have this option.** That is, **your opponent** has the option to add **30 seconds** to your time to increase her/his probability of winning.

What is your choice if this condition applies?

✓ --------
I want to compete.
I do not want to compete.

belief about other people's behavior. Out of the last 10 people who were assigned to the role of opponent how many of them you think chose to sabotage under this condition? If your guess is correct, you will receive $0.50 extra.

- 10 out of 10 chose to sabotage under this condition.
- 9 out of 10 chose to sabotage under this condition.
- 8 out of 10 chose to sabotage under this condition.
- 7 out of 10 chose to sabotage under this condition.
- 6 out of 10 chose to sabotage under this condition.
- 5 out of 10 chose to sabotage under this condition.
- 4 out of 10 chose to sabotage under this condition.
- 3 out of 10 chose to sabotage under this condition.
- 2 out of 10 chose to sabotage under this condition.
- 1 out of 10 chose to sabotage under this condition.

Next

Condition 3 of 7: Sabotage Option for Both of You

Under the "sabotage option for both of you" condition, if you choose the competition scheme, **both you and your opponent** can decide to sabotage each other. That is, **both of you** have the option to add **30 seconds** to your opponent's time to increase your probability of winning.

Notice that sabotage has a **cost**. Whoever sabotages their opponent will be paid **US$7** instead of **US$8** in case they win.

What is your choice if this condition applies?

Now we would like to know your belief about other people's behavior. Out of the last 10 people who were assigned to the role of opponent how many of them you think chose to sabotage under this condition? If your guess is correct, you will receive $0.50 extra.

- 10 out of 10 chose to sabotage under this condition.
- 9 out of 10 chose to sabotage under this condition.
- 8 out of 10 chose to sabotage under this condition.
- 7 out of 10 chose to sabotage under this condition.
- 6 out of 10 chose to sabotage under this condition.
- 5 out of 10 chose to sabotage under this condition.
- 4 out of 10 chose to sabotage under this condition.
- 3 out of 10 chose to sabotage under this condition.
- 2 out of 10 chose to sabotage under this condition.
- 1 out of 10 chose to sabotage under this condition.

Next

Condition 4 of 7: Destroy Option for Your Opponent Only

Under the "destroy option for your opponent only" condition, if you choose the competition scheme **your opponent** has the option to destroy **half** of your earnings in case you win. **You do not have this option in case your opponent wins.** It is your opponent's decision whether they want to use this option or not.

What is your choice if this condition applies?

Now we would like to know your belief about other people's behavior. Out of the last 10 people who were assigned to the role of opponent how many of them you think chose to destroy under this condition? If your guess is correct, you will receive $0.50 extra.

- 10 out of 10 chose to destroy.
- 9 out of 10 chose to destroy.
- 8 out of 10 chose to destroy.
- 7 out of 10 chose to destroy.
- 6 out of 10 chose to destroy.
- 5 out of 10 chose to destroy.
- 4 out of 10 chose to destroy.
- 3 out of 10 chose to destroy.
- 2 out of 10 chose to destroy.
- 1 out of 10 chose to destroy.

Next

Condition 5 of 7: Destroy Option for You Only

Under the "destroy option for you only" condition, if you choose the competition scheme **you** have the option to destroy **half** of your opponent's earnings in case your opponent wins. **Your opponent does not have this option in case you win**. It is up to you whether you want to use destroy option or compete without.

What is your choice if this condition applies?

Next

Condition 6 of 7: No Sabotage/ No Destroy

Under the "no sabotage/ no destroy" condition, there is **no option to sabotage and no option to destroy** for either player. So, under this condition the rules of the competition scheme are the same as the competitive game you have played in the first round.

What is your choice if this condition applies?

Next

Condition 7 of 7: Sabotage Option for You Only

Under "sabotage option for you only" condition, if you choose the competition scheme, **you** can decide to sabotage your opponent's performance. That is, **you** have the option to add **30 seconds** to your opponent's time to increase your probability of winning. **Your opponent does not have this option.** It is up to you whether you want to use your sabotage option or compete without sabotage as in the first round.

Notice that sabotage has a **cost**. In case **you** sabotage your opponent by adding 30 seconds to their time, **you** will be paid **US$7** if you win the competition instead of the **US$8** you receive if you win without sabotage.

What is your choice if this condition applies?

Next

A random condition will now be chosen to be implemented.

Next

The condition that was randomly chosen to be implemented is "Destroy Option for You Only".

Under this condition, your choice was "I want to compete, but not destroy."

The task will start on the next page.

Next

Task

Game 1 of 10

26	52	53
14	49	36
54	63	16

Next

Target Number:

75

You finished the 10 tasks in **226.0 seconds**.

Next

A random round (round 1 or round 2) will now be chosen for the payment. Your performance in the chosen round will be used to calculate your earnings.

Next

The round that is randomly chosen for the payment is round 2.

Please click on the next button to start the third round.

Next

Round 3

In the third round, you do not need to do the task again. We consider your performance in the first round to determine your payment. In the first round you spent **46.0 seconds** to complete the task.

In this round you have an option to choose whether you want to enter the competition or not. **If you choose to compete**, we compare your performance in the first round with the performance of another random participant.

In case you choose competition, the faster player is the winner and earns $2 extra on top of the payment in the randomly selected round. The slower player loses the competition and earns nothing.

If you choose not to compete, we do not compare your performance with the performance of your opponent and there is no winner or loser. You will then receive $1.

There are **four conditions** in this round, and you will be asked to make a choice under each condition.

Conditions:

Lie option for you only: In case you choose competition, **only you** have the option to lie about your performance in the first round.

Lie option for your opponent only: In case you choose competition, **only your opponent** has the option to lie about his/her performance in the first round.

Lie option for both of you: In case you choose competition, **both you and your opponent** have the option to lie about your performance in the first round.

No lie option for either player: In case you choose competition, you will compete based on your performance in the first round. There is **no option to lie** for either player.

After you make your decision for each condition, the computer will randomly choose **one condition** for your extra payment. Your decision under the chosen condition determines your payment.

Next

Condition 1 of 4: Lie Option For Your Opponent Only

In case you choose competition, **your opponent** has the option to lie about his/her performance in the first round. **He/She** will be asked to choose whether they want to lie about their performance or play truthfully. In case they choose to lie, they will be asked to **enter their time in a box**. We consider their **reported time** to determine the winner. **You do not have this option.** It is up to your opponent whether he/she wants to use this option or compete without lying.

What is your choice if this condition applies?

I want to compete.

Now we would like to know your belief about other people's behavior. Out of the last 10 people who were assigned to the role of opponent how many of them you think chose to lie under this condition? If your guess is correct, you will receive $0.5 extra.

- (●) 10 out of 10 chose to lie under this condition.
- ( ) 9 out of 10 chose to lie under this condition.
- ( ) 8 out of 10 chose to lie under this condition.
- ( ) 7 out of 10 chose to lie under this condition.
- ( ) 6 out of 10 chose to lie under this condition.
- ( ) 5 out of 10 chose to lie under this condition.
- ( ) 4 out of 10 chose to lie under this condition.
- ( ) 3 out of 10 chose to lie under this condition.
- ( ) 2 out of 10 chose to lie under this condition.
- ( ) 1 out of 10 chose to lie under this condition.

Next

Condition 2 of 4: Lie Option For Both of You

In case you choose competition, **both you and your opponent** have the option to lie about your performance in the first round. **Both you and your opponent** will be asked to **choose whether you want to lie about your performance or play truthfully**. In case you choose to lie, **you will be asked to enter your time in a box**. We consider **your reported time** to determine the winner. It is up to you whether you want to use the lie option or compete without lying.

What is your choice if this condition applies?

I want to compete, but not lie.

Now we would like to know your belief about other people's behavior. Out of the last 10 people who were assigned to the role of opponent how many of them you think chose to lie under this condition? If your guess is correct, you will receive $0.5 extra.

- (●) 10 out of 10 chose to lie under this condition.
- ( ) 9 out of 10 chose to lie under this condition.
- ( ) 8 out of 10 chose to lie under this condition.
- ( ) 7 out of 10 chose to lie under this condition.
- ( ) 6 out of 10 chose to lie under this condition.
- ( ) 5 out of 10 chose to lie under this condition.
- ( ) 4 out of 10 chose to lie under this condition.
- ( ) 3 out of 10 chose to lie under this condition.
- ( ) 2 out of 10 chose to lie under this condition.
- ( ) 1 out of 10 chose to lie under this condition.

Next

Condition 3 of 4: No Lie Option

In case you choose competition, you will compete against a random participant based on your performance in the first round. There is **no option to lie** for either player.

What is your choice if this condition applies?

I do not want to compete.

Next

Condition 4 of 4: Lie Option For You Only

In case you choose competition, **you** have the option to lie about your performance in the first round. **You** are asked to choose whether you want to lie about your performance or play truthfully. In case you choose to lie, you will be asked to **enter your time in a box**. We consider your **reported time** to determine the winner. **Your opponent does not have this option.** It is up to you whether you want to use the lie option or compete without lying.

What is your choice if this condition applies?

I want to compete and lie.

Next

You chose to lie under the "Lie Option for You Only" condition. You spent **46.0 seconds** in the first round. You can lie about your performance in the box below. Please note that the time you report in the designated box will be used to determine the winner.

Please enter you time in the box below in seconds:

10

Next

A random condition will now be chosen to be implemented.

Next

The condition that was randomly chosen to be implemented is "Lie Option for You Only".

Under this condition, your choice was "I want to compete and lie."

Next

Payment

We will now take some time to calculate your earnings. You will receive your payment within 3 days.

Next

Please answer a few final questions:

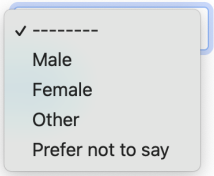
Question 1

Please enter your age.

20

Question 2

Please choose your gender.



Complete the Study

Please complete the following two steps to record your response and receive your reward:

1) Click 'Next' to complete your submission on Prolific.

2) Click 'Submit' on the Prolific page to record your response.

If you do not complete the second step, we will not receive your data and will be unable to reward you. Please note that the completion fee and additional payment for the round chosen will be paid separately.

Thanks for your participation!

Next