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Gender and Psychological Pressure in Competitive Environments

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ABSTRACT

Gender and Psychological Pressure in Competitive Environments[1]

Gender differences in paid performance under competition have been found in many laboratory-based experiments, and it has been suggested that these may arise because men and women respond differently to psychological pressure in competitive environments. To explore this further, we conducted a laboratory experiment comprising 444 subjects, and measured gender differences in performance in four distinct competitive situations. These were as follows: (i) the standard tournament game where the subject competes with three other individuals and the winner takes all; (ii) an anonymized competition in which an individual competes against an imposed production target and is paid only if s/he exceeds it; (iii) a 'personified' competition where an individual competes against a target based on the previous performance of one anonymised person of unknown gender; and (iv) a 'gendered' competition where an individual competes against a target based on the previous performance of one anonymised person whose gender is known. We found that only men respond to pressure differently in each situation; women responded the same to pressure no matter the situation. Moreover, the personified target caused men to increase performance more than under an anonymized target and, when the gender of the person associated with the target was revealed, men worked even harder to outperform a woman but strived only to equal the target set by a male.

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1. Introduction

Introducing competition into the workplace is often seen as a way of increasing workplace and individual productivity (Lazear and Rosen, 1981). In the laboratory, this can generally be observed by comparing performance under piece-rate pay to performance under tournament pay; average performance is higher under the tournament. However, the introduction of competition may introduce psychological pressures that cause some people to perform worse in a tournament setting, as demonstrated by Apesteguia and Palacios-Huerta (2010). Using data from a randomized natural experiment, they show that psychological or emotional effects are relevant to individual performance in a tournament setting. In two other settings, both two-stage competitions, Cai et al (2019) and Iriberri and Rey-Biel (2018) show that the performance of females drops off in the second-stage when competitive pressure is higher.

In this paper we explore how psychological pressure affects the performance of men and women in a variety of competitive situations. We examine psychological pressure by looking at competitive settings where we vary the information that participants receive about their competition. We find stark gender differences depending on what information was given; under competitive pressures men respond more to the information about their competitors than women. These results have implications for why gender gaps may still remain in the labor market.

Since the 1980s, women have been catching up with men in the workforce and yet still women lag behind men with regard to both pay and opportunities for advancement (see for example Arulampalam, Booth and Bryan, 2007; Blau and Kahn, 2017). Reasons put forward to explain these stylised facts include discrimination and the productivity-reducing work-family conflicts that women are more likely to face than men. More recently, other hypotheses around gender differences in response to competition have been advanced: women shy away from competition; and men perform better in a competitive environment.[2]

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[2] Studies investigating gender differences in performance in competitive environments include Gneezy et al., 2003; Niederle and Vesterlund, 2007, 2011; Dreber et al., 2011; Cárdenas et al, 2012; Niederle, 2014 and Booth and Yamamura, 2018. Studies exploring gender differences in preference to enter a competition include Gneezy, Leonard and List, 2009; Booth and Nolen, 2012; Apicella and Dreber, 2015; Florey, Leibbrandt and List 2015; Buser et al, 2017; Booth et al, 2016, while studies analysing attitudes towards risk include Booth et al., 2014a; Dreber et al, 2014; and Khachatryan et al., 2015. Buser et al (2014) explores how preference for competition across genders affects academic task-choice. In a study that is closest to ours, Backus et al (2016) find that the gender composition of chess tournaments affects the behaviour of men and women in ways that are detrimental to female performance.

This paper adds to that literature on gender differences in competitive environments by showing that psychological pressures in different environments can lead men to perform better than women. Furthermore, by carefully varying the environment in which the subject experienced psychological pressure, we can show where gender differences from psychological pressure are minimized.

To look at the effect of competition (or to mimic a competitive environment), laboratory-based research generally compares performance in a fixed-payment scheme (such as a piece-rate) to performance under a variable payment scheme (such as a winner-takes-all tournament). Output is typically higher under variable-payment schemes than under fixed-payment schemes, and recent experimental evidence has found that gender affects self-selection into variable-payment schemes. When subjects are offered the choice of whether or not to enter a tournament rather than be paid by piece, a number of studies have found that women prefer to avoid such competition but men may choose to compete too much. Gneezy, Niederle and Rustichini (2003) found that women choose not to compete even though their piece-rate productivity is comparable to that of men. Niederle and Vesterlund (2007) show that there are gender differences in preference for competition. Gneezy et al (2009) and Booth and Nolen (2012) find that gender differences in preference for competition are not innate but vary depending on the cultural environment.[3] Dohmen and Falk (2011), using experimental evidence, show not only that higher productivity individuals self-select into variable-payment schemes but that preferences and attitudes play a role. These preferences are likely to include confidence and a liking for competition. High productivity individuals may choose to avoid competition if they dislike the psychological pressure that competition can induce. Iriberri and Rey-Biel (2012) find that there is a gender difference in performance in competitive environments only when the task being done is considered to favor men: men increase their performance in competitive environments in all cases, but women only do so on tasks perceived as favoring women.[4]

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[3] Gneezy, Leonard and List (2009) find that women are less competitive than men in a patriarchal society but more competitive than men in a matrilineal society. Booth and Nolen (2012) find that girls from single-sex schools are as competitive as boys from either single-sex or coed schools, and more competitive than girls from coed schools.

[4] See Iriberri and Rey-Biel (2012), Table 1. The estimated coefficient to the female dummy is negative and significant in each of the specifications for the "Mental Rotation Task (MRT)" but is not statistically significant in any of the specifications for the "Symbol Digit Substitution Task (SDST)."

To date there has been little research investigating whether or not there are gender differences in performance in response to varying the environment in which psychological pressure may be experienced. Booth and Yamamura (2018) show that there are gender differences in performance that depend on the gender-mix of the environment to which participants are randomly assigned: men perform better than they usually do when competing against women whereas the reverse happens for women.[5] Moreover, at least one study has considered the role of information-revelation on individual performance with cooperative peer-effects and how this varies with gender.[6] If there are gender differences in response to environment when one is under competitive pressure, they may help explain why gender differences in performance and preference for competition exist. They may also contribute to explaining why there are large and persistent gender gaps observed in the labor market.

In the laboratory experiment reported in this paper, we model psychological pressure by giving subjects targets or thresholds that they have to reach in order to get paid, and we vary the salience of different aspects of the competitive environment. The four environments are: (i) the standard tournament game where the subject competes with three other anonymous individuals and the winner takes all; (ii) a competition in which an individual competes against an imposed production target and is paid only if s/he meets or exceeds the target; (iii) a competition where an individual competes against a target based on the previous performance of an anonymous person; (iv) a competition where an individual competes against a target based on the previous performance of an anonymous person whose gender is also known.

In the workplace it is common for individual bonuses to be tied to performance against other people in the firm (roughly mimicking scenario (i) above). However, in other settings workers may be set targets they have to reach for payment or promotion (roughly mimicking scenario (ii) above). Given how commonplace goals and targets are in the workplace, we vary

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[5] Booth and Yamamura (2018) find that women's race-time is slower in randomly-assigned mixed-sex races than in all-women races, whereas men racer's time is faster in mixed-sex races than men-only races. Moreover, in mixed-sex races, male racers are found to be more 'aggressive' – proxied by changing out of the randomly-assigned lane –whereas women follow less aggressive strategies.

[6] Bellemare, Lepage and Shearer (2010) experimented with paying subjects under fixed wages then under piece rates, and subsequently generated peer pressure by revealing private information about the productivity of their peers. They found that while male performance was affected by information-revelation, the productivity of women was little affected by peer pressure under either fixed wages or piece rates. However, while they considered the role of psychological pressure, it was in a very different context to that considered in our paper.

the way they are set in scenarios (iii) and (iv) to examine the role that pressure plays when more information is known about the person against whom one is competing. Therefore, these four environments closely mimic many situations that individuals may face in the labour market.

We find that only men respond to the differences in environment when they are under psychological pressure. Men increase performance more when they know they have to meet or exceed a target reached by someone else previously than when they are told to meet a target which was set in an unknown manner. However, if men know that the target they have to reach was previously set by a woman, they do even better than if they know it was set by a man. That is, they are more likely to meet and exceed the target if they are told it was previously reached by a woman than a man. Men appear to work harder to outperform a woman but only strive to equal the target set by a male. In contrast, however, women do not respond to any of the environmental changes when they are under psychological pressure.

These results show that men are more likely to thrive in competitive environments than women – they increase their performance with the introduction of targets, whereas women do not. However, the other implication is that, as women enter the workforce (and men have to compete against them), their presence will drive men to perform even better. Therefore, while women may shy away from competition or not perform as well if forced to enter a competitive environment, having females compete with men could lead to an overall increase in productivity.

2. Experiment Design

2.1 Objectives

We designed our experiment to explore the extent to which gender differences in competitive performance can be explained by gender-differentiated responses to environments when one is facing psychological pressure. Psychological pressure can arise through management-imposed targets as well as through non-cooperative peer-effects, and we consider a number of these in our experiment.

2.2 Experiment Location and Subjects

The experiment was conducted at ESSEXLab, the purpose-built University of Essex social science laboratory (full details available at: **http://www.essex.ac.uk/essexlab/**).[7] The laboratory has 32 networked workstations. Each of these is located in a soundproofed three-sided booth, with no vision lines to other booths.

ESSEXLab holds a database of all Essex University students who have registered their interest in participating in social science lab experiments. Students registering are required to have read and understood ESSEXLab policies before signing up to the participant database.

For our experiment we were seeking only undergraduate students. All undergraduates who had registered their interest with ESSEXLab were invited by the Lab Manager to participate in our experiment. Drawing from this subject pool we had 444 students participate, and conducted 20 laboratory sessions over the two-week period. On arrival at their particular session, students were checked in and randomly assigned (through numbered balls picked by the laboratory manager out of an urn) to a booth. Although participants could not see into the other booths, they were aware that others were participating in the experiment because they saw the other students while waiting to sign-in and enter the lab. The average session comprised 23 students (the smallest session size was 12 students and the largest was 28). Around 60% of the sample was female and 40% male.

2.3 Experiment

At the start of the experiment, students were told that they would be performing a sequence of rounds each involving a number of tasks. They were also informed that their performance from one of these rounds would be randomly chosen for payment at the end of the experiment.

In each round, students had three minutes to complete as many tasks as possible. Each task involved looking for two differences between a pair of matrices. Specifically, we asked students to compare a pair of matrices comprising five columns and six rows, and to click on the two letters in the right-hand matrix that differed from those in the left hand matrix.[8]

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[7] Our proposal was approved by Essex University's Ethics Committee prior to its implementation.
[8] The experimental protocol is included in the appendix.

Before the games began, students received instruction in how to complete the task and were allowed to ask questions. The instruction began with students being shown a pair of matrices and told to click on the two letters in the right-hand matrix that differed from those in the left-hand matrix. After this, they were then told to complete a practice round (in which they should try to complete as many tasks as possible) lasting three minutes. Once this instruction was completed, the paid experiments began. The procedure was that, immediately before each round, students were told the nature of the task to be carried out and the payment for that round. At this stage subjects were permitted to ask questions of clarification about that round. (The purpose of the experiment was not explained to students however.)

The specific incentive structures are described below. Note that Round 5 was conducted *before* Round 6 for half of the subject pool (where these individuals were randomly chosen) and *after* Round 6 for the remaining subjects. We also conducted a Holt and Laury (2002) type of risk game at the conclusion of the rounds described below, followed by a questionnaire to obtain demographics information and the Big Five personality traits.

Round 1 (Piece-Rate): Students had three minutes to complete as many tasks as possible and received £0.60 per correct answer.

Round 2 (Standard Tournament): Students were randomly assigned to groups of four but were not told who was in their group. Students had three minutes to complete as many tasks as possible. Students received £2.40 per correct task *IF* they completed the most correctly, otherwise £0. Ties were broken randomly.

Choice before Round 3: Students were next asked to CHOOSE a payment mechanism for Round 3 before playing that round. They could get *either* £0.60 per correct task if they chose the piece rate, *or*, for the tournament, £2.40 per correct answer IF they get more correct than the other three people did in the previous round.

Round 3: Students were given three minutes to complete as many tasks as possible and paid according to their choice.

Round 4 (Imposed Threshold): Students were given a random number from a distribution matching that of the number of correct answers from Round 2.[9] This was their threshold. Students were not told the source of the threshold. They were then given three minutes to solve as many tasks as possible. Students received £2.40 per correct task provided that the number of tasks completed is greater than or equal to the threshold number, and £0 otherwise.

Round 5 (Personified Threshold): Students were told how many tasks another randomly chosen subject *from within the laboratory* had solved correctly in Round 2. The identity of this individual was not revealed. Students were then given three minutes to complete as many tasks as possible. Students received £2.40 per correct task provided that the number of tasks completed is greater than or equal to the Round 2 performance of the randomly chosen competitor, and £0 otherwise.

Round 6 (Gendered Personified Threshold): Students were told how many tasks another randomly chosen subject *from within the laboratory* had solved correctly in round 2. While the identity of this individual was not revealed, their gender was.[10] Students were then given three minutes to complete as many tasks as possible. Students received £2.40 per correct task provided that the number of tasks completed is greater than or equal to the Round 2 performance of the competitor, and £0 otherwise.

2.3 Data Description

For our experiment we have 444 subjects, all of whom were registered for an undergraduate degree at the University of Essex. In the UK, undergraduate degrees take three years to complete; 40%; of our subjects were in their first year, 30% were in second year and the remaining 30% were in their third year. The gender breakdown was 60% female and 40%

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[9] This distribution was of the actual Round 2 scores obtained from that laboratory session in which the subject was participating.
[10] The gender cues were given using a stylised symbol like those appearing on Women's and Men's Restroom doors, as shown in the Appendix. We chose not to have realistic images as we did not want subjects to be influenced in their behaviour by subjective evaluations of beauty and the like.

male. The proportion female varied across sessions, ranging from a low of 49% female to a high of 79%.[11]

[Insert Table 1 here]

Table 1, describing the data, shows estimates from regressions where we include in each specification only a constant and a dummy variable for female gender. In Columns [1] and [2] we show subjects' performance in Rounds 1 and 2 – the mandatory piece rate and tournament respectively. Column [3] gives the improvement in scores in Round 2 compared with Round 1. Column [4] shows how improvement in the tournament varied with piece-rate performance. The second-last column presents the marginal effect estimates from a probit model, where the dependent variable takes the value one if the individual chose to be paid in Round 3 by the tournament mechanism, and zero otherwise. In the final column of Table 1, the dependent variable is the number of risky options chosen by our subjects using the risk game further explained below.

Table 1 shows that our sample has the same properties that are generally seen in the literature looking at gender differences in competitive environments (see Niederle and Vesterlund (2007); Booth and Nolen (2012); and Petrie and Segal (2014) for examples). We have a task where there are no gender differences in performance under the tournament or piece-rate setting, yet women shy away from entering the tournament and are more risk averse than the men. However, controlling for risk does not explain the gender gap in the preference for competition.

Table 1 shows that there are no differences in mean outcomes for either the piece-rate or tournament setting. However, given that we are looking at how environmental changes can have gender-differentiated impacts, we also want to look at the entire distribution and see if performance varies at different parts.

[Insert Figure 1 Here]

As seen in Booth et al. (2018), environmental changes may help women in the lower part of the distribution more, and we wished to see if this was also the case here. Figure 1 presents the performance distributions by gender for both piece-rate and tournament performance.

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[11] We included session dummy variables in the main regression and the results were the same. Estimates available from the authors on request.

The figure shows that there is no statistical difference in the distribution of performance by gender.

In summary, we find that - although there are no gender differences in the task performance in the first two rounds of our experiment - there are statistically significant gender differences in preferences. Women are less willing to enter a competitive environment and make fewer risky choices than men. To explore these findings further, we next compare the differences in scores between the standard tournament round and our various treatments.

[Insert Table 2 Here]

Table 2 shows the difference in scores between Round 2 - the standard tournament round – and the three treatments (Rounds 4, 5 and 6), disaggregated by gender. The first row shows that the average tournament score was 13.814 for women and 13.649 for men, and that the difference between them is not statistically significant. Moving down the columns, we see that for two of the three treatments - the target threshold and the personified threshold – there was a small increase in performance for both women and men. But once the personified threshold was gendered, a male competing with another male slackens off his performance (second last row, second column) as does a female competing with another female (last row, first column). However, when a male is informed that he is competing with *a female* (last row, second column), his performance increases.

Table 2 shows us that performance of men varies more in response to the competitive environment and that women seem to be closer to the target whether they missed it or not. However, we need to examine if these findings hold once we control for ability and the magnitude of the threshold that a subject was shown. (Recall that each subject was given, as their target, a random number from a distribution matching that of the number of correct answers from Round 2.) Clearly if a subject is given a higher threshold, s/he will have to provide more effort to cross it and will also be less likely to meet the target). In the following section, we will see if our findings from Table 2 carry through to the regression analysis.

3. Results

Next, we present one of the main results of our paper, which is that men respond more than women to environment when under psychological pressure.

Table 3 presents the results by round. The estimating sample is the pooled observations from three rounds, namely R4, R5 and R6. Thus, in Column [1] we have 1,332 person-round observations, while in Column [2], estimated for women, we have 810 person-round observations and in Column [3], estimated for men, we have 522 person-round observations. For each of the three 'waves' of data, the dependent variable is the difference between the score in the standard baseline tournament (winner-takes-all) set-up of Round 2 and the score in each of the subsequent rounds: R4 the imposed threshold; R5 the personified threshold; and R6 the gender-personified threshold. Notice also that we include dummy variables to indicate the round for which the difference variable was constructed. The standard errors are clustered at the person level and we are looking at the within-person differences to account for time-invariant subject-specific factors.

In Columns [1] - [3], the difference between the student's score in that round compared to the baseline tournament is shown for all individuals, for all women, and for all men. Column [1] shows that, when a target is used, male and female subjects do not increase their performance when compared to the standard competitive environment studied; the coefficient of Female (=1) is not statistically different from zero and the estimated constant is not different than zero.[12] When a target is personified or gender-personified, though, performance goes up significantly, by 0.220 and 0.330 respectively. However, the effect for the gender-personified target disappears when a male competitor is shown (the total effect for showing male is 0.330-0.348=-0.018). Subjects perform better when they know they have to hit a target set by a female.

By looking at females and males separately (Columns [2] and [3] respectively), we see that the results in the overall sample are driven by males. Column [2] shows no significant response by females to the different environments; females do not vary their performance with regards to how a target was set when under psychological pressure. However, Column [3] shows that men respond to how a target was set when under psychological pressure. First, men perform better when presented with personified targets. Second, when we show the gender of the person hitting the target, there is a differential response: a man will increase

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[12] The coefficient on 'Target Value Shown' also shows that setting targets does not increase performance when compared to the baseline setting. The coefficient is nearly zero in each column [1]-[3] and always insignificant.

his performance when he is competing against a woman but not when he is competing against a man.

Columns [4]-[6] show the marginal effects from the probit regressions for the likelihood that a subject hits the target shown in any round. In these columns we control for a subject's ability when under psychological pressure by including the score that subject got in the tournament round. Furthermore, we control for the target value shown; the higher the target value the less likely a subject will meet the target. Again, consistent with the performance results, the overall effects are primarily driven by the men. However, as seen in column [5], while women do not increase their performance in a gender-personified round, they are more likely to meet their target – regardless of whether they are told the target had been reached by a man or a woman. Column [6] shows that men are more likely to meet the target in the personified and gender-personified settings than in the exogenous threshold setting – which is also when they perform better. However, unlike in column [3], there is no differential effect from the gender of the person showed.

Table 3 clearly shows that, when under psychological pressure, men perform better when they are told they are competing against a target set by another (anonymous) person or a female. Furthermore, in both of those cases, the increase in performance means then men are much more likely to make their target. With women, while we see that change the environment does not lead to a change in performance, when they are in a gender--personified environment, they are more likely to meet their target.

These results show us that, when individuals are under psychological pressure, the environment in which they are competing matters. Furthermore, while males increase performance and hit the target more in some situations, we know from the descriptive situations in Table 2 that women are more likely to be close to the target whether they miss or surpass it. Therefore, we will next explore this differential effect by examining the estimates presented in Table 4 below.

[Insert Table 4 Here]

Table 4 presents the results from tobit regressions estimating individuals' performance above or below the target. In all the rounds in which a target was shown, a person received no money if s/he was below the target but received £2.40 for each task solved correctly if s/he hit or exceeded the target. Therefore, subjects faced nonlinear rewards for performance. However, upon reaching a target, the marginal incentive was constant in each case. Despite

this, we again have differential responses for males and not females when looking at performance above the target. Column [1] shows that, for a personified or gender-personified target, subjects were, roughly, as likely to increase their performance. However, if a male was shown, the effect of the gender-personified target was negated, and this was driven entirely by male subjects. Column [2] shows that, once a female had hit a target, she continued to do well if the target was personified regardless of which gender was shown. Column [3] shows that men had a differential effect. If a target was personified, they continued to put in effort even if they passed the threshold. However, if a female was shown as hitting the target they put in even more effort, while if a male was shown the men did not solve any additional tasks beyond the target. That means that men responded to personified targets and strived to surpass them only if a woman had achieved that score. Once they hit the male target, the men just stopped working.

Columns [4]-[6] show that those who finished below the target did not look different depending on the environment: people were not more likely to barely miss the target in some situations rather than others. There is some evidence than men did try harder when they faced a personified target or when they were told they were competing against a female (0.825 and 0.545 are not statistically different); this is consistent with the way men performed in each environment and how they strove to meet targets.

Tables 3 and 4 provide a picture of how psychological pressure affects men and women differently in competitive environments. When targets are set, both men and women perform better than when there is a standard tournament. When people are told that those targets have been achieved by someone beforehand (i.e. in the personified target setting), men perform better and are more likely to meet their targets, whereas women do not respond. In fact females show no change in performance depending on how their target is set. However, if they are told that a woman achieved the target, they are more likely to meet the target even if their performance does not increase. The behaviour of men is more complicated.

Men increase their performance if they know that a woman or someone else was able to achieve the target beforehand. However, if they are told a male achieved that goal they will work to hit the target but then not push to exceed the target despite the same financial incentives as in other cases.

Given these differential responses to psychological pressure in competitive environments, are there any predictions for policy? While women shy away from competition, once in a competitive environment their performance is not worsened, while men will respond positively. Therefore, policies that increase the likelihood that females will enter into competitive environments will increase output and productivity.

5. Discussion

In our laboratory experiment, we explored the impact on men and women of the introduction into a competitive environment of psychological pressure. We modelled psychological pressure by giving subjects randomly generated targets or thresholds that they had to reach in order to get paid. We varied the salience of those thresholds by using three types: an anonymized target; a personified target; and a gender-personified target. We found that the personified target caused men to increase performance more than under an anonymized exogenous target. However, a personified target – where the subject was notified that the target they have to match or beat is the performance of someone else in the same laboratory – increased average performance even more for men and caused men to hit the target more often than in the anonymized case. In contrast, women did not respond to the target whether it was personified or not. However, if the gender of the person whose performance sets the personified target was also revealed, there are mixed effects: women again did not appear to respond at all but men worked much harder to outperform a woman and aimed only to equal the target set by a man. Men want to avoid being beaten by a woman.

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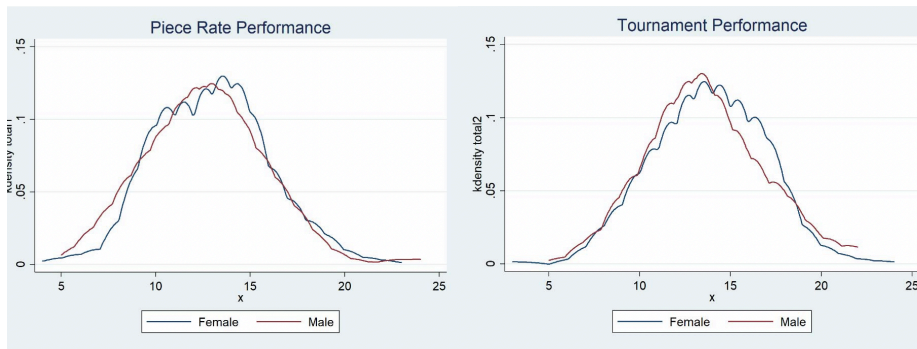
Figure 1: Performance Distribution by Gender for

Piece-rate and Tournament Rounds

Tables

Table 1: Gender Differences in Performance, Risk Preferences and Preference for Competition						
VARIABLES	Piece Rate Score	Tournament Score	Tournament - Piece Rate Score		Chose To Compete (=1)	No. Risky Options
Female (=1)	0.311	0.165	-0.146	-0.051	-0.192***	-1.419***
	[0.305]	[0.312]	[0.243]	[0.228]	[0.047]	[0.371]
Piece Rate Score				-0.305***		
				[0.036]		
Constant	12.655***	13.649***	0.994***	4.858***		13.241***
	[0.244]	[0.249]	[0.189]	[0.474]		[0.298]
Regression Type	OLS	OLS	OLS	OLS	Probit	OLS
Observations	444	444	444	444	444	444
R-squared	0.002	0.001	0.001	0.143		0.033
Robust standard errors in brackets						
*** p<0.01, ** p<0.05, * p<0.1						

Table 2: Difference in Score between Tournament Round and Treatments				
	Female	Male	Difference	SE of Dif
Tournament Score	13.814	13.649	0.165	[0.312]
Difference Between Score in Treatment Below and Tournament:				
Target	0.7	0.552	0.148	[0.255]
Personified Target	0.826	0.920	-0.094	[0.253]
Male Personified Target	0.933	0.164	0.769*	[0.438]
Female Personified Target	0.828	1.204	-0.376	[0.337]

Table 3: Performance Difference By Threshold Type

VARIABLES	Score - Score in Tournament Round			Dependent Variable (=1) If Subject Met Target		
	[1]	[2]	[3]	[4]	[5]	[6]
Female (=1)	0.076			-0.002		
	[0.195]			[0.038]		
Personified Target (=1)	0.220*	0.129	0.383*	0.077***	0.032	0.153***
	[0.119]	[0.145]	[0.208]	[0.029]	[0.036]	[0.048]
Gender Personified Target (=1)	0.284*	0.093	0.602**	0.099***	0.090**	0.122**
	[0.155]	[0.197]	[0.250]	[0.035]	[0.045]	[0.055]
Male Shown for Gender Personified Target	-0.214	0.190	-0.900**	-0.013	-0.010	-0.024
	[0.249]	[0.312]	[0.406]	[0.058]	[0.072]	[0.100]
Target Value Shown	0.010	0.053	-0.060	-0.136***	-0.128***	-0.151***
	[0.026]	[0.032]	[0.041]	[0.008]	[0.011]	[0.013]
Score in Tournament	-0.297***	-0.351***	-0.222***	0.091***	0.089***	0.096***
	[0.037]	[0.041]	[0.063]	[0.007]	[0.010]	[0.010]
Sample	All	Females	Males	All	Females	Males
Estimation Model	OLS	OLS	OLS	Probit	Probit	Probit
Constant	4.534***	4.825***	4.418***			
	[0.569]	[0.696]	[0.959]			
Observations	1,332	810	522	1,332	810	522
R-squared	0.123	0.155	0.098			

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Nonlinear effect on performance around the target

VARIABLES	Number Of Correct Answers Above Target if Score>=Target			Number Of Correct Answers Below Target if Score<Target		
Female (=1)	-0.101			0.247		
	[0.219]			[0.268]		
Personified Threshold (=1)	0.516***	0.503***	0.559**	0.167	-0.260	0.825**
	[0.140]	[0.174]	[0.238]	[0.202]	[0.242]	[0.350]
Gender Personified Threshold (=1)	0.559***	0.391*	0.863***	0.359	0.231	0.545
	[0.177]	[0.226]	[0.285]	[0.258]	[0.340]	[0.379]
Male Shown for Gender Personified Target	-0.424	-0.040	-1.094**	0.152	0.342	-0.133
	[0.281]	[0.351]	[0.474]	[0.403]	[0.513]	[0.629]
Threshold Shown	-0.998***	-0.981***	-1.034***	-1.166***	-1.087***	-1.267***
	[0.038]	[0.047]	[0.063]	[0.051]	[0.067]	[0.076]
Score in Tournament	0.750***	0.714***	0.802***	0.744***	0.696***	0.802***
	[0.048]	[0.051]	[0.087]	[0.044]	[0.055]	[0.070]
Sample	All	Females	Males	All	Females	Males
Constant	4.794***	4.985***	4.497***	7.090***	6.929***	7.596***
	[0.664]	[0.822]	[1.115]	[0.893]	[1.185]	[1.252]
Observations	1,332	810	522	1,332	810	522

Appendix A: Experiment Protocol

Slide 1:

<div align="center">INTRODUCTION</div>

<div align="center">Welcome to ESSEXLab!</div>

Thank you for agreeing to take part in this experiment. Below is a brief introduction regarding what this experiment will involve.

- In this experiment you will complete six rounds of games. The rules and payment will vary from round to round and will be explained before that round begins. At the end of the experiment you will get £2.5 show-up fee and any additional payment based on your performance in one of the rounds.
- The round you will be paid for will be chosen randomly! Therefore, to maximize your payment, you should do the best you can in each round and make choices as if that was the only round that was taking place.
- You will only learn what round you are paid for and how much you earned at the end of the experiment
- After all rounds are completed, you will fill out a survey.
- Once you are done with the survey we ask that you sit quietly until the person running the experiment calls you to the front of the room when you will be paid.

- After everyone has finished reading the introduction, we will begin a practice round.

- If you have any questions at any point just raise your hand and the person running the experiment will come answer your questions.

If you have NO questions then fill out the four questions below and then press "OK" button at the bottom right of the screen

1. Please enter your student registration number

2. Please enter your age

3. Please indicate your gender   ☐ Male   ☐ Female

4. Please indicate your year

    ☐ First Year Undergraduate Student
    ☐ Second Year Undergraduate Student
    ☐ Third Year Undergraduate Student
    ☐ Postgraduate Student
    ☐ Not a student

Slide 2:

<div align="center">PRACTICE MATRIX</div>

<div align="center">In each game you will be shown two matrices, like the ones below.</div>

<div align="center">LEFT MATRIX   RIGHT MATRIX</div>

Y	K	C	M	F
C	M	E	Y	C
X	G	S	X	M
F	D	K	V	T
I	A	Z	D	Z
U	V	A	G	C

Y	K	H	M	F
C	M	E	Y	C
X	G	S	X	M
F	D	K	V	T
I	A	Z	M	Z
U	V	A	G	C

The two matrices will be the same except for two letters. Your job is to click on the two letters that are different in the RIGHT matrix. Once you have highlighted which two letters are different hit "OK" and move to the next set of matrices.

TRY THIS NOW:
- Click on the "H" in the second row of the right matrix.
- Click on the "M" in the sixth row of the right matrix.

After you have highlighted both letters click "OK" in the lower right corner of the screen

Slide 3:

PRACTICE MATRIX

In each game you will be shown two matrices, like the ones below.

LEFT MATRIX   RIGHT MATRIX

Y	K	C	M	F
C	M	E	Y	C
X	G	S	X	M
F	D	K	V	T
I	A	Z	D	Z
U	V	A	G	C

Y	K	**H**	M	F
C	M	E	Y	C
X	G	S	X	M
F	D	K	V	T
I	A	Z	**M**	Z
U	V	A	G	C

The two matrices will be the same except for two letters. Your job is to click on the two letters that are different in the RIGHT matrix. Once you have highlighted which two letters are different hit "OK" and move to the next set of matrices.

TRY THIS NOW:
- Click on the "H" in the second row of the right matrix.
- Click on the "M" in the sixth row of the right matrix.
After you have highlighted both letters click "OK" in the lower right corner of the screen

Slide 4:

PRACTICE ROUND
You will now do a practice round where you will try to find the TWO characters that are different in each pair of matrices. You need to always choose the characters in the RIGHT matrix.
You will have **60 seconds** to correctly identify the TWO characters in as many pairs of matrices as possible.
Remember, please highlight the two characters in the RIGHT matrix then click "OK" to continue to the next pair of matrices. You will not be able to go back after you have clicked OK.
If you have NO questions, press the "OK" button. Otherwise raise your hand and wait for the experimenter to come answer your question.
The practice round will begin once everyone has clicked OK.

Slide 5:

Some subjects are still reading the instructions. Please wait patiently until everyone has finished.
Once everyone has read the instructions, the round will begin.

Slide 6:

Everyone is ready to begin.
The practice round will start in 00:03.

Slide 7:

Click on the TWO LETTERS in the RIGHT matrix that are NOT the same as in the left matrix.
Then click "OK" to move to the next set of matrices

LEFT MATRIX   RIGHT MATRIX

Z	J	J	G	C
M	O	Y	H	N
Q	E	I	E	E
O	J	Q	G	X
R	D	W	P	Z
S	O	D	Z	K

Z	J	J	G	C
M	O	Y	H	N
Q	E	I	E	E
O	L	Q	I	X
R	D	W	P	Z
S	O	D	Z	K

Matrices solved correctly so far: 0

Slide 8:

You are now done the practice round!

Slide 9:

ROUND ONE

In this round you will have 180 seconds (**3 minutes)** to correctly identify the TWO differences in as many pairs of matrices as possible.

You will need to click on the TWO letters in the RIGHT matrix that are different from those in the LEFT matrix.

For each correct answer you will get **£0.60.** For example, if you correctly identify the TWO differences in **9** pairs of matrices you will get **£5.40** if this round is randomly chosen to be paid at the end of the experiment.

If you have NO questions, press the "OK" button. Otherwise raise your hand and wait for the experimenter to come answer your question.

Round One will begin once everyone has clicked OK.

Slide 10:

Click on the TWO LETTERS in the RIGHT matrix that are NOT the same as in the left matrix.

Then click "OK" to move to the next set of matrices

LEFT MATRIX						RIGHT MATRIX				

O	O	B	Q	F
B	J	B	H	G
Q	N	Y	Y	L
P	K	B	Z	F
I	W	E	I	V
B	P	L	F	T

P	O	B	Q	F
B	J	B	H	G
Q	N	Y	Y	L
P	L	B	Z	F
I	W	E	I	V
B	P	L	F	T

Matrices solved correctly so far: 0

Slide 11:

You are now done the Round One!

Slide 12:

ROUND TWO

In this round you will have 180 seconds (**3 minutes)** to correctly identify the TWO differences in as many pairs of matrices as possible.

For this round you have been assigned to a random group. There are FOUR people in your group: three other people and yourself. Your pay in this round will depend on how you do in comparison to the other people in your group. You will not be told who is in your group!

In this round, for each correct answer, you will get **£2.40** IF you are the person who identifies the MOST correct pairs of differences in the matrices in your group. Otherwise you will get **£0.00.**

- For example, if you correctly identify the TWO differences in **9** pairs of matrices AND you have solved the most correctly in your group, you will get **£21.60** if this round is randomly chosen to be paid at the end of the experiment.
- However, if you correctly identify the TWO differences in **9** pairs of matrices AND someone in your group correctly identified the TWO differences in MORE than 9 pairs of matrices you will get **£0.00** if this round is randomly chosen to be paid at the end of the experiment. Note: if two or more people tie for the highest score we will pick the winner randomly from the people who tied.

If you have NO questions, press the "OK" button. Otherwise raise your hand and wait for the experimenter to come answer your question.

Round Two will begin once everyone has clicked OK.

Slide 13:

ROUND THREE

In this round you will have 180 seconds (**3 minutes)** to correctly identify the TWO differences in as many pairs of matrices as possible.

For this round you will need to make a choice. The payment you will get for this round depends on what choice you make. You can choose OPTION ONE or OPTION TWO.

- If you choose OPTION ONE then you will receive **£0.60** for each correct answer.
- If you choose OPTION TWO, then you will receive **£2.40** for each correct answer. IF you identify MORE correct pairs of differences in the matrices than the three other people in your group did LAST ROUND. Otherwise you will get **£0.00.**

Note: If you chose OPTION TWO and tie with someone in your group, we will flip a coin to determine if you are paid £2.40 per correct answer or £0.00.

Therefore, for example, if you correctly identify the differences in **9** pairs of matrices AND chose:

- OPTION ONE you will get **£5.40**
- OPTION TWO you will get **£21.60** IF you solved MORE than the other three people in your group did in Round Two, otherwise you will get **£0.00.**

If you have a question, raise your hand now. Otherwise chose OPTION ONE or OPTION TWO below and then click OK.   Please note you cannot change your choice after you have clicked OK.

☐ OPTION ONE   ☐ OPTION TWO

Slide 14:

You have now finished Round Three!

Before moving onto Round Four we would like to ask you some questions about how you think you did in ROUND TWO and give you an option of how to get paid in ROUND ONE.

Slide 15:

FIRST QUESTION

In Round Two you were assigned to a random group of four people. Please think about how well you did in that round and consider the following:

Based on your performance in Round Two, do you think you came in first place, second place, third place, or fourth place?

Below we ask you to select a choice regarding how well you think you did in Round Two. If you guess correctly you will get £10. If this question is randomly chosen to be paid. If you guess incorrectly you will get £0 if this question is randomly chosen to be paid.

For example, if you think you did the best in your group in Round Two, you should choose "First Place" below. If this round is chosen to be paid, then you will receive £10 if you did score the highest in your group in Round Two. If you came in second, third, ort fourth place, though, you will get £0.

Please think carefully about how well you believe you did in Round Two, and select one option below:

Please choose what place you think you came in in Round Two then click "OK" to continue

☐ First Place ☐ Second Place ☐ Third Place ☐ Fourth Place

Slide 16:

SECOND QUESTION

In Round One you tried to correctly identify the TWO differences in as many pairs of matrices as possible. As explained before, if Round One is randomly chosen for payment then you will get **£0.60** per correct answer.

We now want to give you an additional choice. You do not have to identify any more differences in pairs of matrices but we would like you to choose how you would like to be paid if we randomly chose this question to pay when the experiment is over. Think of your Round One performance. We will now pay you based on that performance and a choice you make below. You can choose:

- OPTION A: Receive **£0.60 per correct answer** for your Round One performance if this question is chosen to be paid at the end of this experiment.
- OPTION B: Receive **£2.40 per correct answer** for your Round One performance if it is higher than the number of correct answers solved by each other person in your randomly assigned group in Round Two if this question is chosen to be paid, otherwise you will get **£0.00.**

Take the time to think about your performance in Round One and decide how you would like to be paid.

Note that if your Round One score is tied for the highest score with someone else in your randomly assigned group from Round Two the tie will be broken with a coin toss.

Please chose if your payment option for this question below:

☐ OPTION A ☐ OPTION B

Slide 17:

ROUND FOUR

In this round you will have 180 seconds (**3 minutes**) to correctly identify the TWO differences in as many pairs of matrices as possible.

In this round you will be paid **£2.40** for each pair of differences you find in the matrices IF you correctly identify at least the threshold number of pairs of differences listed below. Otherwise you will get **£0.00.**

THRESHOLD 2

For example, since your threshold is 2, then if you identify 1 pairs of differences you will get **£0.00** if this round is chosen for payment. However, since your threshold is 2, if you identify 3 pairs of differences correctly you will get **£7.20** if this round is chosen for payment.

Note, if score exactly the threshold number correctly, i.e. identify exactly 2 correctly, you will still get **£2.40 per correctly identified pair.**

If you have NO questions, press the "OK" button. Otherwise raise your hand and wait for the experimenter to come answer your question.

Slide 18:

ROUND FIVE

In this round you will have 180 seconds (**3 minutes**) to correctly identify the TWO differences in as many pairs of matrices as possible.

In this round you will be paid based on how you do compared to how another randomly chosen person in this room did in Round Two.

The image below represents the person you have been matched with. You must do at least as well as him.

You have been matched with a random person represented by the picture on the left. That person identified 1 pair of differences correctly in Round Two

In this round you will be paid **£2.40** for each pair of differences you find in the matrices IF you correctly identify **at least as many** pairs of differences as the person described above. Otherwise you will get **£0.00**.

For example, since he identified 1 pair of differences correctly, then if you identify 0 pairs of differences you will get **£0.00** if this round is chosen for payment. However, since he identified 1 pair of differences correctly, if you identify 2 pairs of differences correctly you will get **£4.80** if this round is chosen for payment.

Note, if you solve the exact same number of pairs correctly as the other person did in Round Two you, you will get paid £2.40 per correctly identified pair.

If you have NO questions, press the "OK" button. Otherwise raise your hand and wait for the experimenter to come answer your question.

ROUND FIVE

In this round you will have 180 seconds (**3 minutes**) to correctly identify the TWO differences in as many pairs of matrices as possible.

In this round you will be paid based on how you do compared to how another randomly chosen person in this room did in Round Two.

The image below represents the person you have been matched with. You must do at least as well as her.

You have been matched with a random person represented by the picture on the left. That person identified 2 pairs of differences correctly in Round Two

In this round you will be paid **£2.40** for each pair of differences you find in the matrices IF you correctly identify **at least as many** pairs of differences as the person described above. Otherwise you will get **£0.00**.

For example, since she identified 2 pairs of differences correctly, then if you identify 1 pair of differences you will get **£0.00** if this round is chosen for payment. However, since she identified 2 pairs of differences correctly, if you identify 3 pairs of differences correctly you will get **£7.20** if this round is chosen for payment.
Note, if you solve the exact same number of pairs correctly as the other person did in Round Two you, you will get paid £2.40 per correctly identified pair.

If you have NO questions, press the "OK" button. Otherwise raise your hand and wait for the experimenter to come answer your question.

Slide 20:

ROUND SIX

In this round you will have 180 seconds (**3 minutes**) to correctly identify the TWO differences in as many pairs of matrices as possible.

In this round you will be paid based on how you do compared how another chosen person in this room did in Round Two.

Someone in this room identified 2 pairs of differences correctly in Round Two.

In this round you will be paid £2.40 for each pair of difference you find in the matrices. IF you correctly identify at least as many pairs of differences as the person described above. Otherwise you will get £0.00.
For example, since someone identified 2 pairs of differences correctly, then if you identified 1 pair of differences you will get £0.00 if this is chosen for payment, however since someone identified 2

pairs of differences correctly, if you identify 3 pairs of difference correctly you will get £7.20 if this round is chosen for payment.

Note, if you solve the exact same number of pairs correctly as the other person did in Round Two you, you will get paid £2.40 per correctly identified pair.

If you have NO questions, press the "OK" button. Otherwise raise your hand and wait for the experimenter to come answer your question.

Slide 21:

You are now done with Round Six!
You will now answer some questions. You may receive payment based on one question.

Slide 22:

QUESTION

On the right of these instructions there is a table indicating a series of choices. For each row, we ask that you consider which option you prefer, OPTION A or OPTION B. If this round is chosen for payment we will randomly pick one row and follow your choice.
For example, after you have made all your choices below, if we randomly choose the 7th row then your payment for this question will be based on your choice in row seven

- If you chose OPTION A you will get **£1.50** for sure.
- If you chose OPTION B we will flip a coin and if it comes up heads you will get **£30.00** otherwise you will get **£0.00**

For each row below click OPTION A or OPTION B. You need to make a choice for each row in order to continue. After you have made all your choices click "OK."
Since the bet in OPTION B is the same for each row, think about what amount of money you would want for sure instead of the bet with a 50% chance to win £30.
For every row with an OPTION A value greater than that value you would probably want to choose OPTION A and for every value lower than that value you would likely want OPTION B.
If you have any questions please raise your hand and wait for the experimenter to come to you.

	OPTION A	OPTION B
[1]	☐£0.00 for sure	☐50% chance of winning £30 and a 50% chance of getting £0
[2]	☐£0.20 for sure	☐50% chance of winning £30 and a 50% chance of getting £0
[3]	☐£0.40 for sure	☐50% chance of winning £30 and a 50% chance of getting £0
[4]	☐£0.60 for sure	☐50% chance of winning £30 and a 50% chance of getting £0
[5]	☐£0.80 for sure	☐50% chance of winning £30 and a 50% chance of getting £0
[6]	☐£1.00 for sure	☐50% chance of winning £30 and a 50% chance of getting £0
[7]	☐£1.50 for sure	☐50% chance of winning £30 and a 50% chance of getting £0
[8]	☐£2.00 for sure	☐50% chance of winning £30 and a 50% chance of getting £0
[9]	☐£2.50 for sure	☐50% chance of winning £30 and a 50% chance of getting £0

[10]   □£3.00 for sure   □50% chance of winning £30 and a 50% chance of getting £0

[11]   □£4.00 for sure   □50% chance of winning £30 and a 50% chance of getting £0

[12]   □£5.00 for sure   □50% chance of winning £30 and a 50% chance of getting £0

[13]   □£6.00 for sure   □50% chance of winning £30 and a 50% chance of getting £0

[14]   □£7.50 for sure   □50% chance of winning £30 and a 50% chance of getting £0

[15]   □£9.00 for sure   □50% chance of winning £30 and a 50% chance of getting £0

[16]   □£11.50 for sure   □50% chance of winning £30 and a 50% chance of getting £0

[17]   □£13.00 for sure   □50% chance of winning £30 and a 50% chance of getting £0

[18]   □£15.00 for sure   □50% chance of winning £30 and a 50% chance of getting £0

[19]   □£17.00 for sure   □50% chance of winning £30 and a 50% chance of getting £0

[20]   □£19.00 for sure   □50% chance of winning £30 and a 50% chance of getting £0

Slide 23:

SURVEY Page 1 of 3
1. Please enter your registration number   [   ]
2. Please indicate your gender by clicking the appropriate box.   □ Male   □ Female
3. Is English your native language?   □ Yes   □ No
4. Are you an EU Citizen?   □ Yes   □ No
5. To which of these ethnic groups do you consider you belong?
        □ White – British
        □ White – Other
        □ Mixed – White and Black Caribbean
        □ Mixed – White and Black African
        □ Mixed – White and Asian
        □ Mixed – Any other mixed background
        □ Asian or Asian British – Indian
        □ Asian or Asian British – Pakistani
        □ Asian or Asian British – Bangladeshi
        □ Asian or Asian British – Any other Asian Background

☐ Black or Black British – Caribbean

☐ Black or Black British – African

☐ Black or Black British – Any other Black background

☐ Chinese

☐ Any other ethnic group

6. How many brothers and sisters do you have? [   ]

7. How many of your siblings are female? [   ]

8. Where were you born in relation to your sibling(s), that is, were you the eldest, the second, third, fourth or subsequent child? Circle the number that best describes your birth order.

☐ Eldest (first born) ☐ Second born ☐ Third ☐ Fourth ☐ Fifth ☐ Sixth

☐ Seventh (or later)

9. What type of **secondary school** did you attend?

☐ Comprehensive school   ☐ Grammar school (not fee-paying)

☐ Fee-paying Grammar school   ☐ Independent fee paying school

☐ Don't know

10. Was your secondary school or high school single-sex?   ☐ Yes   ☐ No

11. Thinking about your <u>mother's</u> educational background, please click the number that best describes the type of qualifications your mother has.

☐ She did not go to school at all.

☐ She left school with no qualifications or certificates

☐ She left school with some qualifications or certificates

☐ She gained further qualifications or certificates after leaving school

☐ She gained a university degree or higher degree

☐ Don't know

Slide 24:

Survey Page 2 of 3

12. Thinking about your <u>father's</u> educational background, please circle the number that best describes the type of qualifications your father has.

☐ He did not go to school at all.

☐ He left school with no qualifications or certificates

☐ He left school with some qualifications or certificates

☐ He gained further qualifications or certificates after leaving school

☐ He gained a university degree or higher degree

☐ Don't know

13. Thinking back to when you were 14 years old, what job was your mother doing at that time?

☐ Mother in paid employment

☐ Mother not working

☐ Mother not living with you

☐ Mother deceased

☐ Don't know

14. Thinking back to when you were 14 years old, what job was your father doing at that time?

☐ Father in paid employment

☐ Father not working

☐ Father not living with you

☐ Father deceased

☐ Don't know

15. How old are you? Enter age in whole numbers

16. What year were you born? Please enter the four digit

17. What month were you born?

☐ January   ☐ February   ☐ March   ☐ April   ☐ May

☐ June   ☐ July   ☐ August   ☐ September   ☐ October

☐ November   ☐ December

18. Thinking back over the last 7 days, how many times have you had friends to your house, flat, or residence?

☐ None   ☐ 1-3   ☐ 4-6   ☐ 7 or more   ☐ Don't know

19. Thinking back over the last 7 days, how many times have you gone out with friends?

☐ None   ☐ 1-2   ☐ 3-5   ☐ 6 or more times   ☐ Don't know

20. How many close friends do you have – friends you could talk to if you were in some kind of trouble? Enter number

21. Thinking of your close friends- friends you could talk to if you were in some kind of trouble – what proportion of them are male?

☐ None   ☐ Less than 25% but more than none   ☐ roughly half

☐ more 75% but not all of them   ☐ all of them

Slide 25 :

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Survey Page 3 of 3
The following questions are about how you see yourself as a person. Please click on the number which best describes how you see yourself where 1 means 'does not apply to me at all' and 7 means 'applies to me perfectly.'

Does not apply to me at all   *Applies to me perfectly*
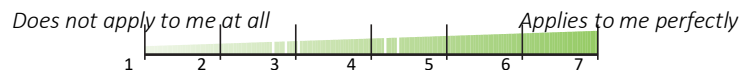
1   2   3   4   5   6   7

   I see myself as someone who…

Is sometimes rude to others	1	2	3	4	5	6	7
Does a thorough job	1	2	3	4	5	6	7
Is talkative	1	2	3	4	5	6	7
Worries a lot	1	2	3	4	5	6	7
Is original, comes up with new ideas	1	2	3	4	5	6	7
Has a forgiving nature	1	2	3	4	5	6	7
Tends to be lazy	1	2	3	4	5	6	7
Is outgoing, sociable	1	2	3	4	5	6	7
Gets nervous easily	1	2	3	4	5	6	7
Values artistic, aesthetic experiences	1	2	3	4	5	6	7
Is considerate and kind to almost everyone	1	2	3	4	5	6	7
Does things efficiently	1	2	3	4	5	6	7
Is reserved	1	2	3	4	5	6	7
Is relaxed, handles stress well	1	2	3	4	5	6	7
Has an active imagination	1	2	3	4	5	6	7

Slide 26:

Thank you for participating!
The experiment is over but some students are still working. Please wait until they are done. You will then get paid for your choices.