The anatomy of competitiveness

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Abstract

A large empirical literature in behavioral economics investigates heterogeneity across individuals and groups in preferences for competition. In this study, we provide a more detailed view on competitiveness by differentiating between four different motivations for entering competitions – enjoyment of competition, desire to win, competition for personal development, and general challenge seeking. We investigate which of these dimensions are picked up by traditional measures of competitiveness; how they predict individual and gender differences in career outcomes including income, holding a leadership position, and entrepreneurship; how they predict wellbeing; and how they relate to other personality traits, skills, and preferences.

Keywords: competitiveness, personality traits, labor market outcomes, leadership, gender
JEL codes: C92, D91, J24

Willingness to compete varies strongly across individuals and predicts achievement in education and the labor market. Initial studies in experimental economics focused on documenting that women are less willing to compete in incentivized experimental tasks relative to men (Niederle, 2016).[1] A growing follow-up literature shows that competitiveness is a strong predictor of labor market outcomes. People who are more competitive choose more challenging study majors, are more successful in their professional careers, and are more likely to hold leadership positions.[2] Most of these studies measure competitiveness through a binary incentivized choice. Some recent studies instead use survey questions that ask to which extent people see themselves as competitive, which facilitates the elicitation of competitiveness in large samples and survey panels.[3]

In this paper, we provide a more nuanced view of competitiveness by differentiating between different motivations for competing with others. Intuitively, being "competitive" can both refer to an enjoyment of competition and to a need to win or outperform others. Moreover, people may enter competitions for personal development motivations – to improve themselves – or out of a general drive to seek new challenges, whether competitive or not. It is an open question which of these dimensions of competitiveness are picked up by the measures used in the literature, and how they relate to career outcomes and gender gaps.

We first investigate which of the four dimensions of competitiveness – enjoyment of competition, desire to win, competition for personal development, and general challenge seeking – are picked up by two standard measures of competitiveness: the incentivized measure of Niederle and Vesterlund (2007) and the survey question of Buser, Niederle, and Oosterbeek (2021). We then ask how the different dimensions predict career outcomes and wellbeing, and how they relate to other personality traits and preferences. We also analyze how they differ between men and women and whether they can statistically explain gender differences in management positions and other labor market outcomes.

We do this through a detailed questionnaire which is based on different competition scales from the psychology literature. This questionnaire is an augmented version of Urbig et al. (2021), who also differentiate between enjoyment of competition, desire to win, and competition for personal development motives (but not general challenge seeking).[4] The questionnaire contains several questions for each of the four competition motives. We elicit these questions in a representative Dutch survey panel. We then link our data to extensive panel data on other psychological traits – including the big five personality traits (Goldberg et al., 2006), grit (Duckworth and Quinn, 2009), the "dark triad" traits (Jonason and Webster, 2010), risk seeking (Dohmen et al., 2011), and social preferences (Falk et al., 2023) – and also to an incentivized competition choice that was elicited for a subsample for a previous study (Buser, Niederle, and Oosterbeek, 2021). The panel data also contains detailed indicators of educational attainment, professional achievement, and personal wellbeing.

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[1] These studies commonly measure competitiveness using the design of Niederle and Vesterlund (2007), where participants choose between piece-rate and tournament incentives for their performance in a real-effort task. Competitiveness is then measured as the choice for tournament incentives conditional on prior performance in the task (and, sometimes, measures of confidence and risk attitudes). Niederle and Vesterlund (2007) find that men are much more likely to compete than women. Their result has been replicated many times (see Croson and Gneezy, 2009, Niederle and Vesterlund, 2011, Niederle, 2016, and Dariel et al., 2017 for surveys), including in field settings (Flory, Leibbrandt, and List, 2015; Samek, 2019; Buser, van den Assem, and van Dolder, 2023). Other studies have focused on showing that men react more strongly than women to competitive incentives (Gneezy, Niederle, and Rustichini, 2003; Ors, Palomino, and Peyrache, 2013). These gender differences in competitiveness have been shown to vary with the social and cultural environment (Gneezy, Leonard, and List, 2009; Almås et al., 2015; Alan and Ertac, 2019; Boneva et al., 2022).

[2] Buser, Niederle, and Oosterbeek (2014) and Buser, Peter, and Wolter (2017) show that an incentivized measure of competitiveness predicts specializing in more prestigious and math-heavy subjects for Dutch and Swiss students from the pre-university track of secondary school. Reuben, Sapienza, and Zingales (2015) show the same for the starting salaries and industry choices of MBA graduates. Other studies find that competitiveness predicts participating in a competitive high school entrance exam (Zhang, 2012), investment choices of entrepreneurs (Berge et al., 2015), choosing an ambitious college track in high-school (Almås et al., 2016), future salary expectations of undergraduate students (Reuben, Wiswall, and Zafar, 2017), and career choices at the vocational education level (Buser, Peter, and Wolter, 2022). See Lozano, Ranehill, and Reuben (2022) for a survey of this literature.

[3] Buser, Niederle, and Oosterbeek (2021) introduce a generally worded single-item survey measure of competitiveness and – using the same survey panel used in this study – demonstrate that it predicts the same career outcomes that are predicted by the incentivized choice measure of Niederle and Vesterlund (2007). Other studies that use survey questions to elicit competitiveness include Bönte and Piegeler (2013); Bönte (2015); Bönte, Lombardo, and Urbig (2017); Fallucchi, Nosenzo, and Reuben (2020).

[4] Urbig et al. (2021) focus on documenting correlations of the three competitiveness dimensions with classic personality traits and gender. In the results section, we provide comparisons between our results and theirs.

We document several new patterns. 1. Traditional measures of competitiveness mainly pick up a mix of enjoyment of competition and desire to win. 2. Both enjoyment of competition and desire to win predict success in the labor market, but desire to win is negatively correlated with measures of happiness, mental health, and career satisfaction, while these correlations are positive for enjoyment of competition. 3. Of the four dimensions of competitiveness, enjoyment of competition differs most between men and women and has the highest explanatory power for gender gaps in labor market outcomes. 4. Enjoyment of competition is most strongly correlated with risk taking, confidence, extraversion, and mental stability. Desire to win is most strongly correlated with negative reciprocity, lower agreeableness, lower mental stability, machiavellianism (a tendency to manipulate others), and narcissism.

Survey, data and analysis

We collected the data on the Dutch LISS (Longitudinal Internet Studies for the Social sciences) panel. This is an ongoing online survey panel that has been operating since late 2007. It is based on a true probability sample of households drawn from the population register by Statistics Netherlands (www.lissdata.nl). Approximately 7,500 panel members answer yearly "core" questionnaires which cover topics including work, education, wealth, family, and personality. On top of this, researchers can pay to run questionnaires on the panel, which can then be linked to all other data that is available on the respondents. All LISS data, including researcher-run questionnaires, is publicly available to all researchers.

Our competitiveness survey was conducted in July 2021. On top of the questions that elicit the four dimensions of competitiveness, the survey also elicited a range of social preferences (Falk et al., 2023), general willingness to take risk (Dohmen et al., 2011), general competitiveness (Buser, Niederle, and Oosterbeek, 2021), grit (Duckworth and Quinn, 2009), and general confidence.[5] We additionally link the new survey data to the yearly LISS personality core module, which contains the big five personality traits (Goldberg et al., 2006), a follow-up questionnaire that measures the dark triad personality traits and two measures of cognitive skills (need for cognition and cognitive reflection), and to the incentivized competitiveness measure elicited by Buser, Niederle, and Oosterbeek (2021).[6]

The competitiveness survey elicits four dimensions of competitiveness, which represent four different motivations to compete with others: enjoyment of competition, desire to win, competition for personal development motives, and general challenge seeking. Most of the questions are taken from the questionnaire of Urbig et al. (2021) who also differentiate between enjoyment of competition, desire to win, and competition for personal development motives.[7] The questionnaire contains the following items – elicited in a randomized order – where respondents are asked to express their agreement on a scale from 1 to 7.

Enjoyment of competition:
I enjoy competing against others
I prefer competing with others when pursuing a goal over pursuing the goal alone
I like situations in which I compete with others
I find competitive situations unpleasant

Personal development competitiveness:
Competition allows me to measure my own success
Competition allows me to judge my level of competence

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[5]Confidence is measured through the extent of agreement with the survey item "I have confidence in myself".

[6]The Buser, Niederle, and Oosterbeek (2021) experiment closely followed the design of Niederle and Vesterlund (2007) and was conducted in April 2018.

[7]Their questionnaire items are in turn taken from Spence and Helmreich (1983); Smither and Houston (1992); Newby and Klein (2014); Bönte, Lombardo, and Urbig (2017).

I use competition as a way to prove something to myself

I can improve my competence by competing

Desire to win:

I find losing very painful

I often try to outperform others

I want to win in both work and games

I try to be the best person in the room at almost anything

It is important for me to outperform others

Challenge seeking:

I always look for new challenges

I enjoy working on challenging tasks

Our social preference questionnaire is based on the Global Preferences Survey of Falk et al. (2023) and includes six questions that measure negative reciprocity, willingness to punish someone who treats you unfairly, willingness to punish someone who treats others unfairly, positive reciprocity, trust, and altruism. Following Chapman et al. (2023), we use these six social preference questions to construct two measures: "generosity" (the average of positive reciprocity, trust, and altruism) and "punishment" (the average of negative reciprocity and the two willingness to punish questions). Our grit questionnaire is based on the short grit scale of Duckworth and Quinn (2009). Table A1 shows descriptive statistics of all survey measures we use in the paper. We also link the competitiveness questionnaire to a follow-up questionnaire we conducted in February 2023 that elicits the so-called dark triad traits – machiavellianism (a tendency to manipulate and exploit others), psychopathy (lack of empathy and remorse), and narcissism (excessive self-love and entitlement) – through the short scale of Jonason and Webster (2010). The same questionnaire also contains two measures of cognitive skills – a short version of the need for cognition scale (Lins de Holanda Coelho, Hanel, and Wolf, 2020)[8] and the three-item cognitive reflection test (Frederick, 2005)[9].

We also use the LISS core questionnaires as the source of measures of labor market outcomes and individual wellbeing. The LISS background data contains each respondent's monthly gross income and level of education. Respondents are asked to update this information every time they answer a survey. The Work and Schooling core module asks respondents to classify their profession.[10] From this, we construct three indicators of professional position: "Management" (respondent indicated that they hold a "higher supervisory profession" at least once over the five years leading up to our survey), "Supervisor" (respondent indicated that they hold a "higher supervisory profession" or an "intermediate supervisory profession"), and "Professional" (respondent indicated that they work in a "higher academic or independent profession"). We also create an indicator of entrepreneurship.[11] The Work and Schooling core module asks respondents how satisfied they are with several aspects of their current employment.[12] We use the mean of the answers as an indicator of how happy respondents are with their career.

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[8]Need for cognition measures "the tendency for an individual to engage in and enjoy thinking" (Cacioppo and Petty, 1982) and has been shown to predict fluid intelligence (Fleischhauer et al., 2010; Hill et al., 2013).

[9]The cognitive reflection test consists of three quantitative questions where the most intuitive answer is wrong, and therefore measures a person's "ability or disposition to reflect on a question and resist reporting the first response that comes to mind" (Frederick, 2005).

[10]LISS gives respondents the following answer options: Higher academic or independent profession (e.g. architect, physician, scholar, academic instructor, engineer). Higher supervisory profession (e.g. manager, director, owner of large company, supervisory civil servant). Intermediate academic or independent profession (e.g. teacher, artist, nurse, social worker, policy assistant). Intermediate supervisory or commercial profession (e.g. head representative, department manager, shopkeeper). Other mental work (e.g. administrative assistant, accountant, sales assistant, family carer). Skilled and supervisory manual work (e.g. car mechanic, foreman, electrician). Semi-skilled manual work (e.g. driver, factory worker). Unskilled and trained manual work (e.g. cleaner, packer). Agrarian profession (e.g. farm worker, independent agriculturalist).

[11]We designate as entrepreneurs all respondents who indicated that they are a "director of a limited liability or private limited company" or a "majority shareholder director" at least once over the five years leading up to our survey.

[12]Respondents rate their satisfaction with their earnings, working hours, type of work, colleagues, and their current work in general on a scale from 0 to 10.

We also use the LISS data to construct several indicators of general wellbeing. The Personality module asks respondents to rate their general happiness on a scale from 0 to 10. The same module asks respondents to rate how close they feel to others, using the Inclusion of Others in the Self scale (Aron, Aron, and Smollan, 1992). Finally, we use the binary response to the question whether respondents take medication for depression or anxiety from the Health module as an "objective" indicator of wellbeing.

Our ability to differentiate between the four dimensions of competitiveness will partially depend on how strongly they are correlated. The correlation matrix in Figure A1 in Appendix shows that they are highly correlated, with correlation coefficients between 0.40 and 0.75. We will therefore base our conclusions mainly on multivariate regressions where we include the four dimensions simultaneously. The fact that each of our four dimensions of competitiveness is measured through several survey items enables us to use the obviously related instrumental variables (ORIV) technique of Gillen, Snowberg, and Yariv (2019) to correct for measurement error in additional analyses reported in the appendix.[13]

Results

We present our results in four steps. First, we investigate which of the four dimensions of competitiveness are picked up by traditional measures of competitiveness. Second, we show how the four dimensions predict labor market outcomes and personal wellbeing. Third, we take a closer look at gender differences. And fourth, we analyze to which extent each dimension of competitiveness is correlated with other personality traits and economic preferences.

Which dimensions of willingness to compete are picked up by standard competitiveness measures?

We will first ask which of the four motivations for competing are picked up by by the generally worded survey question of Buser, Niederle, and Oosterbeek (2021) and an incentivized tournament entry decision á la Niederle and Vesterlund (2007). The results are shown in Table 1. Columns (1) to (3) show results from regressions of the standardized Buser, Niederle, and Oosterbeek (2021) measure on enjoyment of competition, desire to win, competing for personal development, and general challenge seeking. All measures are standardized and the coefficients therefore represent the increase (in standard deviations) in general competitiveness that is associated with a one-standard deviation increase in each of the competitiveness dimensions, keeping the other dimensions fixed. In column (2), we additionally control for risk seeking and confidence, two controls that are often added to regressions to isolate preferences for competition from risk preferences and beliefs. In column (3), we add a range of standard personality traits that are measured in many datasets (grit, extraversion, agreeableness, conscientiousness, stability, and openness). In columns (4) to (6), we repeat these analyses with the incentivized competition choice as the outcome variable. Here, we additionally control for performance in the two baseline rounds. The coefficients therefore represent the difference in the likelihood of choosing the tournament over the piece rate that is associated with a one-standard deviation increase in each of the competitiveness dimensions (relative to a sample proportion who choose the tournament of 0.26).

Without controls, the single-item survey measure of Buser, Niederle, and Oosterbeek (2021) picks up a combination of enjoyment of competition, desire to win, and general challenge seeking. The coefficient on challenge seeking shrinks much more strongly than the coefficients on the other dimensions when controlling for risk and confidence in column (2) and other personality traits in column (3). This indicates that standard controls for preferences and personality can help isolate competitiveness from more general challenge seeking. The results for the incentivized

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[13]For enjoyment of competition and personal development competitiveness, we create two measures which correspond to the mean of the first two items and the mean of the last two items in the list above. For desire to win, we use the mean of the first three and the mean of the last two items.

Table 1: What is picked up by standard measures of competitiveness?

	(1) Questionnaire	(2) Questionnaire	(3) Questionnaire	(4) Choice	(5) Choice	(6) Choice
Enjoyment	0.272***	0.214***	0.187***	0.050**	0.053**	0.047**
	(0.021)	(0.020)	(0.021)	(0.020)	(0.021)	(0.022)
Development	-0.037	-0.026	0.000	-0.043*	-0.046**	-0.049**
	(0.023)	(0.022)	(0.022)	(0.023)	(0.023)	(0.024)
Winning	0.269***	0.270***	0.266***	0.042**	0.038*	0.045**
	(0.022)	(0.021)	(0.021)	(0.020)	(0.020)	(0.020)
Challenge	0.185***	0.085***	0.056***	-0.002	0.006	0.000
	(0.016)	(0.018)	(0.019)	(0.015)	(0.016)	(0.018)
Adjusted R^2	0.323	0.373	0.394	0.082	0.082	0.099
N	4858	4858	4858	1155	1155	1155
Risk and confidence		x	x		x	x
Personality traits			x			x
Score controls				x	x	x

Note: The table shows OLS regressions of the standardized Buser, Niederle, and Oosterbeek (2021) survey measure of competitiveness (columns 1 to 3) and the incentivized Niederle and Vesterlund (2007) tournament choice (columns 4 to 6) on the measures of the four dimensions of competitiveness. Personality controls include grit, extraversion, agreeableness, conscientiousness, stability, and openness. Columns 4 to 6 control for performance in the two baseline rounds of the experiment.

choice look quite similar, with enjoyment of competition and desire to win being the two competitiveness dimensions that positively and significantly predict tournament entry. However, here this is the case with and without any added controls. Table A2 reports results for ORIV regressions that take account of measurement error in the four dimensions of competitiveness and in the control variables.

Main result 1: *The measures of competitiveness typically used in the literature are most strongly correlated with enjoyment of competition and desire to win. The survey measure of Buser, Niederle, and Oosterbeek (2021) additionally picks up general willingness to seek challenges, but this applies to a lesser extent when standard personality traits are controlled for.*

Competitiveness and life outcomes

In this section, we investigate the predictive power of the four dimensions of competitiveness for life outcomes. Figure 1 shows the magnitude and statistical significance of the coefficients from OLS regressions of outcome measures on the four competitiveness measures, when included individually and simultaneously. We consider several indicators of labor market success and individual wellbeing. The labor market outcomes consist of monthly income at the time of the survey plus binary indicators for having held a management position, having held a supervisory position, having held a professional position, and having been an entrepreneur during the five years leading up to the survey. The indicators of individual wellbeing consist of self-rated happiness, self-rated job satisfaction, self-rated closeness to others, and a binary indicator for having taken medication for depression or anxiety during the five years leading up to the survey. Effects for continuous outcomes are shown in terms of standard deviations and effects for binary outcomes are shown in terms of percent of the sample mean. The underlying regression coefficients are shown in the tables in Appendix B.

The left-hand side graphs show coefficients from regressions where the four dimensions of competitiveness are included individually, controlling for gender, age, and education level. Enjoyment of competition, desire to win, competing for personal development, and general challenge seeking all positively and significantly predict success

Figure 1: Conditional correlations between competitiveness and life outcomes
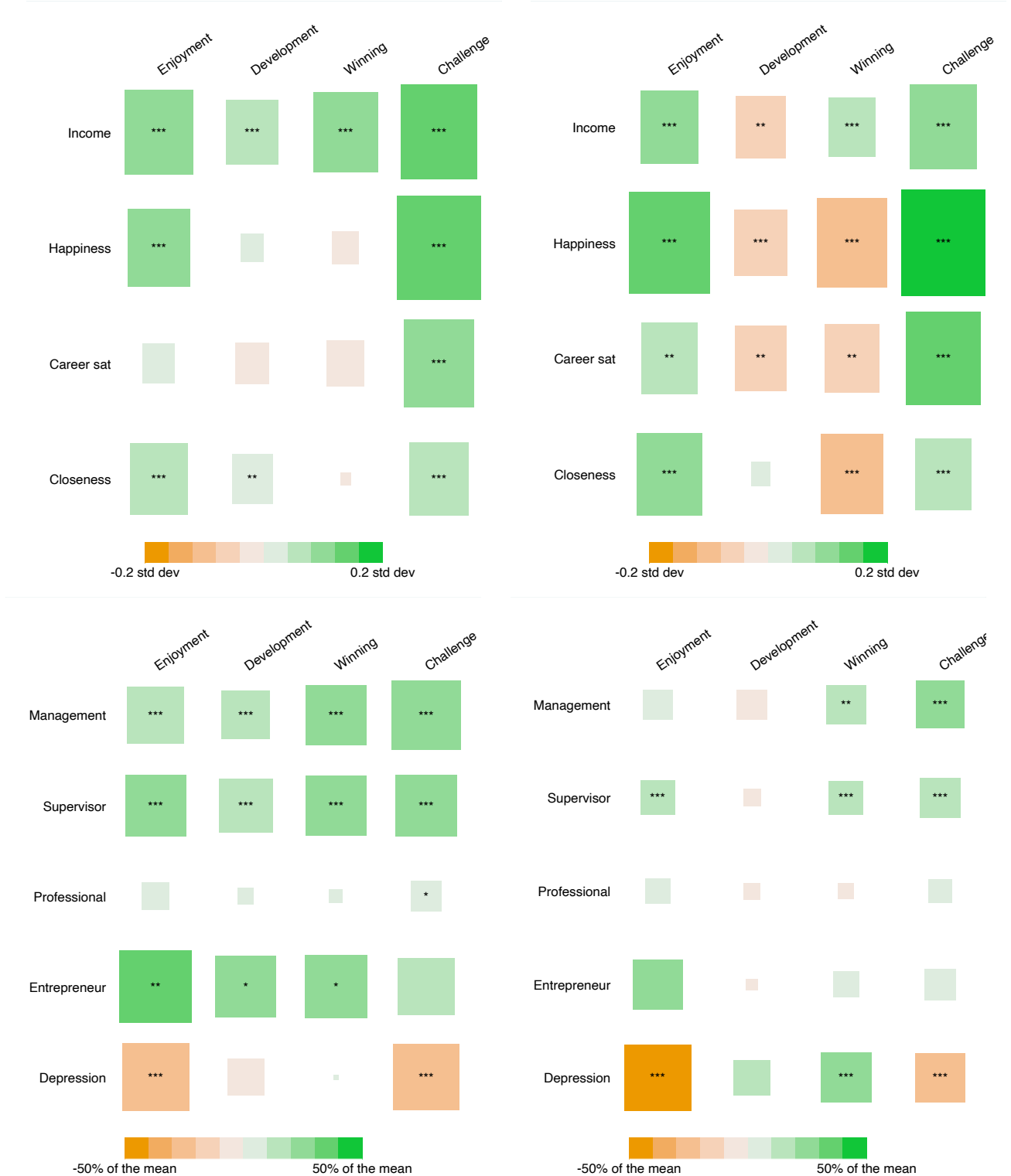
Note: The conditional correlations represented in the graphs are obtained from OLS regressions of outcomes on the four standardized competitiveness measures. Outcomes in the top two graphs are continuous and standardized. Outcomes in the bottom two graphs are binary and effects are scaled by dividing by the sample mean. The left-hand side graphs show results from regressions that include the four competitiveness measures individually, controlling for age, gender, and education level. The right-hand side graphs show results from regressions that include all four competitiveness measures simultaneously, controlling for age, gender, and education level. The sample is restricted to individuals who are between 25 and 65 years old. Significance levels are based on robust standard errors; ∗ p<0.10,∗∗ p<0.05,∗∗∗ p<0.01. See the tables in Appendix B for the underlying regression coefficients.

in the labor market as measured by income or holding a management or supervisory position. However, only enjoyment of competition and challenge seeking also positively and significantly predict wellbeing. The magnitudes are economically meaningful. For example, a one-standard deviation increase in enjoyment of competition is associated with increases in income and happiness of 0.11 and 0.09 standard deviations respectively. It is also associated with an increase of approximately roughly 20 percent in the likelihood of having held a management or supervisory position.

The right-hand side graphs show coefficients from regressions where the four dimensions of competitiveness are included simultaneously. Given the strong correlations between the four measures, this will help to disentangle which dimension of competitiveness has the highest predictive power for each outcome. The results show that enjoyment of competition, desire to win, and challenge seeking – but not competing for personal development motives – are all statistically significant predictors of labor market success. However, while both enjoyment of competition and challenge seeking are positively associated with wellbeing, desire to win is consistently negatively associated with wellbeing conditional on the other competitiveness dimensions. A one-standard deviation increase in desire to win is associated with 0.07-0.12 standard deviations lower happiness, career satisfaction and closeness, as well as with a 25 percent increase in the likelihood of recently having taken medication for depression or anxiety.

Main result 2: *The two main dimensions of competitiveness – enjoyment of competition and desire to win – are both strong predictors of labor market success but have very different implications when it comes to wellbeing. Desire to win is negatively associated with happiness and mental health while associations are positive for enjoyment of competition.*

Gender differences

The economic literature on willingness to compete has to a large extent been focused on gender differences. Most experimental studies either document gender differences in competitiveness (Gneezy, Niederle, and Rustichini, 2003; Niederle and Vesterlund, 2007) – typically finding that women are on average less willing to compete than men – or investigate mechanisms to mitigate the gender gap.[14] Studies linking measures of willingness to compete to labor market outcomes have investigated whether the gender gap in competitiveness can statistically explain gender differences in education and labor market outcomes.[15] In this section, we compare the explanatory power of the four competitiveness dimensions for gender differences in income and professional rank.

Figure A2 in Appendix A shows gender differences in competitiveness and labor market outcomes. The upper panel shows the mean of the four standardized competitiveness dimensions – plus the single-item survey question of Buser, Niederle, and Oosterbeek (2021) – by gender. Men score themselves significantly higher on all four dimensions (P<0.001 in all cases).[16] The gender difference is largest for enjoyment of competition (0.49 standard deviations) and smallest for challenge seeking (0.19 standard deviations).[17] Women also have a €1452 lower average monthly income than men and are much less likely to have held a management, supervisory, or professional position, or to have been an entrepreneur (P<0.001 in all cases).

Figure 2 shows the impact of including each of the four competitiveness dimensions – as well as all four combined – and the single item measure of Buser, Niederle, and Oosterbeek (2021) on the gender gap in each of the five mentioned labor market outcomes. Figure A3 presents results from analogous regressions using the ORIV technique to correct

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[14]See for example Balafoutas and Sutter (2012), Niederle, Segal, and Vesterlund (2013) or Czibor and Dominguez Martinez (2019)on affirmative action.

[15]See, for example, Buser, Niederle, and Oosterbeek (2014) and Buser, Peter, and Wolter (2017) on study choices in high school, and Reuben, Sapienza, and Zingales (2015) and Buser, Niederle, and Oosterbeek (2021) on labor market outcomes.

[16]P-values are from OLS regressions of outcomes on a gender dummy.

[17]Urbig et al. (2021), from whose questionnaire most of the competitiveness questions are drawn, look at gender differences in three dimensions of competitiveness – enjoyment of competition, desire to win, and competing for personal development – and also find the largest gender difference for enjoyment of competition.

Figure 2: Explanatory power of competitiveness for gender gaps in labor market outcomes
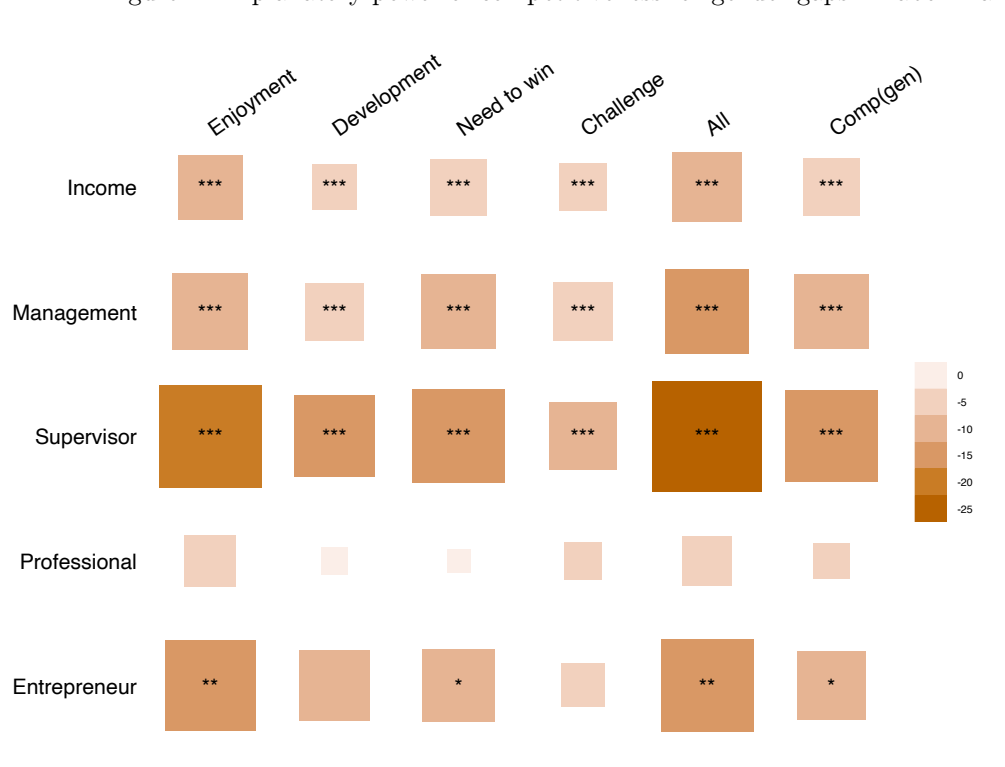
Note: The graph shows the explanatory power of the four competitiveness measures for gender gaps in labor market outcomes. The squares represent the difference (in percent) of the gender gap in labor market outcomes between OLS regressions that do and do not include the various measures of competitiveness. Significance stars represent the level of statistical significance of the difference in the gender coefficient between the regressions with and without competitiveness measures included (using Stata's suest command); ∗ p<0.10,∗∗ p<0.05,∗∗∗ p<0.01. The sample is restricted to individuals who are between 25 and 65 years old. See the tables in Appendix for the underlying regression coefficients.

for measurement error in the competitiveness measures.[18] Consistent with enjoyment for competition differing most between men and women – and it being a strong predictor of labor market outcomes – it has the strongest explanatory power for gender differences. Inclusion of enjoyment for competition in a regression diminishes the estimated gender gap in income by approximately 8 percent (10 percent when using ORIV). It also shrinks the gender gap in holding a supervisory position by 21 percent (26 percent), the gender gap in holding a management position by 11 percent (14 percent), and the gender gap in entrepreneurship by 16 percent (20 percent).

Including all four measures at the same time increases the power to explain gender gaps relative to each dimension separately. Competitiveness can then explain 10 percent (12 percent) of the gender income gap, 24 percent (31 percent) and 14 percent (17 percent) of the gaps in supervisory and management positions, and 17 percent (23 percent) of the gender difference in entrepreneurship. It is also notable that combining the detailed measures of competitiveness increases the explanatory power for gender differences in most of the labor market outcomes relative to the generally worded single-item measure. This means that – when possible given space and time constraints – it may be worth eliciting our 15-item questionnaire rather than just a single general item.

Main result 3: *The gender difference in enjoyment of competition statistically explains a significant part of gender differences in income and professional rank. Controlling for the four dimensions simultaneously further increases explanatory power.*

Competitiveness and other psychological traits

In this section, we investigate how the four dimensions of competitiveness relate to other personality traits and preferences. On top of the four measures of competitiveness, we also elicited risk seeking (Dohmen et al., 2011), grit (Duckworth and Quinn, 2009), a range of social preferences (Falk et al., 2023), and general confidence. In a follow-up questionnaire, we elicited the "dark triad" personality traits (Jonason and Webster, 2010) and two measure of cognitive skills: the need for cognition scale (Lins de Holanda Coelho, Hanel, and Wolf, 2020) and the cognitive reflection test (Frederick, 2005). We additionally use the big five personality traits (Goldberg et al., 2006) which are elicited in the yearly LISS personality core module. Figure 3 shows the magnitude and significance of the coefficients from OLS regressions of these traits on the four competitiveness measures, both when included individually and simultaneously. The underlying regression coefficients are reported in the regression tables in Appendix C.

The left-hand side graphs of Figure 3 show coefficients from regressions where the four dimensions of competitiveness are included individually, controlling for gender and age. The right-hand side graphs show coefficients where the four competitiveness dimensions are included simultaneously. In the top panels, we report results for economics preferences and cognitive skills (risk seeking, confidence, generosity, punishment, need for cognition, and cognitive reflection). In the lower panels, we look into correlations between the four dimensions of competitiveness and classic personality traits (grit, the big five traits, and the dark triad).

The first things that jumps out is that challenge seeking is much more strongly correlated with most of the other traits than the other three competitiveness dimensions. The exception are punishment and the dark triad traits which are not or only weakly correlated with challenge seeking. This again shows that controlling for standard personality traits and economic preferences in regressions can help isolate competitiveness from general challenge seeking. It also extends the conclusion of Buser, Niederle, and Oosterbeek (2021) that competitiveness is a separate trait that is not well captured by traditionally measured traits and preferences to the sub-dimensions of competitiveness.[19]

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[18] The single-item measure of Buser, Niederle, and Oosterbeek (2021) had previously been elicited in the LISS panel in 2017. For those respondents who had also answered the 2017 questionnaire, we can therefore also use the ORIV technique for the single-item measure.

[19] We can confirm this by looking at the r-squared of regressions of the competitiveness dimensions on the other traits. For challenge seeking, the incremental r-squared of the other traits (risk seeking, confidence, social preferences, cognitive skills, grit, the big five traits, and the dark triad traits) above gender and age is 41 percent. For enjoyment of competition this is 20 percent, for desire to win it is 23 percent, and for competing for personal development competition it is 20 percent.

Figure 3: Conditional correlations between competitiveness and other psychological traits

Note: The conditional correlations represented in the graphs are obtained from OLS regressions of trait measures on the four standardized competitiveness measures. The dependent variables are standardized. The left-hand side graphs show results from regressions that include the four competitiveness measures individually, controlling for age and gender. The right-hand side graphs show results from regressions that include all four competitiveness measures simultaneously, controlling for age and gender. Significance levels are based on robust standard errors; $*$ $p<0.10$, $**$ $p<0.05$, $***$ $p<0.01$. See the tables in Appendix C for the underlying regression coefficients.

We will now look at the multivariate regressions on the right to check whether enjoyment of competition, desire to win, and competition for personal development are differentially associated with other traits and preferences. Enjoyment of competition is most strongly correlated with risk taking, confidence, extraversion, and mental stability. Desire to win and personal development competition are more strongly associated with negative reciprocity, lower mental stability, and higher levels of machiavellianism and narcissism. Personal development competition is additionally associated with lower levels of confidence and grit. The results further confirm that enjoyment of competition and desire to win are distinct tendencies, with desire to win presenting a darker side of competitiveness.

Main result 4: *General challenge seeking is well-captured by traditionally measured personality traits and preferences, but enjoyment of competition, desire to win, and competing for personal development motives are not, confirming that competitiveness is an important trait in its own right. Enjoyment of competition is most strongly associated with extraversion, mental stability, confidence, and risk seeking, while desire to win is most strongly associated with negative reciprocity, narcissism, machiavellianism, and lower mental stability.*

Other studies have documented correlations between competitiveness and classic personality traits and preferences. Most importantly Urbig et al. (2021), from whose questionnaire most of the competitiveness questions are drawn, relate three dimensions of competitiveness – enjoyment of competition, desire to win, and competing for personal development – to the six personality traits defined by the HEXACO framework.[20] They find that, in a sample of Colombian university students, desire to win is negatively correlated with agreeableness, competing for personal development is positively correlated with emotionality (a trait that is negatively related to mental stability), and enjoyment of competition is positively correlated with extraversion and negatively with emotionality. Our results confirm all of these associations. Buser, Niederle, and Oosterbeek (2021) show that their single-item measure of general competitiveness is positively correlated with extraversion and openness (and to a lesser extent mental stability and conscientiousness), as well as risk tolerance and confidence. Many experimental studies include evidence that incentivized competition decisions are predicted by measures of risk preferences and confidence (Niederle and Vesterlund, 2011; Niederle, 2016). Balafoutas, Kerschbamer, and Sutter (2012) experimentally investigate the link between competitiveness and distributional preferences and find that efficiency-minded participants choose competition more often, while spiteful and inequality averse participants avoid it (see also Bartling et al., 2009).

Conclusion

Individual preferences for competition have consistently been shown to predict education and labor market outcomes as well as gender differences in career choices. In this paper, we provide a more nuanced view of competitiveness by differentiating between different motivations for competing with others. The main narrative that emerges from our data is that willingness to compete – as measured in the past literature – captures at least two separate dimensions: enjoyment of competition and desire to win. While these two dimensions are strongly correlated, they are differentially associated with life outcomes and other personality traits.

People who compete because they enjoy it and people who are driven to compete by a desire to win and outperform others are both professionally more successful than other people. But otherwise, they look very different. People who enjoy competing tend to be happy, mentally stable, extraverted, and willing to take risk. People driven by a desire or need to win tend to be less happy, more neurotic, disagreeable, and more willing to engage in negative reciprocity. Our results also show that while competitiveness is strongly associated with general challenge seeking,

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[20]Five of the HEXACO traits are closely related to the Big Five traits. The HEXACO model includes an additional sixth trait, honesty-humility. See Lee and Ashton (2004).

it is distinct. Enjoyment of competition and desire to win predict labor market outcomes and personal wellbeing on top of general challenge seeking. Moreover, challenge seeking is relatively well-captured by standard personality traits and preferences, indicating that controlling for other traits partially succeeds in differentiating willingness to compete from a general willingness to seek challenges.

Finally, we contribute to the large literature on gender differences in competitiveness, and show that enjoyment of competition differs more between women and men and has stronger explanatory power for gender differences in labor market outcomes than desire to win or general challenge seeking. Combined, our detailed measures of competitiveness have stronger explanatory power than a single-item questionnaire measure of general willingness to compete, indicating that – time and space permitting – it is worth eliciting a detailed competitiveness scale rather than a single item.

Past studies have documented associations between competitiveness and many labor market and education outcomes (Lozano, Ranehill, and Reuben, 2022). Other studies have uncovered features of the cultural and social environment that correlate with and influence preferences for competition (Gneezy, Leonard, and List, 2009; Almås et al., 2015; Alan and Ertac, 2019; Boneva et al., 2022; Buser et al., 2021; Jørgensen, Piovesan, and Willadsen, 2022). When thinking about the origins and consequences of individual and gender differences in preferences for competition, it is interesting to have a close look at what exactly "competitiveness" means. Several recent studies have used a variety of methods to differentiate preferences for competition from beliefs and general risk seeking (Gillen, Snowberg, and Yariv, 2019; Buser, Niederle, and Oosterbeek, 2021; Van Veldhuizen, 2022; Lozano and Reuben, 2022). Our results indicate that the reason someone is attracted to competition might matter too.

References

Alan, Sule and Seda Ertac. 2019. "Mitigating the gender gap in the willingness to compete: Evidence from a randomized field experiment." *Journal of the European Economic Association* 17 (4):1147–1185.

Almås, Ingvild, Alexander W Cappelen, Kjell G Salvanes, Erik Ø Sørensen, and Bertil Tungodden. 2015. "Willingness to compete: Family matters." *Management Science* 62 (8):2149–2162.

———. 2016. "What explains the gender gap in college track dropout? Experimental and administrative evidence." *American Economic Review* 106 (5):296–302.

Aron, Arthur, Elaine N Aron, and Danny Smollan. 1992. "Inclusion of other in the self scale and the structure of interpersonal closeness." *Journal of Personality and Social Psychology* 63 (4):596.

Balafoutas, Loukas, Rudolf Kerschbamer, and Matthias Sutter. 2012. "Distributional preferences and competitive behavior." *Journal of Economic Behavior & Organization* 83 (1):125–135.

Balafoutas, Loukas and Matthias Sutter. 2012. "Affirmative Action Policies Promote Women and Do Not Harm Efficiency in the Laboratory." *Science* 335 (6068):579–582.

Bartling, Bjorn, Ernst Fehr, Michel Andre Marechal, and Daniel Schunk. 2009. "Egalitarianism and Competitiveness." *American Economic Review: Papers & Proceedings* 99 (2):93–98.

Berge, Lars Ivar Oppedal, Kjetil Bjorvatn, Armando Jose Garcia Pires, and Bertil Tungodden. 2015. "Competitive in the lab, successful in the field?" *Journal of Economic Behavior & Organization* 118:303–317.

Boneva, Teodora, Thomas Buser, Armin Falk, and Fabian Kosse. 2022. "The origins of gender differences in competitiveness and earnings expectations: Causal evidence from a mentoring intervention." CEPR Discussion Paper No. DP17008.

Bönte, Werner. 2015. "Gender differences in competitive preferences: new cross-country empirical evidence." *Applied Economics Letters* 22 (1):71–75.

Bönte, Werner, Sandro Lombardo, and Diemo Urbig. 2017. "Economics meets psychology: experimental and self-reported measures of individual competitiveness." *Personality and Individual Differences* 116:179–185.

Bönte, Werner and Monika Piegeler. 2013. "Gender gap in latent and nascent entrepreneurship: driven by competitiveness." *Small Business Economics* 41:961–987.

Buser, Thomas, Alexander Cappelen, Uri Gneezy, Moshe Hoffman, and Bertil Tungodden. 2021. "Competitiveness, gender and handedness." *Economics & Human Biology* 43:101037.

Buser, Thomas, Muriel Niederle, and Hessel Oosterbeek. 2014. "Gender, competitiveness and career choices." *Quarterly Journal of Economics* 129 (3):1409–1447.

———. 2021. "Can competitiveness predict education and labor market outcomes? Evidence from incentivized choice and survey measures." *NBER Working Paper* (28916).

Buser, Thomas, Noemi Peter, and Stefan Wolter. 2017. "Gender, Competitiveness, and Study Choices in High School: Evidence from Switzerland." *American Economic Review* 107 (5):125–130.

———. 2022. "Willingness to compete, gender and career choices along the whole ability distribution." *Experimental Economics* 25:1299–1326.

Buser, Thomas, Martijn J van den Assem, and Dennie van Dolder. 2023. "Gender and willingness to compete for high stakes." *Journal of Economic Behavior & Organization* 206:350–370.

Cacioppo, John T and Richard E Petty. 1982. "The need for cognition." *Journal of Personality and Social Psychology* 42 (1):116.

Chapman, Jonathan, Mark Dean, Pietro Ortoleva, Erik Snowberg, and Colin Camerer. 2023. "Econographics." *Journal of Political Economy Microeconomics* 1 (1):115–161.

Croson, Rachel and Uri Gneezy. 2009. "Gender differences in preferences." *Journal of Economic Literature* 47 (2):448–474.

Czibor, Eszter and Silvia Dominguez Martinez. 2019. "Never too late: Gender quotas in the final round of a multistage tournament." *The Journal of Law, Economics, and Organization* 35 (2):319–363.

Dariel, Aurelie, Curtis Kephart, Nikos Nikiforakis, and Christina Zenker. 2017. "Emirati women do not shy away from competition: Evidence from a patriarchal society in transition." *Journal of the Economic Science Association* 3 (2):121–136.

Dohmen, Thomas, Armin Falk, David Huffman, Uwe Sunde, Jurgen Schupp, and Gert G. Wagner. 2011. "Individual risk attitudes: Measurement, determinants, and behavioral consequences." *Journal of the European Economic Association* 9 (3):522–550.

Duckworth, Angela Lee and Patrick D Quinn. 2009. "Development and validation of the Short Grit Scale (GRIT–S)." *Journal of Personality Assessment* 91 (2):166–174.

Falk, Armin, Anke Becker, Thomas Dohmen, David Huffman, and Uwe Sunde. 2023. "The preference survey module: A validated instrument for measuring risk, time, and social preferences." *Management Science* 69 (4):1935–1950.

Fallucchi, Francesco, Daniele Nosenzo, and Ernesto Reuben. 2020. "Measuring preferences for competition with experimentally-validated survey questions." *Journal of Economic Behavior and Organization* 178:402–423.

Fleischhauer, Monika, Sören Enge, Burkhard Brocke, Johannes Ullrich, Alexander Strobel, and Anja Strobel. 2010. "Same or different? Clarifying the relationship of need for cognition to personality and intelligence." *Personality and Social Psychology Bulletin* 36 (1):82–96.

Flory, Jeffrey A., Andreas Leibbrandt, and John A. List. 2015. "Do competitive workplaces deter female workers? A large-scale natural field experiment on job-entry decisions." *Review of Economic Studies* 82 (1):122–155.

Frederick, Shane. 2005. "Cognitive reflection and decision making." *Journal of Economic Perspectives* 19 (4):25–42.

Gillen, Ben, Erik Snowberg, and Leeat Yariv. 2019. "Experimenting with measurement error: Techniques with applications to the caltech cohort study." *Journal of Political Economy* 127 (4):1826–1863.

Gneezy, Uri, Kenneth L. Leonard, and John A. List. 2009. "Gender Differences in Competition: Evidence From a Matrilineal and a Patriarchal Society." *Econometrica* 77 (5):1637–1664.

Gneezy, Uri, Muriel Niederle, and Aldo Rustichini. 2003. "Performance In Competitive Environments: Gender Differences." *The Quarterly Journal of Economics* 118 (3):1049–1074.

Goldberg, L. R., J. A. Johnson, H. W. Eber, R. Hogan, M. C. Ashton, C. R. Cloninger, and H. G. Gough. 2006. "The international personality item pool and the future of public-domain personality measures." *Journal of Research in Personality* 40 (1):84–96.

Hill, Benjamin D, Joshua D Foster, Emily M Elliott, Jill Talley Shelton, Jessica McCain, and Wm Drew Gouvier. 2013. "Need for cognition is related to higher general intelligence, fluid intelligence, and crystallized intelligence, but not working memory." *Journal of Research in Personality* 47 (1):22–25.

Jonason, Peter K and Gregory D Webster. 2010. "The dirty dozen: a concise measure of the dark triad." *Psychological Assessment* 22 (2):420.

Jørgensen, Lotte Kofoed, Marco Piovesan, and Helene Willadsen. 2022. "Gender differences in competitiveness: Friends matter." *Journal of Behavioral and Experimental Economics* 101:101955.

Lee, Kibeom and Michael C Ashton. 2004. "Psychometric properties of the HEXACO personality inventory." *Multivariate Behavioral Research* 39 (2):329–358.

Lins de Holanda Coelho, Gabriel, Paul H.P. Hanel, and Lukas J. Wolf. 2020. "The very efficient assessment of need for cognition: Developing a six-item version." *Assessment* 27 (8):1870–1885.

Lozano, Lina, Eva Ranehill, and Ernesto Reuben. 2022. "Gender and Preferences in the Labor Market: Insights from Experiments." *Handbook of Labor, Human Resources and Population Economics* :1–34.

Lozano, Lina and Ernesto Reuben. 2022. "Measuring preferences for competition." Working paper.

Newby, Jennifer L and Rupert G Klein. 2014. "Competitiveness reconceptualized: Psychometric development of the competitiveness orientation measure as a unified measure of trait competitiveness." *The Psychological Record* 64 (4):879–895.

Niederle, Muriel. 2016. "Gender." In *Handbook of Experimental Economics*, edited by John Kagel and Alvin E. Roth. Princeton University Press, 353–375.

Niederle, Muriel, Carmit Segal, and Lise Vesterlund. 2013. "How costly is diversity? Affirmative action in light of gender differences in competitiveness." *Management Science* 59 (1):1–16.

Niederle, Muriel and Lise Vesterlund. 2007. "Do women shy away from competition? Do men compete too much?" *The Quarterly Journal of Economics* 122 (3):1067–1101.

———. 2011. "Gender and competition." *Annual Review of Economics* 3 (1):601–630.

Ors, Evren, Frédéric Palomino, and Eloic Peyrache. 2013. "Performance gender gap: does competition matter?" *Journal of Labor Economics* 31 (3):443–499.

Reuben, Ernesto, Paola Sapienza, and Luigi Zingales. 2015. "Taste for competition and the gender gap among young business professionals." Working paper.

Reuben, Ernesto, Matthew Wiswall, and Basit Zafar. 2017. "Preferences and Biases in Educational Choices and Labor Market Expectations: Shrinking the Black Box of Gender." *Economic Journal* 127 (604):2153–2186.

Samek, Anya. 2019. "Gender differences in job entry decisions: A university-wide field experiment." *Management Science* 65 (7):3272–3281.

Smither, Robert D and John M Houston. 1992. "The nature of competitiveness: The development and validation of the competitiveness index." *Educational and Psychological Measurement* 52 (2):407–418.

Spence, Janet T. and Robert L. Helmreich. 1983. "Achievement-related motives and behaviors." In *Achievement and achievement motives: Psychological and sociological approaches*, edited by Janet T. Spence. Freeman, 7–74.

Urbig, Diemo, Werner Bönte, Jana Schmutzler, Andrés Felipe Zambrano Curcio, and Veneta Andonova. 2021. "Diverging associations of dimensions of competitiveness with gender and personality." *Personality and Individual Differences* 176:110775.

Van Veldhuizen, Roel. 2022. "Gender Differences in Tournament Choices: Risk Preferences, Overconfidence, or Competitiveness?" *Journal of the European Economic Association* 20 (4):1595–1618.

Zhang, Y. Jane. 2012. "Can experimental economics explain competitive behavior outside the lab?" Working paper.

Appendix A: Additional tables and figures

Table A1: Descriptive statistics

	N	Mean	SD	Min	Max
Enjoyment	2846	3.51	1.16	1	7
Development	2845	3.57	1.28	1	7
Winning	2844	3.69	1.23	1	7
Challenge	2851	4.61	1.21	1	7
Competitiveness (gen)	2870	6.04	2.05	0	10
Risk taking	2869	5.25	1.97	0	10
Confidence	2853	5.23	1.21	1	7
Grit	2835	3.58	0.52	1.5	5
Extraversion	2777	3.19	0.69	1.1	5
Agreeableness	2777	3.82	0.55	1.3	5
Conscientiousness	2777	3.76	0.52	2	5
Stability	2777	3.44	0.74	1.1	5
Openness	2777	3.54	0.51	1	5
Punishment	2831	5.05	2.66	0	10
Punishment (3rd party)	2831	4.84	2.47	0	10
Altruism	2831	6.17	2.61	0	10
Reciprocity (pos)	2829	7.74	1.77	0	10
Reciprocity (neg)	2829	3.59	2.64	0	10
Trust	2829	6.48	2.12	0	10
Income	2709	2890.4	1907.8	0	19960.3
Happiness	2733	7.29	1.45	0	10
Career satisfaction	2279	7.35	1.23	0	10
Closeness	2775	4.29	1.60	1	7
Management	2797	0.096	0.29	0	1
Supervisor	2797	0.24	0.43	0	1
Professional	2797	0.12	0.33	0	1
Entrepreneur	2537	0.013	0.12	0	1
Depression	2767	0.063	0.24	0	1

Note: This table shows summary statistics for all trait and outcome variables for the subsample of working age (between 25 and 65 years old) individuals.

Table A2: What is picked up by standard measures of competitiveness? (ORIV)

	(1) Questionnaire	(2) Questionnaire	(3) Questionnaire	(4) Choice	(5) Choice	(6) Choice
Enjoyment	0.331***	0.295***	0.292***	0.053**	0.051**	0.044**
	(0.022)	(0.029)	(0.030)	(0.021)	(0.021)	(0.021)
Development	0.086***	0.104***	0.099***	-0.025	-0.027	-0.026
	(0.020)	(0.025)	(0.025)	(0.020)	(0.020)	(0.020)
Winning	0.328***	0.312***	0.317***	0.043**	0.037*	0.045**
	(0.022)	(0.027)	(0.028)	(0.020)	(0.020)	(0.020)
Challenge	0.285***	0.195***	0.178***	0.002	0.008	0.019
	(0.022)	(0.029)	(0.030)	(0.020)	(0.020)	(0.021)
Adjusted R^2	0.293	0.318	0.320	0.319	0.323	0.330
N	4858	3131	3018.5	1155	1153	1109.5
Risk and confidence		x	x		x	x
Personality traits			x			x
Score controls				x	x	x

Note: The table shows ORIV regressions of the standardized Buser, Niederle, and Oosterbeek (2021) survey measure of competitiveness (columns 1 to 3) and the incentivized Niederle and Vesterlund (2007) tournament choice (columns 4 to 6) on the measures of the four dimensions of competitiveness. Personality controls include grit, extraversion, agreeableness, conscientiousness, stability, and openness. Columns 4 to 6 control for performance in the two baseline rounds of the experiment.

Figure A1: Correlations between the four dimensions of competitiveness

Figure A2: Gender differences in competitiveness and labor market outcomes
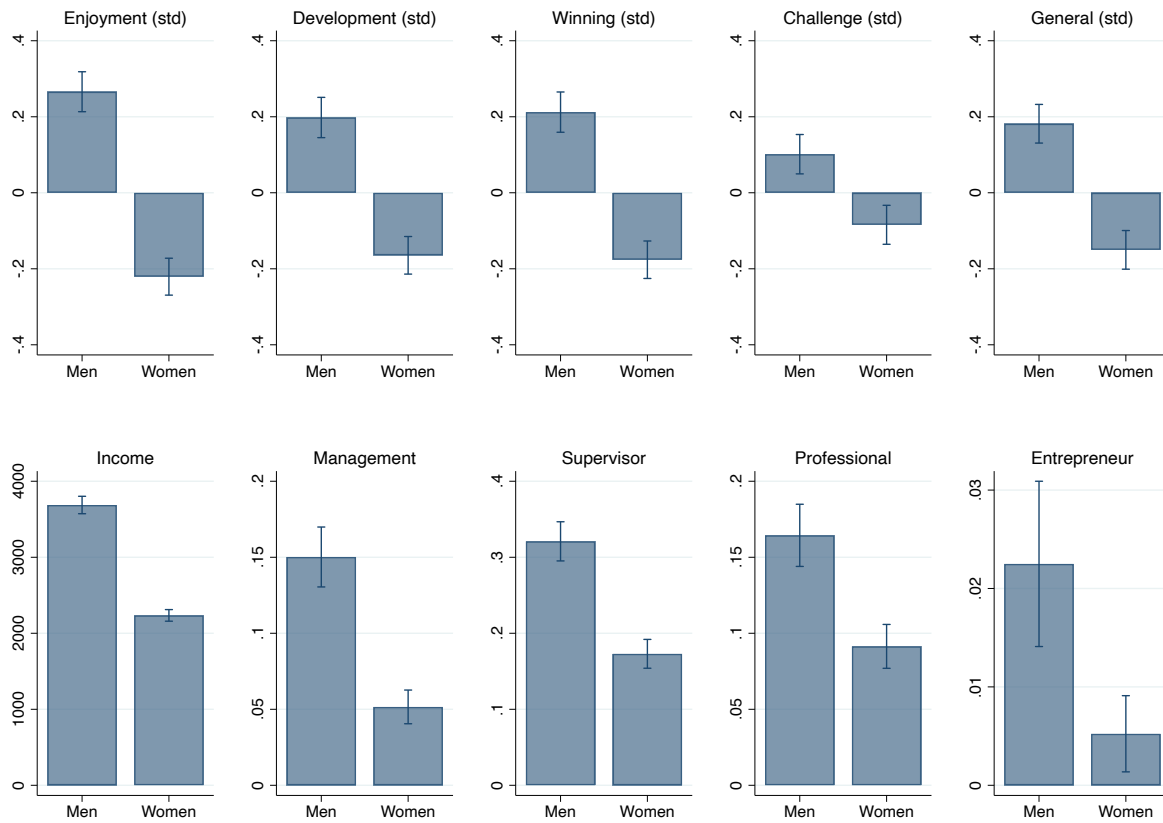
Note: The graphs show averages of standardized competitiveness measures (upper panel) and labor market outcomes (lower panel) by gender, using the subsample of working age (between 25 and 65 years old) individuals. The error bars represent 95-percent confidence intervals.

Figure A3: Explanatory power of competitiveness for gender gaps in labor market outcomes (ORIV regressions)
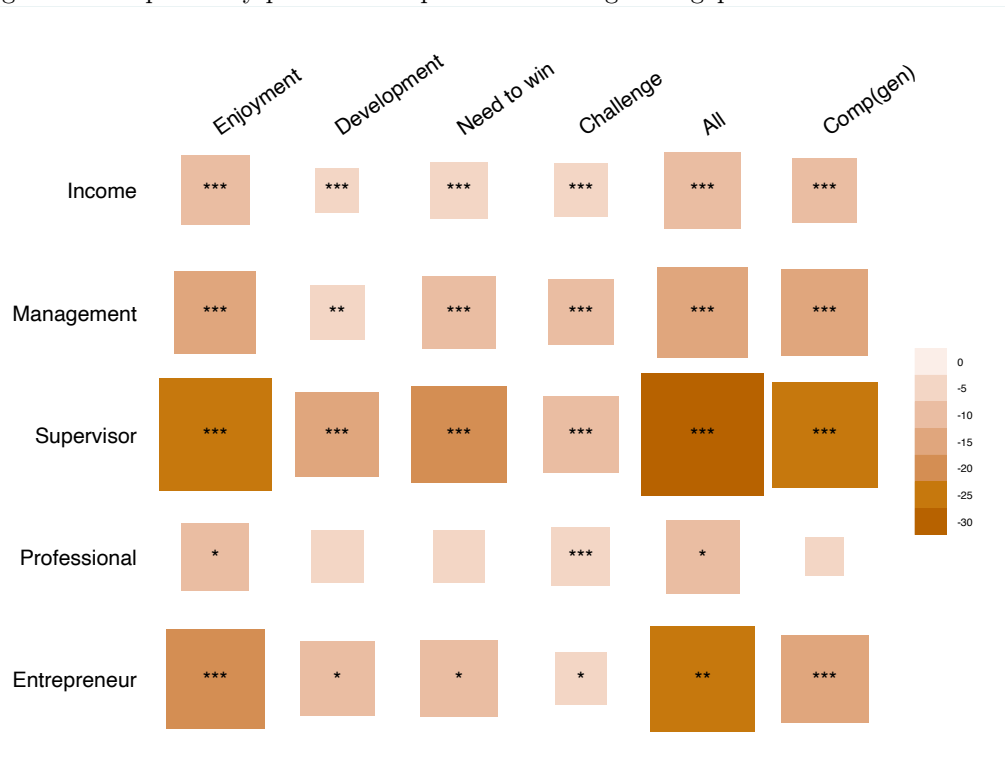
Note: The graph shows the explanatory power of the four competitiveness measures for gender gaps in labor market outcomes. The squares represent the difference (in percent) of the gender gap in labor market outcomes between ORIV regressions that do and do not include the various measures of competitiveness. Significance stars represent the level of statistical significance of the difference in the gender coefficient between the regressions with and without competitiveness measures included (using Stata's suest command); $*$ p<0.10,$**$ p<0.05,$***$ p<0.01. The sample is restricted to individuals who are between 25 and 65 years old. See Tables in Appendix for the underlying regression coefficients.

Appendix B: Regression tables (life outcomes)

<div align="center">

Table B1: Income

	(1)	(2)	(3)	(4)	(5)	(6)
Enjoyment		0.106***				0.080***
		(0.015)				(0.024)
Development			0.062***			-0.058**
			(0.013)			(0.024)
Winning				0.093***		0.053***
				(0.014)		(0.019)
Challenge					0.133***	0.106***
					(0.014)	(0.014)
Female	-0.749***	-0.687***	-0.719***	-0.702***	-0.715***	-0.676***
	(0.033)	(0.033)	(0.034)	(0.033)	(0.032)	(0.033)
Adjusted R^2	0.303	0.316	0.308	0.314	0.327	0.333
N	2679	2679	2679	2679	2679	2679
Dif		-0.082	-0.040	-0.062	-0.045	-0.096
P-val		0.000	0.000	0.000	0.000	0.000

Table B2: Happiness

	(1)	(2)	(3)	(4)	(5)	(6)
Enjoyment		0.089***				0.155***
		(0.019)				(0.028)
Development			0.011			-0.066***
			(0.017)			(0.025)
Winning				-0.016		-0.118***
				(0.019)		(0.024)
Challenge					0.158***	0.168***
					(0.020)	(0.020)
Female	0.065*	0.116***	0.071*	0.057	0.102***	0.104***
	(0.038)	(0.040)	(0.040)	(0.040)	(0.038)	(0.040)
Adjusted R^2	0.010	0.020	0.010	0.010	0.044	0.064
N	2706	2706	2706	2706	2706	2706
Dif		0.780	0.081	-0.122	0.559	0.588
P-val		0.000	0.519	0.387	0.000	0.006

</div>

Table B3: Career satisfaction

	(1)	(2)	(3)	(4)	(5)	(6)
Enjoyment		0.023				0.075**
		(0.020)				(0.030)
Development			-0.026			-0.064**
			(0.019)			(0.029)
Winning				-0.032		-0.070**
				(0.020)		(0.029)
Challenge					0.112***	0.131***
					(0.021)	(0.022)
Female	0.003	0.017	-0.011	-0.015	0.027	0.007
	(0.041)	(0.043)	(0.042)	(0.042)	(0.041)	(0.043)
Adjusted R^2	0.018	0.018	0.018	0.019	0.033	0.042
N	2261	2261	2261	2261	2261	2261
Dif		5.423	-5.057	-6.549	9.357	1.676
P-val		0.260	0.166	0.110	0.000	0.762

Table B4: Closeness

	(1)	(2)	(3)	(4)	(5)	(6)
Enjoyment		0.076***				0.100***
		(0.018)				(0.027)
Development			0.037**			0.008
			(0.016)			(0.027)
Winning				-0.002		-0.094***
				(0.017)		(0.025)
Challenge					0.079***	0.075***
					(0.017)	(0.019)
Female	0.296***	0.339***	0.314***	0.295***	0.314***	0.329***
	(0.038)	(0.039)	(0.038)	(0.039)	(0.038)	(0.039)
Adjusted R^2	0.040	0.047	0.041	0.039	0.048	0.057
N	2748	2748	2748	2748	2748	2748
Dif		0.146	0.059	-0.004	0.061	0.108
P-val		0.000	0.027	0.903	0.001	0.006

Table B5: Management

	(1)	(2)	(3)	(4)	(5)	(6)
Enjoyment		0.019***				0.009
		(0.005)				(0.007)
Development			0.013***			-0.009
			(0.004)			(0.007)
Winning				0.021***		0.015**
				(0.005)		(0.006)
Challenge					0.027***	0.022***
					(0.005)	(0.005)
Female	-0.095***	-0.084***	-0.089***	-0.085***	-0.089***	-0.082***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Adjusted R^2	0.086	0.091	0.089	0.093	0.097	0.099
N	2769	2769	2769	2769	2769	2769
Dif		-0.114	-0.066	-0.109	-0.068	-0.140
P-val		0.000	0.003	0.000	0.000	0.000

Table B6: Supervisor

	(1)	(2)	(3)	(4)	(5)	(6)
Enjoyment		0.054***				0.029***
		(0.007)				(0.010)
Development			0.042***			-0.007
			(0.006)			(0.011)
Winning				0.053***		0.028***
				(0.007)		(0.009)
Challenge					0.055***	0.038***
					(0.006)	(0.007)
Female	-0.149***	-0.118***	-0.129***	-0.123***	-0.136***	-0.113***
	(0.016)	(0.017)	(0.016)	(0.016)	(0.016)	(0.016)
Adjusted R^2	0.045	0.064	0.059	0.065	0.067	0.078
N	2769	2769	2769	2769	2769	2769
Dif		-0.209	-0.131	-0.172	-0.089	-0.240
P-val		0.000	0.000	0.000	0.000	0.000

Table B7: Professional

	(1)	(2)	(3)	(4)	(5)	(6)
Enjoyment		0.006				0.008
		(0.005)				(0.007)
Development			0.002			-0.003
			(0.004)			(0.008)
Winning				0.001		-0.003
				(0.005)		(0.006)
Challenge					0.007*	0.007
					(0.004)	(0.005)
Female	-0.061***	-0.058***	-0.061***	-0.061***	-0.060***	-0.058***
	(0.011)	(0.012)	(0.012)	(0.012)	(0.011)	(0.012)
Adjusted R^2	0.246	0.246	0.246	0.246	0.246	0.246
N	2769	2769	2769	2769	2769	2769
Dif		-0.052	-0.014	-0.011	-0.028	-0.049
P-val		0.246	0.666	0.771	0.104	0.310

Table B8: Entrepreneur

	(1)	(2)	(3)	(4)	(5)	(6)
Enjoyment		0.004**				0.003
		(0.002)				(0.003)
Development			0.003*			-0.000
			(0.002)			(0.003)
Winning				0.003*		0.001
				(0.002)		(0.002)
Challenge					0.003	0.001
					(0.002)	(0.002)
Female	-0.015***	-0.013***	-0.014***	-0.014***	-0.015***	-0.013***
	(0.005)	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)
Adjusted R^2	0.016	0.017	0.017	0.017	0.016	0.016
N	2514	2514	2514	2514	2514	2514
Dif		-0.162	-0.096	-0.105	-0.037	-0.171
P-val		0.012	0.101	0.089	0.148	0.016

Table B9: Depression

	(1)	(2)	(3)	(4)	(5)	(6)
Enjoyment		-0.017***				-0.028***
		(0.005)				(0.007)
Development			-0.005			0.008
			(0.004)			(0.006)
Winning				0.000		0.016***
				(0.004)		(0.006)
Challenge					-0.017***	-0.015***
					(0.005)	(0.005)
Female	0.033***	0.024**	0.031***	0.034***	0.030***	0.026***
	(0.009)	(0.010)	(0.009)	(0.010)	(0.009)	(0.010)
Adjusted R^2	0.010	0.016	0.010	0.009	0.016	0.023
N	2739	2739	2739	2739	2739	2739
Dif		-0.295	-0.073	0.001	-0.113	-0.229
P-val		0.000	0.224	0.987	0.005	0.011

Appendix C: Regression tables (other individual traits)

Table C1: Risk taking

	(1)	(2)	(3)	(4)	(5)
Enjoyment	0.270***				0.167***
	(0.013)				(0.020)
Development		0.199***			-0.007
		(0.013)			(0.020)
Winning			0.200***		0.006
			(0.013)		(0.018)
Challenge				0.316***	0.256***
				(0.012)	(0.014)
Adjusted R^2	0.120	0.091	0.086	0.169	0.197
N	4999	4999	4999	4999	4999

Table C2: Confidence

	(1)	(2)	(3)	(4)	(5)
Enjoyment	0.146***				0.101***
	(0.014)				(0.021)
Development		0.075***			-0.083***
		(0.013)			(0.020)
Winning			0.089***		-0.049***
			(0.014)		(0.019)
Challenge				0.337***	0.351***
				(0.013)	(0.014)
Adjusted R^2	0.041	0.024	0.026	0.171	0.180
N	4999	4999	4999	4999	4999

Table C3: Generosity

	(1)	(2)	(3)	(4)	(5)
Enjoyment	0.070***				-0.031
	(0.014)				(0.020)
Development		0.077***			0.052***
		(0.013)			(0.020)
Winning			0.064***		-0.035*
			(0.014)		(0.019)
Challenge				0.192***	0.197***
				(0.014)	(0.015)
Adjusted R^2	0.015	0.018	0.015	0.060	0.061
N	4981	4981	4981	4981	4981

Table C4: Punishment

	(1)	(2)	(3)	(4)	(5)
Enjoyment	0.196***				0.039*
	(0.014)				(0.021)
Development		0.197***			0.055***
		(0.012)			(0.020)
Winning			0.234***		0.163***
			(0.013)		(0.019)
Challenge				0.116***	0.017
				(0.013)	(0.014)
Adjusted R^2	0.105	0.116	0.132	0.077	0.137
N	4981	4981	4981	4981	4981

Table C5: Need for cognition

	(1)	(2)	(3)	(4)	(5)
Enjoyment	0.132***				-0.022
	(0.015)				(0.020)
Development		0.106***			-0.042**
		(0.014)			(0.021)
Winning			0.147***		0.011
			(0.014)		(0.018)
Challenge				0.411***	0.431***
				(0.013)	(0.014)
Adjusted R^2	0.053	0.049	0.061	0.269	0.272
N	3925	3925	3925	3925	3925

Table C6: Cognitive reflection

	(1)	(2)	(3)	(4)	(5)
Enjoyment	0.004				-0.037*
	(0.014)				(0.022)
Development		0.015			0.007
		(0.013)			(0.022)
Winning			0.027**		0.024
			(0.013)		(0.020)
Challenge				0.046***	0.048***
				(0.013)	(0.014)
Adjusted R^2	0.071	0.071	0.072	0.074	0.074
N	3917	3917	3917	3917	3917

Table C7: Grit

	(1)	(2)	(3)	(4)	(5)
Enjoyment	0.021				0.037*
	(0.014)				(0.020)
Development		-0.040***			-0.164***
		(0.013)			(0.020)
Winning			0.009		-0.019
			(0.014)		(0.019)
Challenge				0.265***	0.321***
				(0.013)	(0.014)
Adjusted R^2	0.042	0.044	0.042	0.139	0.169
N	4985	4985	4985	4985	4985

Table C8: Extraversion

	(1)	(2)	(3)	(4)	(5)
Enjoyment	0.235***				0.252***
	(0.014)				(0.020)
Development		0.119***			-0.129***
		(0.012)			(0.020)
Winning			0.143***		0.006
			(0.013)		(0.019)
Challenge				0.253***	0.208***
				(0.013)	(0.014)
Adjusted R^2	0.067	0.021	0.027	0.088	0.122
N	4872	4872	4872	4872	4872

Table C9: Agreeableness

	(1)	(2)	(3)	(4)	(5)
Enjoyment	-0.005				-0.010
	(0.013)				(0.020)
Development		-0.020*			-0.028
		(0.012)			(0.019)
Winning			-0.029**		-0.083***
			(0.013)		(0.019)
Challenge				0.154***	0.201***
				(0.012)	(0.014)
Adjusted R^2	0.091	0.092	0.092	0.124	0.137
N	4872	4872	4872	4872	4872

Table C10: Conscientiousness

	(1)	(2)	(3)	(4)	(5)
Enjoyment	0.070***				-0.018
	(0.014)				(0.020)
Development		0.062***			-0.015
		(0.012)			(0.020)
Winning			0.086***		0.025
			(0.013)		(0.018)
Challenge				0.200***	0.203***
				(0.012)	(0.014)
Adjusted R^2	0.036	0.036	0.040	0.086	0.086
N	4872	4872	4872	4872	4872

Table C11: Stability

	(1)	(2)	(3)	(4)	(5)
Enjoyment	0.103***				0.234***
	(0.013)				(0.020)
Development		-0.013			-0.132***
		(0.012)			(0.019)
Winning			-0.044***		-0.172***
			(0.013)		(0.018)
Challenge				0.185***	0.218***
				(0.013)	(0.014)
Adjusted R^2	0.094	0.081	0.083	0.128	0.178
N	4872	4872	4872	4872	4872

Table C12: Openness

	(1)	(2)	(3)	(4)	(5)
Enjoyment	0.112***				-0.004
	(0.013)				(0.019)
Development		0.084***			-0.044**
		(0.012)			(0.019)
Winning			0.115***		0.001
			(0.013)		(0.017)
Challenge				0.351***	0.369***
				(0.012)	(0.013)
Adjusted R^2	0.037	0.033	0.040	0.192	0.194
N	4872	4872	4872	4872	4872

Table C13: Machiavellianism

	(1)	(2)	(3)	(4)	(5)
Enjoyment	0.144***				0.015
	(0.014)				(0.021)
Development		0.163***			0.083***
		(0.013)			(0.021)
Winning			0.182***		0.145***
			(0.013)		(0.019)
Challenge				0.018	-0.078***
				(0.013)	(0.014)
Adjusted R^2	0.142	0.156	0.162	0.117	0.173
N	3929	3929	3929	3929	3929

Table C14: Psychopathy

	(1)	(2)	(3)	(4)	(5)
Enjoyment	0.071***				0.048**
	(0.015)				(0.023)
Development		0.058***			-0.006
		(0.013)			(0.023)
Winning			0.072***		0.057***
			(0.015)		(0.021)
Challenge				0.017	-0.021
				(0.014)	(0.015)
Adjusted R^2	0.065	0.064	0.066	0.059	0.067
N	3929	3929	3929	3929	3929

	(1)	(2)	(3)	(4)	(5)
Table C15: Narcissism					
Enjoyment	0.204***				-0.028
	(0.014)				(0.021)
Development		0.246***			0.140***
		(0.013)			(0.021)
Winning			0.276***		0.205***
			(0.013)		(0.019)
Challenge				0.086***	-0.040***
				(0.013)	(0.014)
Adjusted R^2	0.122	0.160	0.174	0.081	0.186
N	3926	3926	3926	3926	3926