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ABSTRACT

Gender Gaps in Competition: New Experimental Evidence from UK Professionals

We use a controlled experiment widely adopted in the literature to assess the extent of gender differences in attitudes towards competition in a sample of UK professionals working in two different companies. We find no gender differences in attitudes towards competition nor in performance under a competitive reward scheme. This results qualifies the findings of a large number of experimental studies that show that women are more likely than men to shy away from competition. We also find that, in our sample of professionals, women's performance under competitive schemes does not decline. We conclude that it is important to avoid generalisations on the presence of gender gaps in attitudes towards competition. This being the first field study with professional workers in relatively competitive sectors, we think more needs to be carried out.

JEL Classification: C93, J16, J71

Keywords: gender, competition, field experiment

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1 Introduction

The determinants of gender gaps in labour market outcomes have been the subject of a substantial literature. [1] Two perspectives were originally adopted to explain these gender differences: one focused on the role of productivity differentials and supply-side factors, such as human capital accumulation; the other emphasised the role of discrimination, whether statistical or taste for discrimination. Productivity-based factors have lost explanatory power over time [2] while discrimination has traditionally assumed a multiple role, a kind of black box that contains both all that remains unexplained after controlling for a range of factors, as well as the underlying cause of other explanatory factors, such as educational and occupational gaps. Consequently, economists have started to pay increased attention to two other possible explanations. On the demand side, given the importance of occupational segmentation in determining gender pay gaps, the role of firms has been looked at more carefully, in particular at how workers are allocated to firms and the importance of firms-specific wage premiums [3]. On the supply-side, the role of individuals' preferences and psychological traits, such as attitudes towards competition and risk-aversion have become the motivation of various experimental studies, often complementing existing and new survey-based evidence.[4] In this paper, we contribute to this latter literature by carrying out field experiments in two established UK consulting firms in order to assess whether there are gender differences in attitudes towards competition. To our knowledge, this is the first field experiments with professionals while they are actively engaged in the labour market. In fact, there is a substantial number of studies now that document that women are more reluctant than men to engage in competitive interactions. More precisely, when given the choice of whether to enter tournaments, which are associated with a competitive compensation scheme, women appear to shy away from competition. Most of these studies have also looked at the performance of men and women under more or less competitive schemes and found that the gender gap in performance increases with competitive pressure: the performance of men rises in response to competition, that of women does not. However, this evidence is, to a large extent, characterised by two important elements: first, its main motivation has been placed on attempting to understand the persisting and unexplained gender gaps in important labour market outcomes, such as the gender pay gap, the glass ceiling effect and the gender gap in representation in companies' boards. Second, the well-documented gender differences in taste for competition are the result of a predominant body of laboratory experiments run with undergraduate students. While section 2 presents and discusses this evidence more fully, here it is important to note that the large body of these experiments are run when the participants are far and detached from the labour market; it therefore assumes a close relationship between measures of competitive dispositions while studying at undergraduate or post-graduate level and, for instance, pay gaps while participants are actively engaged in the labour market.

Possibly in order to address this issue, while accepting the finding from the laboratory experiments, the literature has developed in two ways. One way has seen the development of some field studies but these are either in very specific environments, like in tennis or race tournaments, such as in Paserman (2007) and Garratt et al. (2013) respectively, or in educational establishments where, for instance, gender difference in competition are assessed for children, as in Booth (2009), or where the competitive attitudes of teachers are assessed through the performance of students , as in Lavy (2013). Another way has been to link the gender differences in competition, found in laboratory experiments with students, to their labour market outcomes, such as the notable study by Reuben et al. (2015). This assessed attitudes towards competition of business students and, through the career service of the University, linked them to the same students' earnings in the first job after graduation. These approaches, in our opinion, have the basic limitation of not assessing attitudes towards competition of individuals while they are in the labour market. They are extremely relevant to explain why individuals might sort into competitive or no-competitive working environments

[1] For reviews, see Altonji and Blank (1999), Blau and Kahn (2017), Weichselbaumer and Winter-Ebmer (2005), Bertrand (2011)

[2] For instance, the importance of educational differences has almost disappeared in many statistical decompositions of the gender pay gap, also as a result of the reversal in educational achievement between men and women that started in many countries since the 1980s (Vincent-Lancrin (2008))

[3] See Card et al. (2016), Cardoso et al. (2016) and Jewell et al. (2018)

[4] We use the term preference interchangeably with attitudes, dispositions and psychological traits. It is therefore used in a more general and wider sense than the typical use made in economics as a binary representation of individuals' ranking of commodities.

but not what happens once they join the labour market.

Our experiment is run with 115 professionals in two established, international consulting firms in the UK. We are therefore looking at a relative competitive working environment. We use a common design to assess the participants' potential gender differences towards competition, based on the choice of rewards schemes that participants make before undertaking a real effort task consisting of resolving mazes, as originally proposed by (Gneezy et al., 2003) and used and amended by others later on. Participants choose between a non- competitive (piece rate) or a competitive (tournament) reward scheme. The former pays a given amount of money per number of mazes resolved regardless of other participants' performance while the latter pays more money per maze resolved than the piece rate scheme but only if the participant resolves more mazes than another participant. Gender attitudes towards competition are assessed by looking at the extent to which men and women chose the tournament as opposed to the piece rate reward scheme and gender gaps in performance are assessed by looking at the number of mazes resolved under each scheme. Following the literature, our experiment allows us to control for the role played by the fact that men and women might differ in the willingness to take risk and by the role that information about the gender of other participants is known (Datta Gupta et al. (2013)).

We find that, overall, women in our sample do not shy away from competition and perform as well as men. We find that, on one hand, women are more likely than men to chose a competitive scheme when knowledge of the sex of the other participant is revealed while, on the other hand,men are more likely than women to chose the competitive scheme when they are competing against random participants with no information about their sex. We also find that women's performance is higher under a competitive than a piece rate scheme when competing against random participants but does not change between the two schemes when they are competing against participants of the opposite sex. We do not observe gender gaps in performance under the competitive reward scheme and this is confirmed even after controlling for the potential neutralising effect of risk attitudes.

These results, therefore, are not fully in line with other main findings and generate interesting implications for the literature and for policy.

In Section 2 we review the literature in detail in order to outline the motivation and the rationale for our research question. In Section 3 we present and discuss the method in detail while in Section 4 we present the analysis and results. In concluding, in Section 5, we discuss the implication of the findings and link back to the existing literature.

2 Literature Review

Table 1 and Table 2 report a total of 30 papers that have studied gender gaps in competition using either laboratory and field experiments respectively. [5] This list results from a two-pronged approach consisting of, firstly, a selection of the papers referred to in the six major reviews of experimental evidence on this topic currently available, namely those by Croson and Gneezy (2009), Booth (2009), Niederle and Vesterlund (2011), Bertrand (2011), Azmat and Petrongolo (2014) and Blau and Kahn (2017) [6] and, secondly, a snow-balling approach that identified other relevant studies from the various ones looked at. Starting with Table 1, we have selected 20 studies that rely on a similar overall design, based on assessing gender gaps in competition through the participants' choice of reward schemes, as originally proposed in the seminal paper by Gneezy et al. (2003), subsequently developed by Datta Gupta et al. (2005)

[5] Including the analyses that have made use of surveys or data sets of various kind, such as data from Grand Slam tournaments or academic promotion panels, some of which are often considered as field studies and which we summarise in Table 3, and the six major reviews we have started from, this literature review has considered a total of 42 studies.

[6] We focus here on reviews that are explicitly about gender gaps and do not include the much wider set of experimental evidence on tournaments more generally. For this, an extensive review is in Dechenaux et al. (2015), which has also a relatively short section on gender difference that refers to papers that are included in our list.

and Niederle and Vesterlund (2007). Table 1 also reports on the sample of participants, the effect on competition, the country and the type of task used in the experiment.

Putting aside the country coverage, four key messages emerge from these laboratory-based experiments. First, the sample, although ranging in its dimension from a minimum of 60 to a maximum of 360, is always composed of university students. Second, the task students are asked to perform and from which attitudes towards competition are assessed, is either about resolving a simple maths problem, generally adding two-digit numbers, or resolving mazes. In a few studies, the simple maths exercise is followed by a word and verbal exercise, as for instance in Shurchkov (2012) and Wozniak et al. (2009). Third, the motivation reported by the authors for assessing potential gender differences in competition is always based on the persisting gender gaps in labour market outcomes, such as in pay or in representation in leadership positions. Fourth, all studies have looked at one or two aspects of the relationship between gender and competition: the propensity of men and women to *participate* in competitive games and the gender differences in *performance* under competitive and non-competitive games. [7] Let's discuss the implications of these key messages in more detail, starting from the latter.

Table 1 shows that, overall, the studies report the presence of gender gaps in competition, particularly in decision to enter a competitive game as opposed to one that rewards in a non-competitive way. Only Price (2008) finds no gender gaps while two others finds that gender gaps are fully explained by productivity, risk attitudes and social preferences (Dohmen and Falk (2011)) or by risk-attitudes and over-confidence ((van Veldhuizen, 2017)). In general, as also summarised by the main review articles, Table 1 shows that the studies find that women students appear to be more reluctant than men to engage in competitive games. In terms of performance, the overall conclusion appears to be that, under competition, men's performance improves relative to that of women. There are of course various qualifications to these general observations: most importantly, various studies point to the role of context in which the experiments are run, ranging from the role of biological factors (Wozniak et al. (2009)), team composition (Dargnies (2009)), whether the gender of the participants is made explicitly known (Datta Gupta et al. (2013)), whether feedback on performance is provided (Ertac and Szentes (2010)), or the type of task involving a maths or verbal exercise (Shurchkov (2012)). Moreover, as also made clear in the main review articles on the topic by Croson and Gneezy (2009), Booth (2009), Niederle and Vesterlund (2011) and Bertrand (2011) mentioned above, all these studies are motivated by the need to explore new explanations for the remaining gender gaps in labour market outcomes, given the limited role of the more traditionally used explanatory factors, such as differences in human capital and discrimination. Indeed, these review articles start with a similar line pointing to gender gaps in labour market outcomes: Croson and Gneezy (2009) with "Economists and policymakers have observed gender differences in a number of different domain, including consumption, investment and, perhaps of most concern, in the labour market"; Booth (2009) with "Measuring gender wage gap has occupied applied labour economists for decades and unfortunately the wage gap is not withering away"; Niederle and Vesterlund (2011) with "Despite significant female educational advances, we continue to see gender differences in labour market outcomes"' Bertrand (2011) with "At the time Altonji and Blank completed their influential Handbook chapter in 1999, the two main factors discussed as sources of the gender gap in earnings were differences in human capital accumulation and discrimination (taste-based or statistical)". [8] This is also the case for the articles in Table 1; it is therefore quite telling that, given the focus and motivation above, all the lab experiments are run with university students, therefore with a sample far removed from the labour market of interest. As many of these studies do conclude that the gender differences in preferences towards competition amongst university students are powerful explanatory factors for persisting gender gaps in the labour market, alongside other factors such as discrimination, it must be logically assumed that these psychological traits do not change over time and women and men maintain the same traits they had when students once they join and progress in the labour market. This assumption is, however, difficult to sustain. For instance, in many of the Western countries where the laboratory experiments took place, the gender gap is much reduced and sometime negative for those entering the labour market while it increases substantially later on, particularly after the birth of the first child.

[7] The Method and Data section below will describe the way in which the two aspects are assessed through the reward schemes chosen by participants.

[8] Blau and Kahn (2017) and Azmat and Petrongolo (2014) are reviews specifically about the gender pay gap and gender differences in labour markets respectively.

[9] While the articles reported in Table 1 do tend to avoid this issue, the review articles do mention it. Niederle and Vesterlund (2011), in particular, points out that the laboratory studies are far removed from the labour market of interest but, nevertheless, they provide "an environment in which factors such as discrimination or preferences for family cannot compromise any underlying gender differences in competitiveness". It is perhaps for this reason that the literature has then branched out to examine competitiveness in the "noisier and less controllable field setting" (Niederle and Vesterlund (2011)) and through survey data.

Table 2, in a similar fashion to Table 1, reports 10 studies that aimed to assess gender differences in competitiveness through field experiments.[10] Considering the limitation of the laboratory experiments we have pointed out above, let's start by looking at the sample of participants to the field experiments. In 6 of those studies reported in Table 2, participants were children, aged between 3 and 18 depending on the study. In one, they were undergraduate students. In one seminal study by Gneezy et al. (2009), participants were men and women in a patriarchal society in Kenya and a matriarchal society in India, the study aiming to assess the role of cultural factors in explaining gender differences in competitiveness. In another by Lavy (2013), participants were teachers and their performance was assessed through the performance of their class students. Flory et al. (2015) instead, looks at women job seekers and find they are less likely to apply for relatively more competitive jobs than men job seekers when responding to job adverts, therefore deducing a stronger aversion to competitive work environments. It is evident, therefore, that none of the existing field-based experimental evidence assesses the extent of gender differences in competitiveness for individuals in a real work environment while actively engaged with the labour market. Two studies come closest to that context: the study by Lavy (2013), but the the performance of teachers is "imputed" by the test performance of their students; the study by Reuben et al. (2015), which powerfully links gender differences in competitiveness to labour market outcomes following the same individuals over time; however, the gender differences in competitiveness are assessed while the individuals were students in the MBA programme and not when they were actively engaged in the labour market. In terms of effects, most of these field experiments do find gender differences in performance under competition. The only one that does not conclusively find gender gaps is the study with teacher of Lavy (2013). Moreover, similarly to the lab experiments of Table 1, it is important to point out that the results regarding positive gender gaps are often qualified by considering the role of various contexts, environments, social and cultural factors that neutralise gender gaps, by reducing or eliminating them.

The last set of evidence we look at comes from studies based on secondary data. We limit this assessment to a few such studies, reported in Table 3. Given the data sources, the sample size is of course much more significant than those of the experimental studies reported in Table 1 and Table 2. Two of them use data from sports competitions. As mentioned earlier on, an often-quoted study as part of the field-based evidence is that of Paserman (2007), who uses data on the performance of tennis players from Grand Slam tournaments, finding no significant gender differences in performances when using aggregate set-level data but gender differences when using point-by-point data. Garratt et al. (2013) uses data from the Californian State Street Mile race, finding that women are much less likely than men to enter for the relatively more competitive elite race, apart however for the fastest young women who always enter the more competitive race. Another interesting study is by De Paola et al. (2015b) who uses data on about 42,000 professors and find that females are 4 percentage points less likely to apply for competition. This appears to be due to gender differences in risk-aversion and self-confidence and women's fear of discrimination. Finally, the study by Manning and Swaffield (2008) is relevant in the way it aims to directly link the impact of psychological traits, including competitiveness, to the gender wage gap, as in Reuben et al. (2015) mentioned above. Manning and Swaffield (2008) use the British Household Panel Survey (BHPS) and found that the role of psychological factors, such as risk-attitudes and competitiveness, amongst others, explains very little of the gender wage gap. It is also important to point out that the competitiveness variables used in this study are measured at age 16 and relate to sport and game activities and are, therefore, quite indirect proxies for those attitudes. Many other survey-based studies

[9] See for instance OECD (2017)

[10] Three studies are often referred to as field-type evidence but we do not report them in Table 2 and consider them later on as survey-based evidence. These are the paper by Paserman (2007), which uses a dataset that reports on performance of tennis players in Grand Slam tournaments; the paper by Antonovics et al. (2009), which uses data from the TV show The Weakest Link; the paper by Garratt et al. (2013) which uses data from the State Street Mile in California.

investigate the relationship between various psychological and personality traits on wages but these are beyond the scope of this review.[11]
In summarising this review of the literature we draw out the following key points:

- The majority of the studies are based on laboratory experiments where participants' attitudes towards competition is assessed by the choice of rewards scheme; they find, overall, gender differences in entry into competitive games and performance.
- However, and especially in the case of differences in performance, various qualifications apply. These relate to the context, the type of task, biological factors, team composition, knowledge of the sex of the competitor, but the most relevant ones that appear to neutralise the differences in competitiveness are the presence of risk aversion and self confidence.
- In all laboratory experiments, participants are university students, therefore far detached from the labour market experience these studies purports to explain.
- Some field experimental and survey-based studies attempt to link more directly the differences in competitiveness to the persisting labour market outcomes but most of these, again, measure differences in competitiveness when the participants are school children or MBA students, or teachers whose performance is measured through their students' class tests, or from data from sports competitions.

In conclusion, no experimental study we know of at this stage uses a similar experimental design to the one adopted in most laboratory and field experiments with real-world professionals, adult individuals actively engaged in the labour market. As also pointed out by Azmat and Petrongolo (2014), "more direct evidence from the workplace is needed to draw useful conclusions for gender gaps in real markets". This is what we attempt to do in this paper.

[11] See for instance Mueller and Plug (2006), Goldsmith et al. (1997) and also Bowles et al. (2001) for an inter-generational perspective

TABLE 1: Laboratory Experiments of gender differences in competitiveness

Study	Sample	Effect*	Country	Task
Niederle and Vesterlund (2007)	80 students	Y	U.S.	Simple Maths
Dargnies (2009)	77 students	Y but not in team tournaments	France	Simple Maths
Balafoutas and Sutter (2010)	360 students	Y	Austria	Simple Maths
Healy and Pate (2011)	192 students	Y but reduced in teams	U.S.	Simple Maths
Wozniak et al. (2009)	345 students	Y but feedback and biology	U.S.	Maths and Words
Price (2008)	60 students	N	U.S.	Maths
Datta Gupta et al. (2013)	280 students	Y but gender known	France	Mazes
Vandegrift and Yavas (2009)	90 students	Y but reduced in repeated tournaments	U.S.	Forecasting stock prices
Ertac and Szentes (2010)	148 students	Y but context and feedback	U.S.	Simple Maths
Dohmen and Falk (2011)	360 students	N if account for risk attitudes and social preferences	Germany	Simple Maths
Shurchkov (2012)	212 students	Y but type of task	U.S.	Maths and Words
Datta Gupta et al. (2005)	240 students	Y but gender known	France	Mazes
Ivanova-Stenzel and Kübler (2005)	144 students	Y but team composition	Germany	Memory games
van Veldhuizen (2017)	140 students	N if account for risk attitudes and overconfidence	Germany	Simple Maths
Peterle and Rau (2017)	248 students	Y	Netherlands	Simple Maths
Gneezy et al. (2003)	324 students	Y	Israel	Mazes
Gill and Prowse (2014)	120 students	Y	U.K.	Slider Task
Iriberri and Rey-Biel (2012)	240 students	Y but only under conditions and gender known	Spain	Mental rotation and Symbol digit
Reuben et al. (2015)**	409 MBA students	Y	U.S.	Simple Maths
Apicella et al. (2017)***	204 students	Y but not against self	U.S.	Simple maths

* The Effect columns reports a summary on the impact on gender gaps in both choice to compete and performance under competitive schemes. Y stands for positive gender gaps and N for no gender gaps.

** This is an unusual study in that it contains a lab element and longitudinal assessment of the impact of the lab findings on earnings and occupations. There is therefore a tangential field nature to it but the measurement of gender differences in competitiveness is done in a lab and when participants are engaged in studying rather than in the labour market.

*** This study contains both a laboratory experiment and an assessment of labour market data from the online Amazon Mechanical Turk.

TABLE 2: Field Experiments of gender differences in competitiveness

Study	Sample	Effect*	Country	Task
Sutter and Rützler (2010)	1035 children aged 3-18	Y from early life	Austria	Maths and Race
Booth (2009)	260 children	Y but context	U.K.	Mazes
Gneezy et al. (2009)	155 Masai and Khasi	Y but culture	India and Kenya	Tennis balls into basket
Andersen et al. (2013)	318 children aged 7-15	Y but context and culture	India	Tennis balls into basket
Gneezy and Rustichini (2004)	140 elementary school children	Y	Israel	Race
Buser et al. (2014)	397 students	Y	Netherlands	Simple Maths
Dreber et al. (2014)	216 children	N overall but some for Maths	Sweden	Maths and Verbal
Lavy (2013)	Teachers	N	Israel	Test performance of teachers students
Flory et al. (2015)	6779 Job Seekers	Y	U.S.	Employment adverts
De Paola et al. (2015a)	720 UG students	N	Italy	Mid-term and final exams

* The Effect columns reports a summary on the impact on gender gaps in both choice to compete and performance under competitive schemes. Y stands for positive gender gaps and N for no gender gaps.

TABLE 3: Studies of gender differences in competitiveness based on secondary data

Study	Sample	Effect*	Country	Type of data
Paserman (2007)	6070 tennis sets	Mixed	Various	Grand Slam tennis games
Garratt et al. (2013)	963 Participants to elite races	Yes but age	U.S.	Mile Street races in California
De Paola et al. (2015b)	42000 University academics	Y	Italy	Applications to national qualification
Bosquet et al. (2013)	8085 academic economists	Y	France	Promotions
Manning and Swaffield (2008)	10300 individuals followed over time	Small effect on wage gap	Great Britain	Effect of psychological traits on wage gaps
Antonovics et al. (2009)**				

* The Effect columns reports a summary on the impact on gender gaps in both choice to compete and performance under competitive schemes. Y stands for positive gender gaps and N for no gender gaps.
** This study also replicates the game in a laboratory setting with undergraduate students

3 Method and Data

3.1 Four Methodological issues

We start this section with a discussion of the key methodological issues from the existing literature, which we have deliberately excluded from the review in Section 2, because it informs our methodological approach and the choice of the experimental design. These key issues are about the nature of the task; the measurement of preferences towards competition; the potential relationship between competitiveness and other psychological traits, particularly risk-aversion and the potential problem of reverse causality associated with field experiments and contemporaneous measurement of preferences for competition. We discuss these in turn, keeping in mind our overall objective is to shed light on whether the gender differences found in the laboratory studies with students - and field studies with children or adults not actively engaged in the labour market - are confirmed when *the same type of experiment* is run in the real world of work, with adults actively engaged in the labour market.

As mentioned earlier, the previous section focused on those studies that, mostly, adopted an experimental design, more specifically a task where participants were asked to choose between rewards schemes, one of which was associated with competition. Therefore, these tasks are considered to be reflective of various types of contexts, environments and situations that workers typically find themselves in, such as promotions or bonus schemes that rely on relative performance evaluations. Indeed, participants are usually asked to undertake some real effort tasks, most often resolving a simple maths addition of a series of 2-digit numbers, or resolving mazes of different levels of difficulty. A reduced number of studies have used verbal tasks, or a combination of verbal and numeric ones. Although the maths-related tasks used in most of the studies reviewed in Section 2 are basic, involving a simple addition of two-digit numbers for which, overall, gender difference in the ability to resolve them have not been found, there is some evidence that shows that the gender gaps in competitiveness disappear or are even reversed when the nature of the environment becomes more women-oriented and the type of the task changes from a mathematical to a verbal one (Shurchkov (2012). In our design, we therefore opt for using mazes.

Regarding the measurement of preferences, most studies we have reviewed in Section 2 assess attitudes towards competition by asking participants to choose between a piece rate reward scheme, which pays a given amount of money per correct answers regardless of how well the other participants have performed, or a tournament reward scheme, which pays a larger amount of money per correct answer but only if the participant's performance is superior to that of other participants. A choice of the latter rewards scheme is associated with a stronger preference for competition while choosing the piece rate reward suggests an attitude that shies away from competition. This is also what we replicate in our experiment.

The review section also pointed out that the reason as to why men and women differ in their propensity to choose tournaments is that these are riskier than the piece rate: indeed, participants who choose the winner-take-all option end up with no prize if they are outperformed by the competitor. The extent of gender differences in risk-aversion could thus be one of the factors explaining the gender gaps in competitiveness.[12] However, competitiveness could also be seen as independent from such factors and be present over and above underlying preferences for risk. The latter is the most prevalent view, supported by studies that, after statistically controlling for measures of risk attitudes and beliefs, find gender gaps in competitiveness still present (Niederle and Vesterlund (2007)).[13] Similarly, in our design, we measure risk-aversion, which we use as a control variable in our analysis.

[12] Another confounding factor is the degree of confidence or self-belief that lead men to be more optimistic than women about their chances of success and therefore opt for the tournament option.

[13] Other studies instead find that gender gaps in competitiveness are fully explained by risk preferences and other factors (van Veldhuizen (2017) and Dohmen and Falk (2011))

Finally, field experiments differ from their laboratory counterparts in many respects (Harrison and List (2004)), the most important one being that the real effort-tasks are performed by participants in their natural "professional" environment. This is indeed what we aim to do with our experiment. Methodologically, in line with the approach proposed by Harrison and List (2004), we see our field experiment not as a replacement for the laboratory experiments and do not consider the latter in isolation and limited in relevance for the prediction of actual outcomes in the field; on the contrary, we aim to set up an ideal experiment as per Harrison and List (2004) in the sense that "one is able to observe a subject in a controlled setting but where the subject does not perceive any of the controls as being unnatural and there is no deception being practiced". That is why we run experiments, which have been well-established in the laboratory, when professional workers are undertaking meetings such as training events and team meetings, during which we have been allocated a specific time slot.

3.2 Our Experimental design

We conducted three sessions with a total of 115 professionals from two international consulting firms: one was in London and two were in Reading. These sessions were included in a daily programme during which the participants were having team meetings aimed at planning for their workload and developing team strategies. The experiments therefore took place in a large meeting room, where participants were seating in tables of 6 randomly allocated. Participants were randomly allocated to two treatment groups: one in which they were competing against someone from the opposite sex and one where they were competing with another randomly allocated participant. At no point the underlying gender objective of the study was made salient to participants even though participants could obviously see the gender composition of the group. At the start, the general instructions were read and they were told they would be performing a number of tasks, one of which would be randomly chosen for payment at the end. Given the payment round was randomly selected once they had completed the experiment, participants should maximise the pay off in each round to maximise the overall payment and had no opportunity to edge across tasks as only one of them was selected for payment.

Immediately before each task, participants were told the nature of each task and the payment options. The experiment consisted of five rounds: once each round was completed they had to put the respective set of papers inside their envelope before moving to the following one. At no stage participants were told or had information on how they performed relative to other participants. The first two tasks involved resolving as many paper-based mazes as possible in 4 minutes for each task [14] but before starting the actual game, participants were asked to practice and allowed to ask questions. The rounds allowed us to measure attitudes towards competition while also collecting information on social preferences and risk aversion. As explained earlier, attitudes towards competition were measured as in Gneezy et al. (2003), Datta Gupta et al. (2005) and others, whereby participants had two rewards options. In mode A they received "£5 for each maze resolved, no matter the number of mazes solved by other participants". In mode B, participants received: (i) £10 for each maze resolved if they resolve more mazes than co-participant, which was randomly chosen; (ii) £1 for each maze resolved if they resolve fewer mazes than co-participant; (iii) if they resolve the same number of mazes as co-participant, the winner would be determined by a random draw and would receive £10 and the loser £1 for each maze resolved. One set of participants were allocated to a random co-participant and another set were randomly allocated to a co participant of the opposite sex. This allowed us to investigate the impact on attitudes and performance associated with having information on the gender of the participant, as, for instance, in Datta Gupta et al. (2013). Risk-aversion was measured also by the rewards scheme chosen by participants as follows. Mode A paid £5 for each correct solution to a game that involved breaking codes[15], while mode B paid either £10 for each correct solution with a 50:50 chance or £1 for each correct solution with a 50:50 chance. The sessions lasted around 45 minutes. Social preferences were measured by offering participants a reward scheme that paid £10 for the first two mazes resolved correctly (£5 each) and donated £5 to a charity of choice for each additional mazes resolved.

[14] Mazes were of the type found at ?????

[15] The adoption of a different type of game, breaking codes instead of resolving mazes, is important in order to control for the effect of learning and adaptation that would otherwise result from playing the same games various times.

Participants were given a list containing 6 choices of charities, 5 of which are large well know charities and one gave the opportunity to select another one of their choice not listed. On average, women earned £58 and men about £66: all payments were made in cash separately after the winners were randomly selected at the end of the experiments.

4 Analysis and Results

Table 4 reports sample descriptive statistics: we collected 115 observations, 57.5 percent of which are male; about two-thirds of the sample falls within the 20-40 age category and the age distribution is well balanced across gender. Regarding income, men are over represented in the higher income category: more than 80 percent of individuals earning above £80,000 per year are men.
Table 5 summarises the overall results in terms of competitiveness and performance.

TABLE 4: Sample descriptive statistics

	%Male	Female	Male
Gender %Male	57.52		
Age			
20-30	0.60 (0.08)	35.4	38.5
30-40	0.52 (0.08)	41.7	33.9
40-50	0.59 (0.12)	14.6	15.4
50-60	0.43 (0.20)	8.3	4.6
Income			
<40k£	0.50 (0.08)	45.7	33.9
40k£ - 60 k£	0.54 (0.09)	34.8	30.7
60k£ - 80 k£	0.56 (0.13)	15.2	14.5
80k£ - 100 k£	0.83 (0.17)	2.2	8.1
>100 k£	0.89 (0.11)	2.2	12.9

Standard errors in parenthesis.

TABLE 5: Competitiveness and Performance, overall

	Female	Male	Gender Gap*
Competitiveness: opted for tournament scheme			
Tournament	32.6 (0.07)	37.1 (0.06)	z = -0.481; p = 0.6307
Performance: number of mazes solved			
Tournament	6.13 (0.6)	6.61 (0.53)	z = -0.408; p = 0.6831
Piece Rate	5.03 (0.41)	6.05 (0.38)	z = -1.764; p = 0.0777

* Wilcoxon rank-sum test. Standard errors in parenthesis.

When looking at competitiveness, 32.6 percent of women select the tournament option compared to 37.1 percent of men. The difference, relatively small, is not significant. When looking at performance under the different rewarding schemes, we observe that men outperform women under the piece rate scheme by about 1 maze. This difference in performance disappear under the tournament scheme. Overall, therefore, we find that: (i) women are as competitive as men and (ii) women are not underperforming (relatively to men) under a competitive scheme.

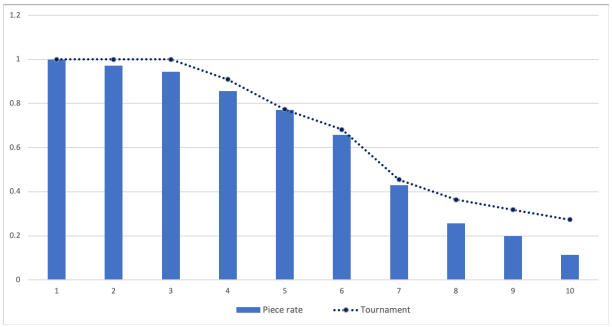
Figure 1 reports the details on the number of mazes solved, our measure of performance, under both rewarding schemes and by gender.

In Table 6 we show results that take account of the information about the gender of the other participants.[16] Similar to earlier findings reported in Section 2, men are more likely than women to chose the tournament payment scheme, 47 and 21 per cent respectively, when no information on the gender of the co-participant is provided, more precisely when

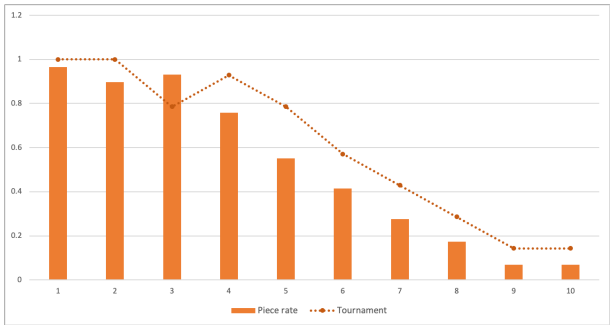
[16] As described in subsection 3.2, participants were randomly allocated to two treatment groups: one in which their were competing against someone from the opposite sex and one where they were competing with another randomly allocated participant.

FIGURE 1: Performance under different rewards scheme, by gender

(a) Performance across payment scheme for male



(b) Performance across payment scheme for female



they are competing against another randomly allocated participant rather than with participants from the opposite sex. However, women are more likely than men to opt for the tournament rewards scheme when information on the gender of the co-participant was provided. This is in contrast to previous findings reported in section 2, which outlined the aggravating role of providing information about gender in increasing the gender gap.

The studies reviewed in Section 2 also suggest that women's performance declines under a competitive scheme relative to a non competitive (piece rate) scheme; here, on the contrary, we find that the number of mazes solved by women increases from 4.63 to 7.2 when competing against another random participant. When, instead, women professionals in our sample compete against a participant of an opposite sex, performance is on average slightly higher and similar under the two rewards schemes. As for men, we found that their performance remains almost the same in the two schemes when no gender information is provided (when competing against a random participant), but they do perform better under the tournament when competing against someone of the opposite sex, although the difference is not significant. Therefore, overall, we find that there is no gender gap in performance under a competitive reward scheme.

TABLE 6: Attitudes towards competition under different reward scheme and gender information

Scheme	**Female**	**Male**	**Pooled**	**Gender Gap***
		Competitiveness **		
Random allocation	**24**	**32**	**56**	
Piece rate	19 (79.17)	17 (53.12)	36 (64.18)	
Tournament	5 (20.83)	15 (46.88)	20 (35.71)	z=-1.995; p=0.0807
Opposite sex	**22**	**30**	**52**	
Piece rate	12 (54.54)	22 (73.33)	34 (65.38)	
Tournament	10 (45.46)	8 (26.27)	18 (34.62)	z=1.393; p=0.2665
		Performance ***		
Random allocation	**5.16 (0.50)**	**6.21 (0.42)**	**5.76 (0.32)**	
Piece rate	4.63 (0.49)	6.17 (0.57)	5.36 (0.39)	z=-1.932; p=0.0536
Tournament	7.2 (1.2)	6.26 (0.65)	6.5 (0.56)	z=0.712; p=0.05316
Opposite sex	**5.63 (0.46)**	**6.3 (0.45)**	**6.01 (0.32)**	
Piece rate	5.66 (0.64)	5.95 (0.51)	5.85 (0.40)	z=-0.200; p=0.8500
Tournament	5.6 (0.65)	7.25 (0.94)	6.33 (0.57)	z=-1.300; p=0.2043

* Wilcoxon rank-sum test.
** Percentages in parenthesis.
*** Standard errors in parenthesis.

We now consider the potential role of some behavioural explanatory variables, which we found in the literature to be helpful in explaining women's decision to compete. Table 7 reports the results of a probit regression that sheds light on this. Overall, the regression confirms the absence of a gender effect in explaining the decision to compete. We find that age plays a small role for men, with older men less likely to choose the competitive reward scheme, while age does not seem to be associated with women's behaviour. Interestingly, the decision to compete appears to be significantly driven by behavioural characteristics in the case of women. The probit regression confirms the

role that information on the opposite sex of the competitor has on attitudes towards competition, with women more likely to choose the tournament in those cases, while this has no impact on men's decision whether to choose the tournament or the piece rate scheme. Social preferences in the model refers to performing for a non self-rewarding task. In the case of this task, any money made from mazes solved above a threshold of two mazes is sent to a charity that participants had previously chosen. The women that performed best under this scheme where also more likely to choose a competitive reward scheme. Finally, we also measure risk preference via a task where individuals where given the choice between two payment options: a low/sure payment versus a higher/riskier payment. Similarly, what we observe is that women that are relatively more likely to choose the tournament scheme are also more likely to choose for the risky reward scheme.

TABLE 7: Probit regression on likelihood to enter the competitive reward scheme

	(1)		(2)		(3)	
	All sample		Male sub-sample		Women sub-sample	
Male	-0.0570	(-0.20)				
Info about gender	0.204	(0.74)	-0.357	(-0.95)	1.247**	(2.33)
Age	-0.0290	(-1.61)	-0.0411*	(-1.65)	-0.0245	(-0.72)
Social preferences	0.0366**	(2.28)	0.0243	(1.22)	0.0965***	(2.62)
Risk preferences	0.932***	(3.23)	0.453	(1.18)	1.908***	(3.24)
Team 1	-0.272	(-0.48)	-0.148	(-0.19)	-1.877	(-1.59)
Team 2	-0.486	(-1.04)	-0.481	(-0.63)	-0.645	(-0.95)
Team 3	-0.769	(-1.55)	-0.702	(-0.88)	-1.576**	(-1.99)
Constant	0.107	(0.14)	1.050	(0.84)	-1.297	(-1.04)
Observations	104		58		46	
BIC	155.6		99.55		65.61	
chi2	21.56		9.930		23.11	
p	0.00580		0.193		0.00163	

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Finally, in Table 8 we run an ordered probit model to analyse the impact of behavioural characteristics on individuals' performance under both rewarding schemes (score value ranges from 1 to 10). This confirms that gender plays no role and that men and women perform equally under a competitive scheme.

TABLE 8: Ordered Probit regression on performance under the different rewarding schemes

	(1)		(2)	
	Piece rate		Tournament	
Male	0.227	(0.86)	0.0652	(0.16)
Info about gender	0.312	(1.21)	-0.230	(-0.57)
Age	-0.0107	(-0.85)	-0.0270	(-0.87)
Risk preferences	0.454	(1.39)	-0.542	(-1.50)
Team 1	1.600***	(2.76)	0.360	(0.51)
Team 2	0.435	(0.95)	-0.0123	(-0.02)
Team 3	0.255	(0.53)	-0.181	(-0.30)
Observations	67		37	
BIC	346.4		196.6	
chi2	15.63		4.934	
p	0.0287		0.668	

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5 Concluding Discussion

Our analysis of gender gaps in attitudes towards competition, based on three experiments with more than 100 professionals in two international consulting firms in the UK, has resulted in the following seven concluding findings:

(i) overall, women appear to be as competitive as men;
(ii) women do not under perform relatively to men under a competitive scheme;
(iii) men are more likely than women to chose a competitive scheme (47 percent vs 21 percent) when no information about the sex of the competitor is revealed;
(iv) women are more likely than men to chose a competitive scheme when knowledge of the sex of the competitor is revealed;
(v) women's performance is higher under under a competitive scheme when competing against a random participant but does not change when knowing they are competing against a participant of the opposite sex;
(vi) overall, we observe no gender gap in performance under a competitive scheme;
(vii) under competitive schemes, women and men perform equally even when considering the potential differences in risk and socially-oriented attitudes.
To some extent, these are new findings, in the sense that they do not fully confirm the mainstream results we reported from looking at the literature in Section 2. However, direct comparisons are not, in our opinion, completely justifiable. Before we explain why, let us review briefly where the divergences lie, which requires a brief summary of the main results of the literature.
Indeed, in section 2, we comprehensively assessed the literature that specifically focused on gender gaps in attitudes towards competition, looking at 42 papers: 36 studies and 6 reviews, ranging from the pioneering study of Gneezy, Niederle and Rustichini in 2003 to the one by van Veldhuizen in 2017. We categorised these studies, amongst other variables, according to the method and data adopted and the results found.
Regarding the data, we categorised according to whether they relied on laboratory, field or other secondary data analyses and we found that: (i) the majority was based on laboratory experiment with students; (ii) the field experiments also largely relied on games played by children, with exceptions for analyses using job seekers and teachers, the latter assessed through students' performance; (iii) we categorised other relevant analyses based on secondary data, as they used information, for instance, from sports competitions or from television games. One main point we draw from this assessment of the evidence is that, despite the explicit motivation to link understanding of gender gaps in competitiveness to labour market outcomes such as pay and career progression, the samples of these studies are individuals far detached from the labour market. In this respect, therefore, lies one of the differences with our study, which is based on a sample of professionals engaged in a real working environment.
Regarding the main results, the studies we assessed overall found: (i) gender differences in entry into competitive games and in performance: women tend to shy away from competition and tend to perform less well than men under competitive environments; (ii) in the case of gender gaps in performance, the results would need to be qualified, particularly by taking account of the neutralising role played by risk attitudes as well as the information about the gender of the competitor. As pointed out above, here lies another difference with our study, which overall found that women do not tend to shy away from competition and perform equally to men under competitive schemes. We also qualify this study but the most important neutralising factor is not given by risk attitudes but by whether knowledge of the sex of the competitor is known. In this respect, however, we do find that women are more likely than men to choose a competitive scheme only when they are competing against a participant of the opposite sex.
We do not claim that these findings undermine the results of the extant literature but suggest that they arise mostly from the first difference we outlined above: the data and type of experiment. In fact, we believe ours to be the first study of gender gaps in attitudes towards competition that is based on the same, real effort, task used in previous laboratory studies, but performed by participants in their natural, professional environment, as per Harrison and List (2004). This is very important, in our opinion, as we assess a sample of individuals that are closer to the labour market than any previous study has been able to assess, which is fundamental when the main motivation is to try to explain labour market outcomes.
Therefore, it is worth asking what it all means: what are the implications of these findings? Here we focus on two. The first relates to the possible substantive underlying reasons for our findings. We suggest that a form of sorting into sectors and occupations might well be at play here. Our sample comes from two consulting firms that operate in a relatively competitive environment, internationally renowned consulting firms : women who decide to work in these

firms and have been successfully employed are therefore relatively competitive women, and indeed as competitive as men. Although this line of reasoning should apply to men as well, it might be the case that it applies to women in a relatively more pronounced fashion. There is some relationship here with the findings from Bandiera et al. (2016), who conclude that performance pay increases performance for men and women alike. To the extent which performance pay can be considered a proxy for competitive environments, their findings of no gender gaps associated with it might be consistent with ours in this paper. However, a full understanding of this issue is beyond the scope of this paper and represents ground for future research. For instance, in order to test this hypothesis, it will be worth assessing the extent to which our results are confirmed when the same experiments are undertaken with a sample of workers from other sectors, particularly in what are considered relatively less competitive environments, such as for instance the public sector.

Second, our findings clearly point to the need to avoid generalisations on the existence of gender gaps in attitudes towards competition that have now become quite common: it is not always the case that women shy away from competition or performs less well than men in competitive environments.

References

Altonji, J. G., and R. M. Blank. 1999. "Race and gender in the labor market." *Handbook of labor economics*, 3 3143–3259.

Andersen, S., S. Ertac, U. Gneezy, J. A. List, and S. Maximiano. 2013. "Gender, competitiveness, and socialization at a young age: Evidence from a matrilineal and a patriarchal society." *Review of Economics and Statistics*, 95(4): 1438–1443.

Antonovics, K., P. Arcidiacono, and R. Walsh. 2009. "The effects of gender interactions in the lab and in the field." *The Review of Economics and Statistics*, 91(1): 152–162.

Apicella, C. L., E. E. Demiral, and J. Mollerstrom. 2017. "No gender difference in willingness to compete when competing against self." *American Economic Review*, 107(5): 136–40.

Azmat, G., and B. Petrongolo. 2014. "Gender and the labor market: What have we learned from field and lab experiments?" *Labour Economics*, 30 32–40.

Balafoutas, L., and M. Sutter. 2010. "Gender, competition and the efficiency of policy interventions."

Bandiera, O., G. Fischer, A. Prat, and E. Ytsma. 2016. "Do women respond less to performance pay? building evidence from multiple experiments."

Bertrand, M. 2011. "New perspectives on gender." In *Handbook of labor economics*. 4 Elsevier, 1543–1590.

Blau, F. D., and L. M. Kahn. 2017. "The gender wage gap: Extent, trends, and explanations." *Journal of Economic Literature*, 55(3): 789–865.

Booth, A. L. 2009. "Gender and competition." *Labour Economics*, 16(6): 599–606.

Bosquet, C., P.-P. Combes, and C. Garcia-Penalosa. 2013. "Gender and competition: evidence from academic promotions in france."

Bowles, S., H. Gintis, and M. Osborne. 2001. "The determinants of earnings: A behavioral approach." *Journal of economic literature*, 39(4): 1137–1176.

Buser, T., M. Niederle, and H. Oosterbeek. 2014. "Gender, competitiveness, and career choices." *The Quarterly Journal of Economics*, 129(3): 1409–1447.

Card, D., A. R. Cardoso, and P. Kline. 2016. "Bargaining, sorting, and the gender wage gap: Quantifying the impact of firms on the relative pay of women." *The Quarterly Journal of Economics*, 131(2): 633–686.

Cardoso, A. R., P. Guimarães, and P. Portugal. 2016. "What drives the gender wage gap? a look at the role of firm and job-title heterogeneity." *Oxford Economic Papers*, 68(2): 506–524.

Croson, R., and U. Gneezy. 2009. "Gender differences in preferences." *Journal of Economic literature*, 47(2): 448–74.

Dargnies, M.-P. 2009. "Does team competition eliminate the gender gap in entry in competitive environments?".

Datta Gupta, N., A. Poulsen, and M. C. Villeval. 2005. "Male and female competitive behavior-experimental evidence."

Datta Gupta, N., A. Poulsen, and M. C. Villeval. 2013. "Gender matching and competitiveness: Experimental evidence." *Economic Inquiry*, 51(1): 816–835.

De Paola, M., F. Gioia, and V. Scoppa. 2015a. "Are females scared of competing with males? results from a field experiment." *Economics of Education Review*, 48 117–128.

De Paola, M., M. Ponzo, and V. Scoppa. 2015b. "Gender differences in attitudes towards competition: Evidence from the italian scientific qualification."

Dechenaux, E., D. Kovenock, and R. M. Sheremeta. 2015. "A survey of experimental research on contests, all-pay auctions and tournaments." *Experimental Economics*, 18(4): 609–669.

Dohmen, T., and A. Falk. 2011. "Performance pay and multidimensional sorting: Productivity, preferences, and gender." *American economic review*, 101(2): 556–90.

Dreber, A., E. von Essen, and E. Ranehill. 2014. "Gender and competition in adolescence: task matters." *Experimental Economics*, 17(1): 154–172.

Ertac, S., and B. Szentes. 2010. "The effect of performance feedback on gender differences in competitiveness: experimental evidence." *Work. Pap., Koc Univ., Turkey*.

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

Garratt, R. J., C. Weinberger, and N. Johnson. 2013. "The state street mile: Age and gender differences in competition aversion in the field." *Economic Inquiry*, 51(1): 806–815.

Gill, D., and V. Prowse. 2014. "Gender differences and dynamics in competition: The role of luck." *Quantitative Economics*, 5(2): 351–376.

Gneezy, U., K. L. Leonard, and J. A. List. 2009. "Gender differences in competition: Evidence from a matrilineal and a patriarchal society." *Econometrica*, 77(5): 1637–1664.

Gneezy, U., M. Niederle, and A. Rustichini. 2003. "Performance in competitive environments: Gender differences." *The quarterly journal of economics*, 118(3): 1049–1074.

Gneezy, U., and A. Rustichini. 2004. "Gender and competition at a young age." *American Economic Review*, 94(2): 377–381.

Goldsmith, A. H., J. R. Veum, and W. Darity Jr. 1997. "The impact of psychological and human capital on wages." *Economic inquiry*, 35(4): 815–829.

Harrison, G. W., and J. A. List. 2004. "Field experiments." *Journal of Economic literature*, 42(4): 1009–1055.

Healy, A., and J. Pate. 2011. "Can Teams Help to Close the Gender Competition Gap?." *The Economic Journal*, 121(555): 1192–1204.

Iriberri, N., and P. Rey-Biel. 2012. *Let's (not) talk about sex: Gender awareness and stereotype-threat on performance under competition*. GSE Barcelona.

Ivanova-Stenzel, R., and D. Kübler. 2005. "Courtesy and idleness: Gender differences in team work and team competition."

Jewell, S. L., G. Razzu, and C. Singleton. 2018. "Who works for whom and the uk gender pay gap." *British Journal of Industrial Relations*.

Lavy, V. 2013. "Gender differences in market competitiveness in a real workplace: Evidence from performance-based pay tournaments among teachers." *The Economic Journal*, 123(569): 540–573.

Manning, A., and J. Swaffield. 2008. "The gender gap in early-career wage growth." *The Economic Journal*, 118(530): 983–1024.

Mueller, G., and E. Plug. 2006. "Estimating the effect of personality on male and female earnings." *ILR Review*, 60(1): 3–22.

Niederle, M., and L. Vesterlund. 2007. "Do women shy away from competition? do men compete too much?" *The quarterly journal of economics*, 122(3): 1067–1101.

Niederle, M., and L. Vesterlund. 2011. "Gender and competition." *Annu. Rev. Econ.*, 3(1): 601–630.

OECD. 2017. *The gender pay gap increases with age*.

Paserman, M. D. 2007. "Gender differences in performance in competitive environments: evidence from professional tennis players."

Peterle, E., and H. A. Rau. 2017. "Gender differences in competitive positions: Experimental evidence on job promotion." *CEGE Number*.

Price, C. 2008. "Do women shy away from competition? do men compete too much?: A (failed) replication." *SSRN Electronic Journal*.

Reuben, E., P. Sapienza, and L. Zingales. 2015. "Taste for competition and the gender gap among young business professionals."Technical report, National Bureau of Economic Research.

Shurchkov, O. 2012. "Under pressure: gender differences in output quality and quantity under competition and time constraints." *Journal of the European Economic Association*, 10(5): 1189–1213.

Sutter, M., and D. Rützler. 2010. "Gender differences in competition emerge early in life."

Vandegrift, D., and A. Yavas. 2009. "Men, women, and competition: An experimental test of behavior." *Journal of Economic Behavior & Organization*, 72(1): 554–570.

van Veldhuizen, R. 2017. "Gender differences in tournament choices: Risk preferences, overconfidence or competitiveness?"Technical report, Discussion Paper.

Vincent-Lancrin, S. 2008. *The Reversal of Gender Inequalities in Higher Education*.

Weichselbaumer, D., and R. Winter-Ebmer. 2005. "A meta-analysis of the international gender wage gap." *Journal of Economic Surveys*, 19(3): 479–511.

Wozniak, D., W. T. Harbaugh, and U. Mayr. 2009. "Choices about competition: Differences by gender and hormonal fluctuations, and the role of relative performance feedback." *Available at SSRN 1564895*.