Critical Women and Confident Men? Skills Perception and Investment at University

Liqing Chen[*], Adeline Delavande[†], Emilia Del Bono[‡]
Luca Favero[§], Angus Holford[¶]

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Abstract

Technological advancements are reshaping traditional job tasks, increasing the demand for social skills and the returns on these abilities. However, it is unclear whether university students are aware of these in-demand skills and how to acquire them. This paper investigates the impact of a randomized information intervention on students' beliefs about graduate employers' skill requirements, their ability to demonstrate these skills, and their investment decisions and job search strategies. The intervention had no effect on students' beliefs about which skills employers value, as their baseline perceptions were largely consistent with the objective information provided. However, the intervention did influence students' perceptions of their ability to demonstrate those skills. Specifically, female students lowered their self-assessments, while male students showed no such change. As a result, men and women responded differently to the intervention. We find that the intervention had a positive effect on career event participation and academic outcomes for females, while treated males started their job search earlier. However, treated males were less likely to secure long-term, stable jobs upon graduation compared to their peers.

1 Introduction

The popularisation of automation and digitalisation through the use of electronics and the Internet has been transforming our world economy. Computers and machines excel at cognitively demanding tasks, and as a result are gradually substituting manual labour. Employment growth for

[*]University of Technology Sydney
[†]Nova SBE and University of Technology Sydney
[‡]University of Essex
[§]University of Essex and Collegio Carlo Alberto
[¶]University of Essex

cognitively intensive occupations, such as those in science, technology, engineering and mathematics (STEM), peaked in the late 1900s but began to contract during the 2000s [Beaudry and Sand, 2016]. Consistently, smaller returns to cognitive test scores are observed by Castex and Kogan Dechter [2014]. This trend is likely to continue owing to the nature of technological advancements. However, occupations that are predominantly driven by social skills, such as teachers, carers, and managers, are not easily replaced. In fact, there is growing evidence of an increasing demand and increasing return for non-cognitive skills and occupations [David, 2015, Deming, 2017, Edin and Ockert, 2017]. As the labour market changes with an emphasis towards non-cognitive skills, employers are increasingly looking beyond academic grades and tailoring their recruitment processes to graduates with greater employability skills.[1]

Despite the growing importance of non-cognitive skills in work lives, it is relatively less acknowledged among current higher education institutions. Graduate performance in certain soft skills has been persistently criticised by industry in developed countries such as the UK, the USA, and Australia [Casner-Lotto and Barrington, 2006, Jackson and Chapman, 2012]. Consequently, there exists a skill gap between what employers demand and what graduates possess. Yet, whether students perceive the presence of such a skill gap remains unknown. Moreover, it is unclear whether providing information about the skills in demand and how to signal these skills to employers would lead students to invest in these skills and achieve better labour market outcomes. Finally, we also do not know whether men and women would respond similarly to such information, given that men and women are thought to be endowed with different psychological attributes [Croson and Gneezy, 2009, Weisberg and Hirsh, 2011], and they respond differently to information about performance. A recent paper by Coffman and Zafar [2021] finds that females update their beliefs and choices more negatively than men do after bad news, holding fixed performance and decisions before feedback.

This paper attempts to answer these questions with a stratified randomised information intervention that provides information on employability skills in demand by employers and how to signal them to third-year university students attending a typical Higher Education institution in the UK. The intervention started with a video featuring the general recruitment requirement from a typical employer, followed by a list of five non-cognitive skills with their definitions that are regarded as "essential" or "in shortage" by the Association of Graduate Recruiters in 2016. It also includes some statistics on how "essential" or "in shortage" these skills are, as well as information on upcoming events relevant to these skills' development.

Using a rich dataset including a longitudinal survey and administrative records, we first look at the treatment effect on perceptions of skills. We find limited effect of the intervention on students' perceptions about skills in demand by employers, but a negative treatment effects on how employers would rate students' skills based on their CV. This is consistent with the information provided that emphasizes the experience that employers are looking for among recent graduates. In addition, females revise downward their own rating of skills, while there is no such effect for men. This is despite the fact that we did not provide any feedbacks on actual skills or perform-

[1]Employability skills were first defined by Goleman [1998] as "prime qualities that make and keep us employable", which refer to a set of non-cognitive soft skills that demonstrate vital personal attributes.

ance. However, the information led females to believe they were not as skilled as they initially were.

We then investigate how this information translated into investments in non-academic activities as well as academic outcomes. Two months after the intervention, there is an increase of the likelihood of participating in the Big Employability Award by 5 percentage points, which is a university-verified program designed to help students develop and signal skills. The treatment also exhibits a positive, albeit imprecise, impact on hours (0.74) spent in working experience related to study or desired future career among female students who have already had a job. Meanwhile, treated females attend 0.27 more career workshops hosted by the university. The effect is sizable considering the average number of career workshops attended prior to the treatment for females is 0.966, suggesting an increase of about 28%. Female students also report a better academic achievement by the end of the third year, with an average of 1.10 points increase in Year 3 mark and 8 percentage points more likely to graduate with a First-Class degree. However, no significant changes are found for males and most of the gender differences found in the treatment effects are statistically significant.

We also look at job search and find that male students are 11 percentage points more likely to send graduate job applications and are 6 percentage points more likely to have already secured an offer two months after the intervention. There is no treatment effect for females in job searching behaviour and the estimates are statistically significantly different by gender at the 5% level.

Finally, looking at labour market outcomes observed two years after graduation, we find that the treatment has lasting negative effects on the job stability of males. We find an imprecisely estimated 12-percentage-point drop in the probability of being employed under long-term contracts.

The results we found suggest male and female students responded differently to the intervention. Since the intervention bridges the gap between employers and students, we expect it to change students' belief on skills perception if it was inaccurate. Upon learning which skills are in demand and how to signal these skills to employers better, investment should be triggered accordingly. Female students behaved as expected by following the advice mentioned in the intervention. They learn to develop employability skills and signal them well through integrated experiences and practice in workshops. Yet, the behaviour of male students seems rather surprising. One possible interpretation is that the information about the demand for employability skills from employers was misread as a signal of competitiveness of the labour market. With the confidence that they are already equipped with these skills (no immediate negative effect in self-rating), it might be advantageous to enter the labour market and secure a job as soon as possible. The lack of investment underprepared these male students, resulting in less desired job attributes in the long term.

Our findings on the gender differences add to a growing literature that uses non-cognitive skills as one of the newer explanations for gender differences in labour market outcomes. Labour economists have become increasingly interested in the effect of non-cognitive traits, including psychological traits, preferences, and personality, on outcomes and behaviours [Heckman and Kautz, 2012]. Mueller and Plug [2006] first suggest that psychological attributes such as self-

confidence may contribute to a worker's productivity and thus act like human capital variables in a wage regression. A few research have found psychological traits account for some gender wage gap, with the proportion ranges from 2.5% to 27.6% [Manning and Swaffield, 2008, Cattan, 2014, Reuben et al., 2015]. More recent papers have attributed gender wage gap to gender differences in the propensity to negotiate. Women have been found to be less willing than men to negotiate and compete and to be more risk averse. Gender differences in such characteristics have been proposed as an explanation for women's lower wages and lower representation in high-level jobs [Card et al., 2016, Exley and Vesterlund, 2020, Dittrich and Leipold, 2014, Biasi and Sarsons, 2020]. A recent study by Biasi and Sarsons [2021] further investigates the determinants of differences in propensity to negotiate by showing that differences in self-confidence between men and women can explain 17% of the gender gap in bargaining. Our paper differs from those by looking at gender differences in information interpretation that leads to making different investment choices and labour market outcomes.

We also extend the substantial literature that studies human capital by analysing the investment decisions in non-cognitive skills among undergraduates. It has been proven that efforts during adolescence and young adulthood to foster non-cognitive skills can also show promising results. For example, mentoring programs in school that provide students with support and techniques that improve their use of capacities have been shown to be effective [Bettinger and Sanbonmatsu, 2012, Carrell and Sacerdote, 2013, Cook and Steinberg, 2014]. However, few economists have made attempts to understand skills investment during adulthood. One recent paper from Delavande and Holford [2020] discusses the role of subjective expectations on investment decisions in human capital for university students. They consider both time allocation across different types of activities (academic and non-academic) and expectations on the returns of time invested in those activities as primary inputs of human capital accumulation.

The third contribution is to the literature on information intervention in education. Examining the role of information intervention in changing expectations and subsequent decisions as well as behaviours has become progressively popular in economics. Most papers have focused on the education domain. For instance, Jensen [2010] documents higher years of schooling for students given information on higher measured returns when their original perceived returns were low. Bleemer and Zafar [2018] show that intention in college attendance increases in the baseline likelihood when randomly exposed to objective information about average college returns and costs. This paper seeks to study any changes in human capital investment decisions and potential labour market outcomes when graduates are provided with relevant information on employability.

Lastly, this paper contributes to the literature that analyses the relationship between engagement in extra-curricular activities and labour market outcomes. Along with the evidence found amongst researchers in education that extra-curricular experiences ensure a better transition from university to the workplace [Tchibozo, 2007, Roulin and Bangerter, 2013, Milner and McGowan, 2016, Nghia, 2017], a few papers in economics also document that participation in sports and undertaking internships while studying receive higher wage returns [Persico and Silverman, 2004, Siedler and Schumann, 2016, Lechner and Downward, 2017]. Rather than evaluating the effects

of extra-curricular activities on labour market outcome variables, such as wage and employment, we investigate how employability skills can be accumulated through participation in various extra-curricular activities. The key assumption here is that students opted into the activities after the treatment when they believe such activities will improve the skills they are willing to invest in. And they will only invest in the skills that are believed to be beneficial for their labour market outcomes. With this assumption, the results can be interpreted as the effect of employer-perceived labour market outcomes on extra-curricular activities participation.

This paper is organized as follows. Section 2 describes our data and our analytical samples. Section 3 introduces the information intervention and our hypotheses of the treatment effect. We provide detailed descriptive evidence and explanation on how we measure skills perception, investments, job search, and labour market outcomes in Section 4. Section 5 reports empirical strategy and estimation results. Robustness checks for results are presented in Section 6. Section 7 concludes.

2 Data

2.1 BOOST2018

The *BOOST2018* is a longitudinal survey sampled from an entire cohort of undergraduate students who enrolled at a UK university between October 2015 (academic year 2015/16) and June 2018 (academic year 2017/18).[2] The institutional features of this university are typical of other Higher Education institutions in the UK. It usually takes students three years to complete their undergraduate degree. Students are required to pass their previous year successfully before progressing to the next year. Academic performances in the second and third year are used to calculate the "degree mark" as well as the corresponding "degree class" for the level of Honours with which the student graduates.

All university students enrolled in the first year of an undergraduate degree in the academic year 2015/16 were included in the sampling frame of BOOST2018. It comprised 2,621 subjects, including Home (UK resident) and EU students as well as students from overseas. The program was widely advertised on the main university campus with an incentive of £5 for those who signed up to participate. A total of 2,005 students were enrolled in BOOST2018 by the end of the Autumn term of the academic year 2017/18, which is about 76.5% of the entire cohort.

The BOOST2018 consists of 14 online or laboratory-based surveys (14 Waves), which are then linked to the administrative data from university records. In each academic year, enrolled students were invited to participate in three online surveys during the Autumn term in November, Spring term in March, and the revision period in May, as well as one laboratory session at the Social Science Experimental Laboratory in January. In particular, the online surveys in November and March are long (60 minutes) while the one in May is shorter (25 minutes). These surveys

[2] About 20% of students went abroad or on placement in the third year (academic year 2017/18) and completed their degree in June 2019.

collect information on students' university life, including attendance, study time and habits, and a range of extra-curricular activities. The online surveys also ask questions about students' subjective beliefs on ability as well as subjective expectations on academic outcomes and future career prospects. Meanwhile, the administrative data provided by the university includes information on students' demographics (e.g. age, gender, and ethnicity), socio-economic status (e.g. parental education level, parental occupation, and university participation rate in their neighbourhood of domicile), marks, participation in career events run by the University Employability and Careers service, and attendance records obtained from a swipe-card electronic system.

Monetary incentives were used to encourage survey participation, with payments ranging from £8 to £20 for online surveys and around £30 on average for the laboratory sessions. Overall, three randomised interventions were implemented in the laboratory sessions across three years. This paper studies the information intervention that took place in January 2018 (Wave 10), which was also the laboratory session of the third year of study. Figure 1 presents an overview of the data collection timeline. Wave 1 to Wave 12 are standard waves collected between academic year 2015/16 and academic year 2017/18. Wave 13 was collected in academic year 2018/19 and was only completed by students who were still registered at the university as undergraduates at the time—because they had been abroad or on placement in the third year, or they had repeated a year. In May 2020, Wave 14 was launched as the final wave where participants were interviewed about their realised labour market outcomes, about two years after graduation for most.

2.2 Analytical Samples

The target population is third-year university students who have successfully progressed through Years 1 and 2 on time. Column (1) of Table 1 shows the summarised characteristics of the entire cohort upon enrolment in the first year, with male and female students being equally present. In Column (2), we present the sample of students who consented to participate in BOOST2018, which is representative of the cohort. More than 90% are non-mature students (aged 21 or below on entry), and British (Home) or EU students consist of 85% of the target population. Column (3) shows the characteristics statistics of all BOOST registered students who successfully progressed to their third year of study when the intervention happened. Our main estimation sample of this paper are those who attended the lab session in Wave 10, as displayed in Column (4), which represents 75% of the eligible target population.[3]

Different analytical samples used in this paper are listed from Columns (4) to (7). For example, the Wave 9&10 sample includes all students who attended the lab session in Wave 10 as well as responded to the prior survey in Wave 9. Similarly, the Wave 9&10&11 sample consists of those who attended Wave 9, 10, and 11. This is the most frequently used sample to study the treatment effects as it contains our outcomes of interest with baseline information. Comparing Column (3) with all analytical samples from Columns (4)–(7), the sample statistics are similar to the group of interest.

[3]The university did not provide us further students' enrolment information on whether they had dropped out or repeated years if they were not enrolled in the BOOST survey.

3 The Information Intervention

3.1 Overview

The information intervention in Year 3 was designed to test whether providing knowledge of essential employability skills will better prepare graduates for the job market. This intervention was evaluated through a stratified randomised controlled trial and cross-randomised on top of the existing two interventions conducted in Year 1 and 2. After first stratifying by gender, mature status (age above 21), parental socio-economic status, department, and tariff quintile,[4] students within each cell were then randomly assigned into groups A (control group) and B (treatment group) with equal probability. A total of 1,496 email invitations were sent out for the registration of the lab session.[5] Students were offered the option of attending the lab session on different days of the week and at different times of the day for a period of three weeks. The response rate was about 50%, with 394 students in the control group and 376 students in the treatment group. See Table 2 for baseline balancing between the control and the treatment group.

The laboratory is equipped with individual partitioned booths that have their own computers and noise-cancelling headphones. The lab session was divided into two sections. The first one was the information intervention with incentivised tasks or an alternative for the control group. The tasks were different based on the contents they received, while the average payoff was similar—£31.34 for group A and £29.72 for group B. In the second section, students in both groups were asked to answer the same survey questions.

3.2 The Treatment

The treatment took place at the beginning of the lab session in Wave 10 and consisted of five different components as detailed below. For the students in the control group, they received an incentivised non-verbal reasoning test measuring their ability to solve problems, and an incentivised writing task at the end asking them to describe a learning experience.

3.2.1 A Video of a Typical Recruiter

The information intervention began with a 90-second video of a typical recruiter of graduate students talking about general recruitment requirements. It included the minimum degree class (a 2:1 degree), skills required beyond academics, and examples of how these skills can be developed. For example, the recruiter mentioned the importance of developing commercial aware-

[4]The tariff points are available through the linkage with the university administrative data and come from the University and Colleges Admission Service (UCAS). The UCAS Tariff points are a way of comparing the value of all post-16 qualifications in the UK, as students can access university by gaining academic qualifications, vocational qualifications or a mixture of the two. The total score is obtained by assigning a numerical value to each grade and qualification and summing these up. The higher the grade the student achieved per each qualification, the higher the number of points awarded.

[5]Among those 1,497 students, 750 were assigned to the control group and 747 to the treatment group.

ness and used her own experience of working in factories and as a waitress in a bar as examples. A full transcript of the treatment video is provided in Appendix A.1. Students were not allowed to proceed until they had spent at least 90 seconds on the page, although they could spend longer to re-watch the video if they wished.

3.2.2 Quiz on Skills Definition

After the video, students were given a list of five employability skills and a short quiz that asked them to match each skill to its correct definition. The five skills listed were *Teamwork*, *Interpersonal skills*, *Problem solving*, *Commercial awareness*, and *Negotiating and Influencing*. If they answered incorrectly, they were told the correct answer.[6]

3.2.3 Information about essential skills and skills in shortage

Following the quiz, students received information about "essential skills" and "skills in shortage" based on a survey released by the Association of Graduate Recruiters in 2016. "Essential skills" referred to the top three skills employers are looking for when hiring a graduate. Students were told that the top three skills are *Teamwork*, *Interpersonal skills*, and *Problem solving*. This information was supplemented with a graph showing the true proportion of employers tailoring their recruitment to find graduates with these skills. There are also text messages provided below to explain the graph to ensure that students' understanding of the graph is correct. For instance, one of the texts reads as "81% of employers target their hiring to find graduates able to work in a team". Similarly, information on 'skills in shortage' highlighted skills that employers feel hard to find among graduates, which are 'Commercial awareness' and 'Negotiating and Influencing'. A graph was provided for students to visualise the gap between what share of employers demand these skills and the share of graduates that have them. The message that possessing those skills is not enough and students will need to be able to demonstrate they have those skills was also emphasised.

3.2.4 Information about Career Events and the Big Employability Award

The next part of the intervention provided information about upcoming courses or career events with university's Employability service and students can opt-in for an email reminder to sign up one of those events. These career events were designed to help students cultivate or showcase their employability skills. Besides that, we introduced Big Employability Award (BigE Award) developed by the university, which issues a verified certificate documenting participation in any Student Union or university-run employment, volunteering, leadership roles and etc, along with their degree transcript. Particularly, the BigE Award certificate helps (i) identify the skills students developed over the time at university and (2) signal the skills to employers in an interview

[6] 70% of students in the treatment group got at least four correct answers out of five, with the most common mistake occurring on *Interpersonal skills*.

by listing concrete examples. See the original message displayed in the intervention in Appendix A.2.

3.2.5 Incentivised Mock Interview Essay

The treatment finished with an incentivised task where students had 8 minutes to write an essay on mock job interview questions to practice signalling skills with examples. More specifically, students were asked to illustrate an understanding of the challenges faced by organisations in the sector they wish to work in, and to describe a situation in which they won someone over to their point of view. They were awarded with £2 for every 200 characters (2 lines in the box displayed on the screen) of meaningful text written up to a maximum of £10. After the writing task, students were informed about the two skills that employers were testing that underlay the mock interview questions.

3.3 Hypotheses of the Treatment Effect

The provision of information on employability is anticipated to improve students' understanding about the skills in demand in the labour market, and lead to subsequent investment to acquire or better signal these skills. First, we expect students to update their belief on skills perception based on their priors. Second, we expect to see an increase in investment in employability skills, such as participation in extracurricular activities (e.g., university clubs and societies), volunteering, internships, or employment, as these were specifically mentioned as means to develop employability skills during the intervention. Third, we expect an increase in academic investments and achievement, since graduating with a good degree class had been emphasised as being essential. Finally, we anticipate that the intervention helps students to be better prepared in terms of their employability for the job market upon graduation, presumably smoothing the transition from university to the workplace. This could be reflected by less job-searching time, higher earnings, and better non-pecuniary job attributes. In our empirical study, we will test these hypotheses using a combination of self-reported survey data and administrative data.

4 Measuring skills perceptions and employability skills

In this section, we explain how we measure students' skills perception, investment in employability skills as well as their academic investments, and outline the labour market outcomes collected two years after graduation. Table 3 presents summary statistics of the key variables mentioned in the following subsections.

4.1 Skills perception

We measure three aspects of skill perceptions: (i) perceived employers' demand for skills, (ii) self-assessment of skills, and (iii) self-assessment on skill signalling. Each part includes nine

skills that have been identified by graduate employers as factors in their recruitment decisions. These nine skills are *Managing up*, *Dealing with conflict*, *Negotiating and Influencing*, *Commercial awareness*, *Business communication*, *Self-awareness*, *Problem-solving*, *Interpersonal skills*, and *Teamwork*. In particular, students were presented with the following questions and were required to answer them using a scale of 0 to 100.

- "Rate their importance to employers. What proportion of graduate employers do you think tailor their recruitment process specifically to find graduates who already have each of these skills?"
- "Rate yourself. For each of the 9 skills listed below, please rate yourself on the scale from 0 (you have no skill at all in this field) to 100 (your skill is perfect)."
- "Rate how well you signal these skills. For each of the 9 skills listed below, how well do you think an employer looking at your CV would rate you on the scale from 0 (you have no skill at all in this field) to 100 (your skill is perfect)?"

For students who might not be sure about what these terms mean, they could click on these skills for definitions. These questions were asked at Waves 9, 10, 11, and 12, with the exception of the question on self-rating for signalling skills, which was asked from Wave 10 onward. We focus on the five skills that were mentioned in the information intervention in our analysis.

We start with understanding whether students have accurate skills perception on employers' demand, that is, checking whether students' beliefs on the importance of five skills to employers is accurate or not at baseline. Figure 2 & 3 presents the density graph of students' rating on the importance of five skills to employers at the baseline (Wave 9) by gender and by treatment. Density of male and females, as well as density of control and treated mostly overlaps for all five skills, suggesting no difference in the perceived employers demand for skills by gender or by treatment at baseline. Despite the large variance observed, the average ratings of these five skills are very close to the true proportion except for 'Negotiating and Influencing'. For instance, average ratings on the proportion of employers who demand skills of 'Commercial Awareness', 'Problem-solving', 'Interpersonal skills' and 'Teamwork' are 73%, 81%, 79% and 83% (Column (1) of Table 3 Panel A), while the true proportions are 71%, 77%, 76% and 81% respectively. However, we see a large gap in the average perceived employers demand for 'Negotiating and Influencing' at baseline, which is about 20 percentage points.

We then look at students' self-rating on these demanded skills and on how well they signal them. Panel A of Table 3 shows the average rating of these two aspects at baseline for everyone and separately by gender, as well as the p-value for mean differences by gender. Consistent with Figure 2, there is no significant gender difference in the perceived employers demand for skills, but difference in how students rate themselves. Female students have lower self-rating scores than male students in both 'Negotiating and Influencing' and 'Commercial awareness' (3 points and 4 points), and the differences are significant at the 5% and the 1% level respectively. Yet, self-rating scores in 'Interpersonal skills' and 'Teamwork' were significantly higher for female

students than males at the baseline (3.5 points and 4 points), both of which are significant at the 1% level. There was no significant difference by gender in self-rating 'Problem solving' skill. We also find some gender differences in students' self reported ability of signallig their skills. Females report statistically significance lower signalling rating compared to males for 'Negotiate and Influencing' (65.43 vs 68.15), 'Commercial Awareness' (60.37 vs 65.00) and 'Problem Solving' (75.05 vs 77.93).

4.2 Investment in Employability Skills

Our measures of investment in employability skills were derived from students' participation in extracurricular activities, which was endorsed in the intervention as a means of accumulating employability skills. The list of extracurricular activities we examined came from both self-reported survey answers and documented events in the administrative data. In the survey, students were asked to report on several activities, including taking a leadership role in the Student Union; engaging in a sports club or student society; training for or participating in sporting competitions; volunteering; being in an internship; and working for pay. We also collected information on students' enrolment in the Big Employability Award (BigE Award), which had been introduced during the intervention. Meanwhile, the university administrative records provide detailed data on appointment bookings and attendance at career workshops run by the university.

4.2.1 Activities reported in surveys

Questions about the aforementioned activities referred to the student's current term and were asked in Waves 9 and 11 of the survey.

For activities like volunteering, internship, and employment, students were asked whether the experience was relevant to their field of study or desired career. Instead of treating each activity as a separate measure of employability investment, we followed the approach of Delavande and Holford [2020] which combines and then categorises activities into two groups. The first group encompasses any experience related to the field of study or desired career, while the second group includes any other employment or non-academic experience. Specifically, we construct an indicator variable named 'Study/desired career related experience' that is equal to 1 if the student has engaged in any paid work, internship, or volunteering experience reported as being relevant to their field of study or desired career, and 0 otherwise. We also considered a similar indicator variable for the second group. 'Other employment/non-academic experience' is equal to 1 if students participated in sport competitions, or any other aforementioned university activities, as well as employment, internship or volunteering reported as not being relevant to the student's field of study or desired career. Similarly, we construct hours spent in these activities based on which group they belonged.

Panel B of Table 3 reveals that about 30% of our analytical sample Wave9&10&11 have had experience related to the field of study or desired career at the baseline. Not surprisingly, there are more students (74% of the sample) who have had other employment or non-academic

experience during the term, with an even higher proportion among female students (80%) comparing to males (67%). This gender difference is significant at the 1% level. Students on average spent around 3.3 hours for 'Study/desired career related experience' and 9.8 hours for 'Other employment/non-academic experience' per week.[7] There is no significant gender differences in mean hours of working.

The last thing we considered as an investment for employability skills is the participation of BigE Award. The BigE Award was offered as a useful tip in the intervention, with which students can cultivate their skills and showcase to the employers. We measured this investment using the survey answers to two questions about the BigE Award in Wave 9 and Wave 11. In Panel B of Table 3, we see that almost half of the female students (48%) in our sample had already signed up for the BigE Award before the treatment while only less than a quarter of the male students (23%) did the same thing. Again, among females who had enrolled in the BigE Award, they spent about 4 hours per week, which was more than doubled compared to that of males. The gender differences observed in both cases are significant.

4.2.2 Administrative data on career events

Similar to the BigE Award, events and workshops offered by the University Employability and Careers Service help students to develop and demonstrate their skills. The administrative records listed all events organised by the university that students booked onto, along with a brief description, attendance status, and date of the event.

Our primary outcome of interest is the number of these career events attended, regardless of the event type.[8] Using the events' date, we aggregated the total number of events prior and posterior to the treatment based on its timing in relation to the first week of the Wave 10 lab sessions. We only used career events in the third year to construct the baseline to be consistent with other baseline variables. Table 3 Panel B shows the average number of career events students booked in year 3 before the treatment is just slightly below one. There is no significant difference by gender.

4.3 Academic Investment

Our intervention emphasised the importance of the degree mark and the degree class a student graduates with, which may implicitly trigger investments in academic areas. Here, we consider students' academic outcomes—such as marks received in the third year after the intervention, final degree mark, and degree class—as indicators of academic investment.

The teaching structure at the university is similar to that of other UK institutions. All teaching and assessments are organised modularly. Students take 4 to 8 modules per academic year and receive an overall mark for each module, calculated as the weighted average of coursework and

[7] For students who do not participate in these activities, their weekly hours are recoded as zero instead of missing.

[8] The estimation results that include those who booked the events but were absent from their appointment are very similar to the main results reported in the paper.

exam marks. Marks are awarded on a scale from 0 to 100, with a passing mark of 40. The final degree mark is computed from 40% of the second-year average and 60% of the third-year average. A First-Class degree is awarded to students with a final mark of 70 or above, while an upper-second class is award for those who achieved over 60 and below 70.

The administrative date on marks contains information on every module that every BOOST2018 participant was enrolled in during their three years of study. Hence, we computed the overall post-treatment mark, named 'Mark (Year 3)' in Panel C of Table 3, as the weighted average of marks from all modules that took place in Spring or Summer term. The average overall mark for the first year was used as the baseline since it was counted in the calculation of final degree mark. An indicator variable 'First class' was defined as those who achieved 70 or above and was award with first class honours, while the variable 'Upper second or above' is equal to 1 if students achieved above 60 in their final degree mark. Panel C of Table 3 provides descriptive statistics for these variables at the baseline. Overall, about 75% of students graduated with at least an upper second-class degree with no difference across genders. Female students however study more hours per week compared to males (15.72 vs 13.37) and to attend more classes (69% vs 60%), both differences are statistically significant at 1%.

4.4 Job Search Behaviours

We collected various measures of job search behaviours purposefully in the survey of Wave 11. Wave 11 was launched towards the end of the term in year 3, which was about two to three months before the graduation. We considered two measures in this analysis that are from questions: (i) 'Have you started sending job applications to find a good job after you graduate?' and (ii) 'Have you secured a job for after you graduate?'. These two questions helped us to understand any potential changes in the timing for job hunts. Both 'Job application submitted' and 'Job offer secured' are binary variables that equate to 1 if the answers were yes. As no baseline questions were interviewed, Table 3 Panel E shows the descriptive statistics for these variables of Wave 11.

4.5 Labour Market Outcomes

Finally, we investigate the effect of the intervention on actual labour market outcomes after graduation. BOOST participants were interviewed in May 2020 (Wave 14), which was approximately 22 months after graduation for those who completed their degrees on time.[9] Note that the sample size in Wave 14 is smaller ($N = 437$) due to attrition. In the survey, students were asked to retrospectively report their activities for each month since graduation. From this data, we constructed three variables related to job search timing and postgraduate education. For example, the binary variable *Employed within 3 months of graduation* equals 1 if a student reported being employed in any of the first three months post-graduation. A similar method was used for

[9] Around 15% of third-year students did not graduate on time due to study abroad/placement or failing/restarting Year 3. Those who graduated a year later were still included in the survey, and their responses were harmonised with those of students on the standard track.

Employed within 6 months. The variable *Postgraduate education* equals 1 if a student reported any month spent in postgraduate education or training.

We also looked at earnings and some non-pecuniary job attributes, such as the type of contracts of the employment. More specifically, we asked a multiple-choice question which said:

> "Which of these best describes your employment basis?
> (1) On a permanent or open-ended contract
> (2) On a fixed-term contract lasting 12 months or longer
> (3) On a fixed-term contract lasting less than 12 months
> (4) Temporarily, through an agency
> (5) Temporarily, other than through an agency
> (6) Other"

The question was also surveyed among those who were unemployed at that time. Then such participants would be asked on the features of their most recent job. The question for earnings followed the same method. We regarded (1) and (2) as a stable long-term contract named 'Fixed/Long-term contract', while (3), (4) and (5) were classified as 'Temporal/Short-term contract'. As participants of different jobs came with different pay periods, the variable 'Annual gross earning' was therefore imputed for cross comparison. The 'Annual gross earning' was just as reported for those who reported annual pay, while for those who reported monthly or weekly pay, we simply timed 12 months and 52 weeks of their original reported number. Nevertheless, for ones with hourly pay, we multiplied by 52 after multiplying the original reported earnings with the median weekly hours worked for people paid by the hour, working in the same industry sector, and with the same contract type in the 2019 Annual Population Survey.[10] From Panel D of Table 3 we observed that the majority (77%) of graduates found a job within 6 months and about 32% were in postgraduate education or training within 10 months after graduating. The average annual gross earning was calculated around £21,800. As expected, there is a gender wage gap of £3,242 per year, which is significant at the 5% level.

5 Empirical Results

5.1 Empirical Strategy

We investigate the treatment effect of the information intervention on skills perception, investment in employability skills and academic effort, as well as job search behaviours and labour market outcomes using the following regression:

$$Y_{i,t} = \alpha + \gamma \cdot \text{Treat}_i + \beta \cdot Y_{i,t-1} + \mathbf{X}_i'\delta + \epsilon_{i,t} \tag{1}$$

[10] Outliers in annual gross earnings are replaced to 1% and 99% percentiles respectively.

where $Y_{i,t}$ is the post-treatment outcome of interest, Treat_i indicates the treatment status. The use of baseline $Y_{i,t-1}$ outcome (when available) and a series of control variables $\mathbf{X}_i$ including all the stratifying variables and whether receive intervention in the first and second year improve the precision of results [Bruhn and McKenzie, 2009, McKenzie, 2012]. As shown in Figure 1, the intervention took place during the laboratory session in Wave 10, which was also the beginning of the Spring term. For most variables collected from the survey (e.g. self-rating, experience and study hours) the baseline was measured at Wave 9 during the Autumn term, with the exception of the variables of rating signalling and other outcomes that did not have baseline interview (e.g. job search, labour market outcomes). There were outcomes evaluated with the use of administrative data, the baseline of which was either decided by the term or the first week of the lab session. We take a particular interest in the heterogeneity of the treatment effect by gender, as the differences were notable among descriptive statistics. We estimate heterogenous treatment effects by running equation 1 separately for males and females. We then test the null hypothesis of homogeneous treatment effects across genders, reporting the corresponding p-value.

5.2 Treatment Effect on Skills Perception

Table 4 presents the treatment effects on three aspects of students' awareness of employability skills.

5.2.1 Rating on Importance of Skills (Perceived Employers' Demand for Skills)

We start by evaluating the treatment effect of students' perception on skills demanded by employers. Panel A reports the results on average rating on the importance of five skills to employers and Figure 4 displays the detailed treatment effects on each of the five skills. No significant effect was observed in columns (1)-(3) of Panel A. This outcome variable, which was one of the objective information we delivered during the intervention, reflects students' subjective belief about the proportion of employers who demand graduates with these five skills.

One potential reason that we do not see treatment effects is due to the minor differences between the objective information and students' subjective belief at baseline. For example, students reported a rating of 83 for the importance of 'Teamwork' to employers (See baseline descriptive statistics listed in Panel A of Table 3). This means that they believed 83% of the employers tailor their recruitment process specifically to find graduates who have the ability to work in teams, while they learnt from the intervention that the true proportion is 81%. The prior belief of importance on 'Commercial awareness', 'Problem solving' and 'Interpersonal skills' are also very similar to the correct number showed in the intervention (73, 81 and 79 versus 71, 77 and 76).

Recall the large variance we found in the density graph of students' rating on the importance of five skills to employers at the baseline (Figure 3), it is also possible that the treatment narrows the bound of rating as the way of updating beliefs. However, this is unlikely to be the case after

plotting the density of skills perception on employers' demand pre and post treatment in Figure 5. The distribution of the treated group barely changes after the treatment.

Surprisingly, we also do not see any treatment effect on the skill 'Negotiating and Influencing', nor did we see any change in the distribution, especially the fact that there was no downward updating in beliefs, considering this skill had the largest perception gap with students overestimating the importance by more than 20 points. One possible explanation is that 'Negotiating and Influencing' is one of the two skills that are described as in shortage in the intervention and students internalise that message by overestimating the proportion of demand by employers. This might be further validated by a positive treatment effect of 5 points (significant at 10%) among females on 'Commercial Awareness' shown in Figure 4, as 'Commercial Awareness' is the other skill described as in shortage.

5.2.2 Self-rating on Skills and How Well They Signal Skills

Panel B and C look at the other two aspects of skills perception: self-assessment on skills and self-assessment on skills signalling. We find negative treatment effects on average self-rating and average signalling rating as shown in column (1) of Panel B and C. The treatment group lower their average ratings of five skills by almost 1.80 points and reduce the average rating on how well they signal these five skills by 3.14 points. Both estimates are significant at the 5% level.

Next, we look at male and female students separately. Column (3) of Panel B shows a negative effect of 2.82 points on average self-ratings for females, significant at the 1% level. As we compare the size of this effect with the treatment effect that are not significant for males in column (2), we see a difference of 2.69 in the treatment effect between males and females, which has a p-value of 0.06. This means treated females tend to be more critical in terms of reviewing themselves compared to the male counterparts. Figure 6 reveals further details about the differences in the treatment effect by gender. Treated female rated themselves significantly lower in four of the five skills except for 'Teamwork', while male treated students only decreased their self-rating on one skill. From columns (2) and (3) of Panel C, we infer that both treated male and female students believed that they need to improve in signalling their skills to employers. There is no noteworthy gender difference in treatment effect from Figure 7, except for the 'Interpersonal skills'.

5.3 Treatment Effect on Investment in Employability Skills

In Table 5, 6 and 7, we look at the treatment effect on investments in employability skills.

Panel A of Table 5 finds a negative treatment effect on the probability of gaining study or desired career related experience during the university-term time for males only. The effect for females is positive, small and imprecisely estimated. The difference across the two genders is however statistically significant at the 5%. Panel B, instead, report a similar, albeit imprecisely estimated, treatment effect on the likelihood of participating in other non-related or non-academic experience.

In column (3) of Panel A Table 6 we document a not significant decrease of working hours per week for treated males (-1.43) and a positive, imprecisely estimated, increase for females (+0.74). As we find no significant effect in the extensive margin, the increase in working hours could be mostly driven by those who already had a job that is related to study or desired career. Nevertheless, the difference of the treatment effect on working hours is significant at the 10% level, suggesting treated females prolonged more hours in working for study or desired career related job than their male counterparts.

Panel C of Table 5 details a positive impact on enrolment in the university's BigE Award. Students from the treatment group are 5 percentage points more likely to be enrolled in the BigE Award, significant at the 5% level. There is little change in terms of the intensive margin (Table 6 Panel C). Lastly, Table 7 presents the treatment effect on the number of career events attended. We do not find significant impact for the overall treatment group. However, for female students who received the treatment (column 3), they registered and mostly attended 0.27 more career events than those in the control group. The effect is sizeable considering the average number of bookings in year 3 prior to the intervention is 0.966 for females, which is a rise of almost 30%. We identify a p-value of 0.01 for difference in the treatment effect by gender.

In summary, we for males we find a decrease in the probability of gaining study or desired career related experience but no increase in the number of career events following treatment. For females, we find an opposite result, with a clear increase in the number of career events and a positive, despite being small and imprecisely estimated effect, on the probability of gaining study or desired career related experience.

5.4 Treatment effect on academic investment

Table 8 shows the effects of intervention on academic outcomes in year 3 and upon graduation.

We first look at the overall mark in year 3 as this could be viewed as the final outcome where any academic investment inputted after the intervention should be reflected. In spite of no effect were found in columns (1) and (2), we see that female students who received the intervention achieved 1.10 points higher on average than those in the control group for year 3 final mark. Again, the estimate is significant, and the size of the impact is somewhat large. If we take into account that the average baseline mark, in the first year, for females was 62.31, then the result suggests a 1.7% of increment in marks in the last term of the university. In fact, the result was so influential that the treatment effect on year 3 mark even transits to the final degree mark. As mentioned before, the final degree mark consists of 60% of the year 3 mark and 40% of the second-year mark. The significant and positive effect of 1.08 points documented in column (6) under 'Degree mark' would only be come from the improvement in year 3 mark since the intervention took place in the middle of the third year and theoretically would not influence the second-year mark.

When moving to the final degree class, we note that the probability of getting a degree with first-class honours upon graduation is 5 percentage points higher for students in the treatment group. The effect became stronger and more significant among female only sample and became

smaller and insignificant when restricting to male only sample. However, there is no significant difference between the treatment effects of females and that of males. The fact that there is no impact on the probability of getting a second-class or above degree infers the intervention move students from getting second- class honours to first-class.

5.5 Treatment Effect on Job Search Behaviours and Labour Market Outcomes

Table 10 shows the treatment effect on job search behaviours. Here, we only recognised substantial positive impacts for treated male students. In particular, by the time of three months before graduation, males in the treatment group are 11 percentage points more probable to have started job hunts (column (2)) and 6 percentage points more probable to have secured at least one job offer (column (5)). Both estimates are significant at the 10% level. These estimation results along with means reported in Table 3 Panel D indicate that treated males were more inclined to start searching job earlier and to secure an offer as soon as possible, since only about 33% of males in our sample started to send job applications at that time and less than 10% of them has secured a job. On the other hand, no change was observed in job search behaviours for females.

Table 11 presents the estimation results for realised labour market outcomes collected two years after graduation. First, treated females are 9 percentage points more likely to be employed within 3 months or 6 months after graduation than the control group (columns 3 and 6), while treated males are 9 or 6 percentage points less likely for the same things when compared to their counterparts estimated (column 2 and 5). Yet, none of these coefficients is precisely estimated. Treated females, on the other hand, are less likely to attain postgraduate education or training. The size of the impact is 15 percentage points and is significant.

In relation to the contract type of the employment, we see treated males are 12 percentage points less likely to be employed under stable long-term contracts and are 13 percentage points more likely to be employed under casual or short-term contracts. The estimate on long-term contract is imprecisely estimated while the effect on short-term contract is significant at the 5% level. The coefficient in female only sample are smaller though they are not statistically significant. The differences in the coefficients by gender for short-term contracts is nevertheless significant with a p-value of 0.01.

The last outcome variable we look at is earnings. Columns (4)-(6) report results on gross annual earnings in logarithm. None of the coefficient is precisely estimated, but the treatment effect for male graduates points to an unexpected negative direction, while the coefficient for female is positive.

Although the preference for the type of employment contract varies between individuals, it is fair to declare that stable long-term contracts are in general more preferred or would at least be considered as a better non-pecuniary job attribute than the casual or short-term contracts. It is quite surprising to see that male graduates who received the intervention end up with a less favourable work condition. We might get one possible explanation if we link this outcome with the significant changes found in job search behaviours, as well as the fact that little employability

skills or academic investment were observed among males. It seems that they might not take the information intervention at face value as we intended, but instead they interpreted as that the labour market is so competitive. And since that, they need to start searching earlier and secure whatever job as soon as possible, even though the job might not be ideal.

6 Robustness Check

We conduct a series of sensitivity analysis to test whether our estimates are sensitive to the exclusion of baseline outcomes and/or choice of control variables. The main conclusions remain robust.

One potential issue with our analysis is the presence of nonresponse and panel attrition of longitudinal survey data. Even though the treatment was randomised in Wave 10, the actual participation in each wave is voluntary. There are 677 students (88% of the participants in Wave 10) responded two months after the intervention in Wave 11. The number further drops to only 437 (56.7% of the participants in Wave 10) in Wave 14, which is about 28 months after the intervention. This would affect the credibility of our results in two ways.

First, if attrition is caused by the treatment, then the results on the labour market outcomes are subject to selection bias. For instance, students who received treatment could be more/less likely to participate in the later waves based on their gains/losses from the treatment and as a result, the treatment effects on outcomes collected from the later waves would be over/underestimated. We find no evidence suggesting such selection bias after regressing the conditional probability of attending Wave 14 on treatment and other stratifying variables, as shown in Table 12.

Second, nonresponse and attrition problems could render the target population being sampled with unequal probabilities. This would not be an issue if the sample selection is independent of factors that affect the outcome, as if responding to survey is compulsory. However, if nonresponse and attrition is caused by some characteristics that are correlated with the factors that affect the outcome, the sample used is endogenous. For example, graduates who have demanding jobs could be more likely to earn higher income and meanwhile less likely to respond to Wave 14, causing the estimated effect of treatment on income being biased.

One way to alleviate such attrition bias is the use of inverse probability weighting to inflate/deflate the weight for subjects who are under/over-represented due to a large number of nonresponse and attrition rate. Instead of treating all observations as equals, we vary the weight given to different observations by calculating the predicted probability of being in our analytical sample based on stratifying variables. Table 13 represents estimates obtained from inverse probability weighting estimator.

While most conclusions remain similar, our estimates tend to lose precision due to the attrition correction. We however find a clear effect on employment outcomes for males with a marked reduction in the probability of being employed on a long-term contact and a matching increase in the likelihood of being on a short-term contract.

7 Conclusion

Universities have been long criticised by the industry on graduate performance - for them mainly providing students with prefect grades but lack for skills. Graduates who possess employability skills have meanwhile grown in popularity among employers. However, whether university students are aware of these skills in demand and how to acquire these skills remains an open question. In this paper, we seek to bridge this gap in skills perception between employers and graduates through an information intervention. Using a rich dataset comprised of a longitudinal survey and administrative records, we investigate the direct effects of the intervention on skills perception. We find that the treatment results in a lower self-assessment on skills. The effects are large and significant for females but there is no similar effect for males. We identify a negative treatment effect on skills signalling rating for both groups. We also document a positive treatment effect on career events participation and academic outcomes for females only. It is however unclear through which channel female students invest to achieve better academic outcomes, as we observe no effect on the weekly study or attendance. Treated males, on the other hand, are more likely to start job hunting earlier while being less likely to work under stable or long-term contracts upon graduation.

Great heterogeneity in treatment effects by gender is observed. One possible explanation is that the heterogeneity is driven by different interpretations of the information provided during the intervention and/or a gender confidence gap. It seems that female students took it at face value and followed the advice, which is to develop employability skills and signal them well when needed. Yet, male students could have interpreted the demand for employability skills from employers as a signal of competitiveness of the labour market; and therefore, it might be advantageous to enter the labour market and secured a job as soon as possible if they believed they are already equipped with these skills.

Our findings suggests that women are less self-assured than men, which are consistent with the recently growing literature that attribute the gender pay gap to gender confidence gap. The gender confidence gap is not just observed among university students but also among economists [Sarsons and Xu, 2021]. The elusive nature of this gap is intriguing, while only limited paper in economics had analysed it. Unfortunately, we also cannot answer in this paper whether the differences observed in skills perception and investment decisions are caused by the gender confidence gap. Both questions will be worth studying in the future research.

References

G. D. A. Beaudry, P. and B. M. Sand. The great reversal in the demand for skill and cognitive tasks. *Journal of Labour Economics, 34(S1), S199-S247.*, 2016.

B. T. L. P. O. Bettinger, E. P. and L. Sanbonmatsu. The role of application assistance and information in college decisions: Results from the hr block fafsa experiment. *Quarterly Journal of Economics, 127(3), 1205–1242.*, 2012.

B. Biasi and H. Sarsons. Flexible wages, bargaining, and the gender gap, 2020. No. w27894. National Bureau of Economic Research.

B. Biasi and H. Sarsons. Information, confidence, and the gender gap in bargaining, 2021. In AEA Papers and Proceedings (Vol. 111, pp. 174-78).

Z. Bleemer and B. Zafar. Intended college attendance: Evidence from an experiment on college returns and costs. *Journal of Public Economics, 157, 184-211.*, 2018.

M. Bruhn and D. McKenzie. In pursuit of balance: Randomization in practice in development field experiments. *American economic journal: applied economics*, 1(4):200–232, 2009.

D. Card, A. R. Cardoso, and P. Kline. 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, 2016.

S. Carrell and B. Sacerdote. Late interventions matter too: The case of college coaching, 2013. NBER Working Paper 19031, National Bureau of Economic Research.

J. Casner-Lotto and L. Barrington. *Are they really ready to work? Employers' perspectives on the basic knowledge and applied skills of new entrants to the 21st century US workforce.* ERIC, 2006.

G. Castex and E. Kogan Dechter. The changing roles of education and ability in wage determination. *Journal of Labour Economics, 32(4), 685-710.*, 2014.

S. Cattan. Psychological traits and the gender wage gap. Unpublished Working Paper, Institute for Fiscal Studies, 2014.

A. P. U. Coffman, K. B. and B. Zafar. A (dynamic) investigation of stereotypes, belief-updating, and behavior, 2021. No. w29382. National Bureau of Economic Research.

D. K. F. G. F. J. R. G. G. J. L. J. Cook, P. J. and L. Steinberg. The (surprising) efficacy of academic and behavioural intervention with disadvantaged youth: results from a randomised experiment in chicago, 2014. No. w19862. National Bureau of Economic Research.

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

H. J. J. O. E. P. David. Why are there still so many jobs? the history and future of workplace automation. *Journal of economic perspectives, 29(3), 3-30.*, 2015.

D. B. E. Delavande, A. and A. Holford. Academic and non-academic investments at university: The role of expectations, preferences and constraints, 2020. Journal of Econometrics.

D. J. Deming. The growing importance of social skills in the labour market. *The Quarterly Journal of Economics, 132(4), 1593-1640.*, 2017.

K. A. Dittrich, M. and K. Leipold. Gender differences in experimental wage negotiations. *Economic Inquiry, 52(2), 862-873.*, 2014.

F. P. N. M. Edin, P. A. and B. Ockert. The rising return to non-cognitive skill, 2017. No additional details provided.

N. M. Exley, C. L. and L. Vesterlund. Knowing when to ask: The cost of leaning in. *Journal of Political Economy, 128(3), 816-854.*, 2020.

D. Goleman. *Working with emotional intelligence*. Bloomsbury, London, 1998.

J. J. Heckman and T. Kautz. Hard evidence on soft skills. *Labour economics*, 19(4):451–464, 2012.

D. Jackson and E. Chapman. Non-technical skill gaps in australian business graduates, 2012. Education+ Training.

R. Jensen. The (perceived) returns to education and the demand for schooling. *The Quarterly Journal of Economics, 125(2), 515-548.*, 2010.

M. Lechner and P. Downward. Heterogeneous sports participation and labour market outcomes in england. *Applied Economics, 49(4), 335-348.*, 2017.

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

D. McKenzie. Beyond baseline and follow-up: The case for more t in experiments. *Journal of development Economics*, 99(2):210–221, 2012.

C. W. Milner, S. and I. McGowan. Does all work and no play make a dull graduate? perceptions of extra-curricular activities and employability. *Journal of Perspectives in Applied Academic Practice, 4(1), 13-18.*, 2016.

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

T. L. H. Nghia. Developing generic skills for students via extra-curricular activities in vietnamese universities: Practices and influential factors. *Journal of Teaching and Learning for Graduate employability, 8(1), 22-39.*, 2017.

P. A. Persico, N. and D. Silverman. The effect of adolescent experience on labor market outcomes: The case of height. *Journal of Political Economy, 112(5), 1019-1053.*, 2004.

E. Reuben, P. Sapienza, and L. Zingales. Competitiveness and the gender gap among young business professionals. 2015.

N. Roulin and A. Bangerter. Students' use of extra-curricular activities for positional advantage in competitive job markets. *Journal of Education and Work, 26(1), 21-47.*, 2013.

H. Sarsons and G. Xu. Confidence men? evidence on confidence and gender among top economists, 2021. In AEA Papers and Proceedings (Vol. 111, pp. 65-68).

S. N. Siedler, T. and M. Schumann. Door opener or waste of time? the effects of student internships on labour market outcomes, 2016. No further details provided.

G. Tchibozo. Extra-curricular activity and the transition from higher education to work: A survey of graduates in the united kingdom. *Higher Education Quarterly, 61(1), 37-56.*, 2007.

D. C. G. Weisberg, Y. J. and J. B. Hirsh. Gender differences in personality across the ten aspects of the big five. *Frontiers in psychology, 2, 178.*, 2011.

Figures and Tables

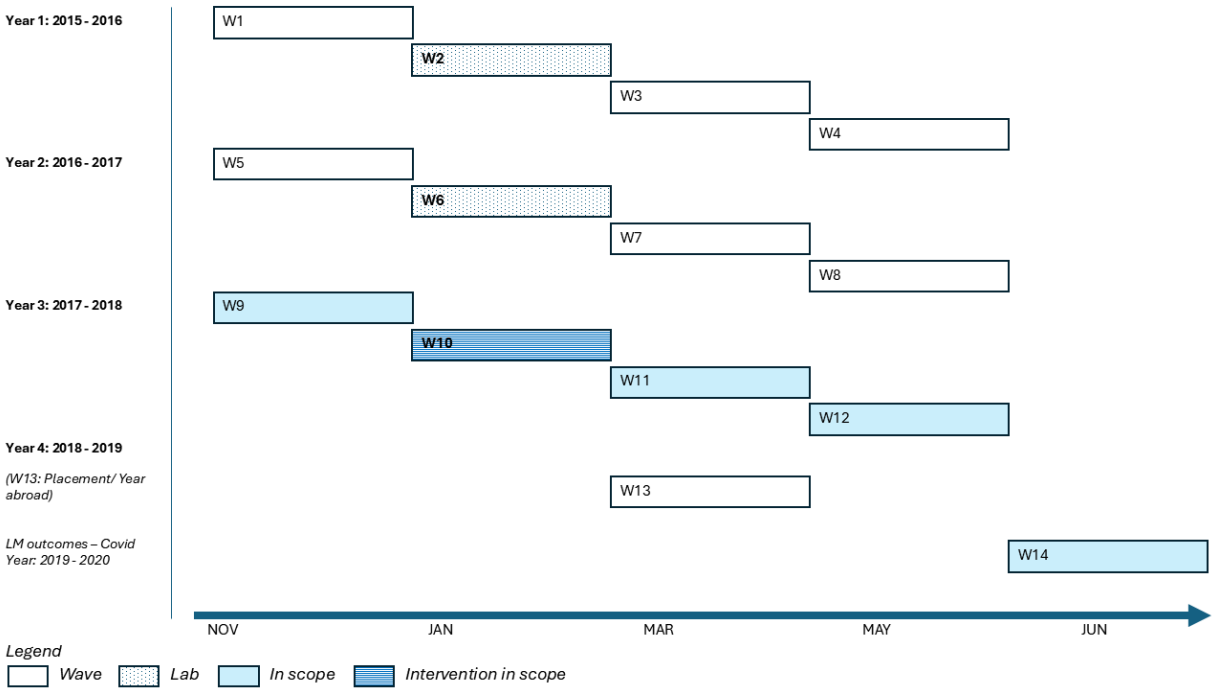


Figure 1: BOOST: Data collected across 14 waves spanning 4 academic years. Lab sessions feature interventions.

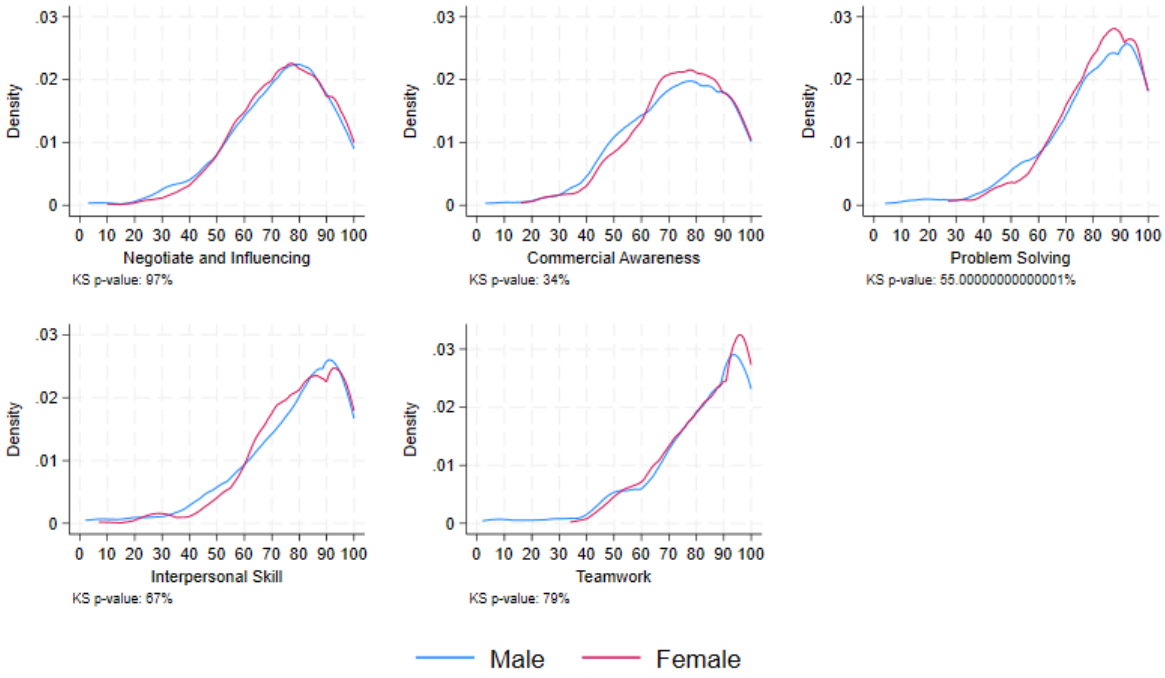


Figure 2: Skills Perception on Employers' Demand at Baseline - by Gender

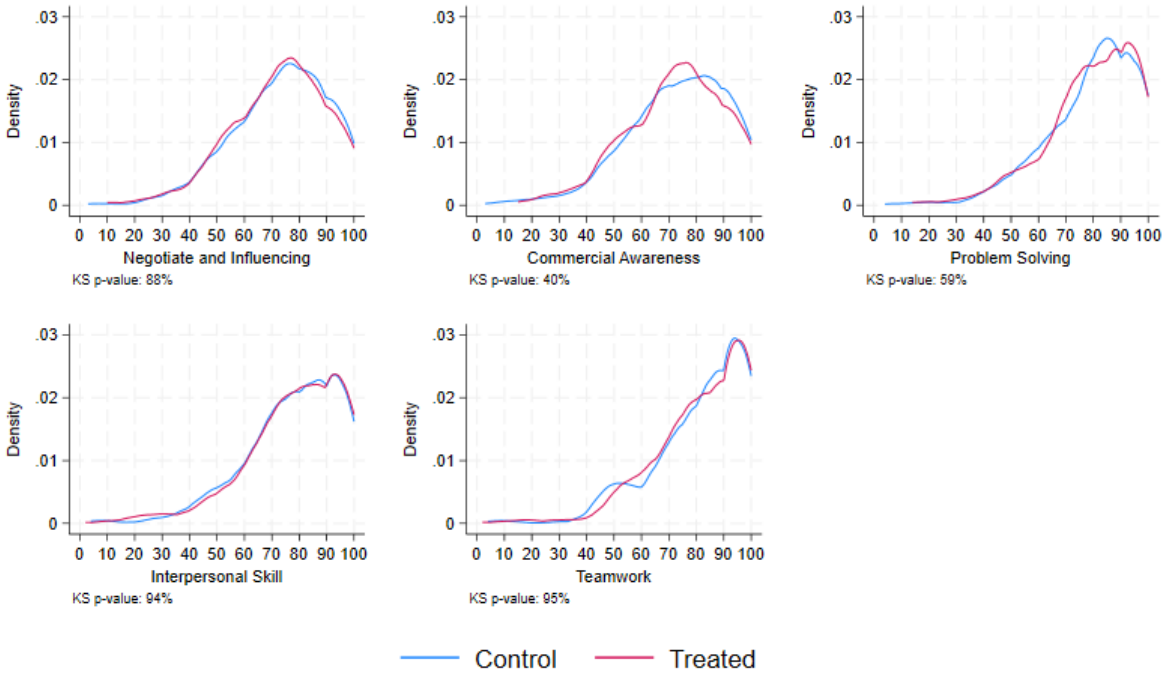


Figure 3: Skills Perception on Employers' Demand at Baseline - by Treatment

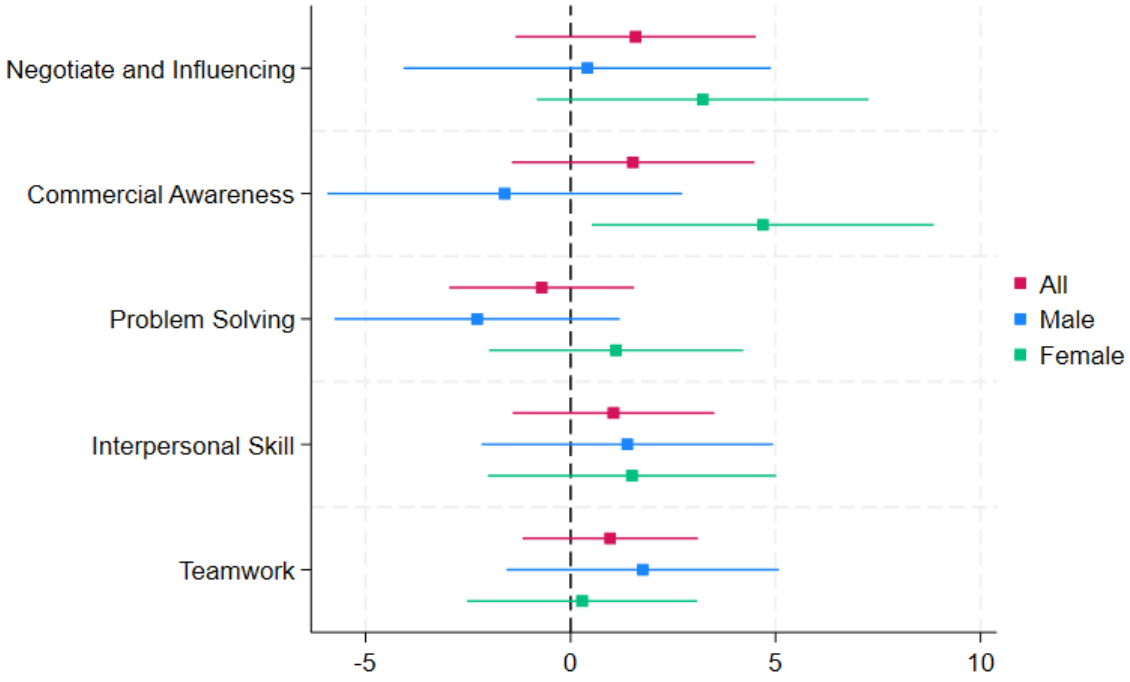
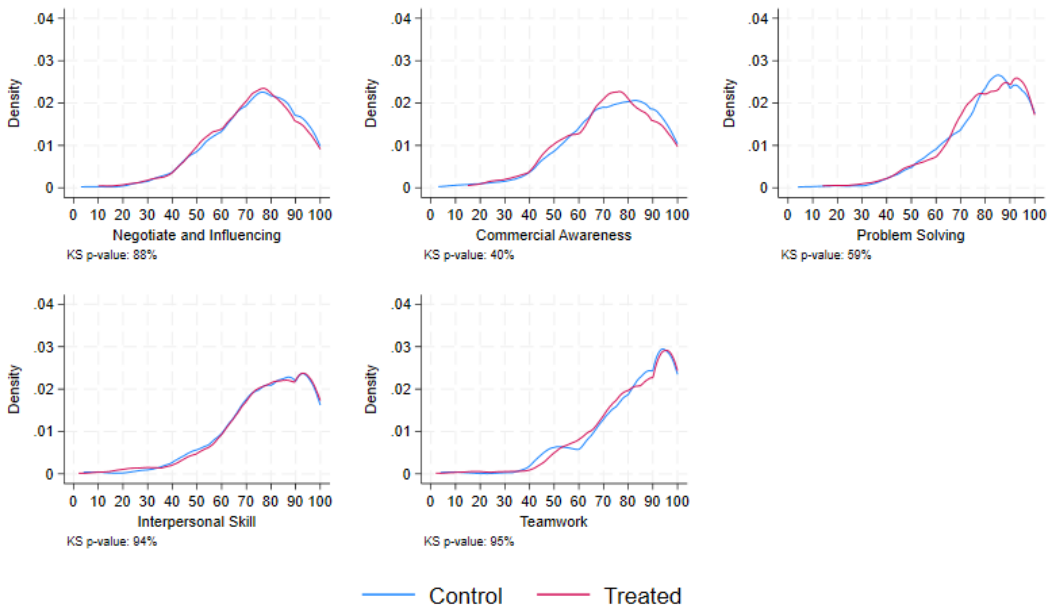
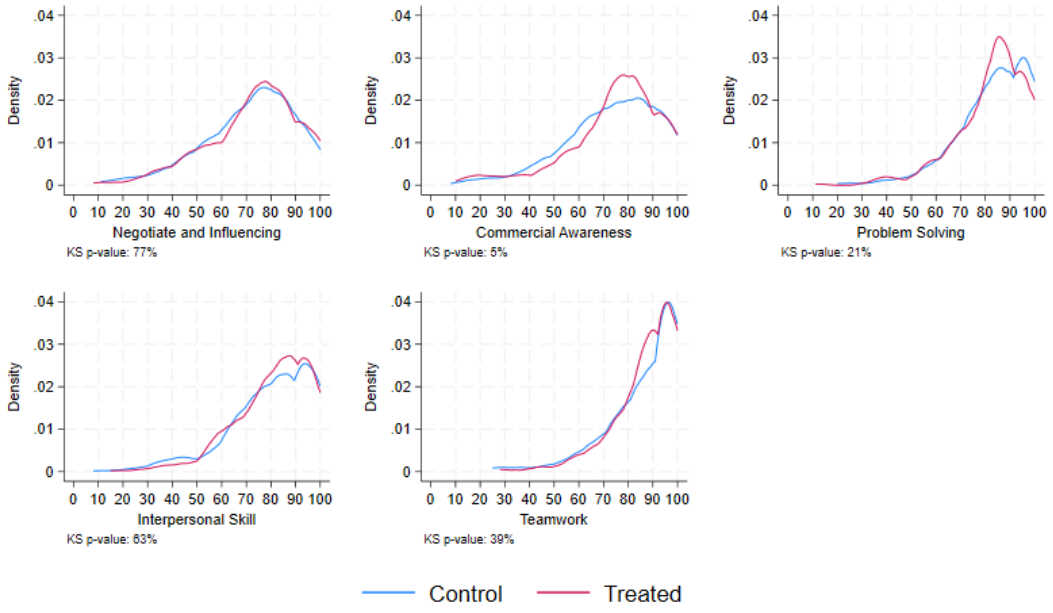


Figure 4: Treatment Effect on Rating the Importance of Skills to Employers
Note: 95% CI reported



(a) Before Treatment (Wave 9)



(b) After Treatment (Wave 10)

Figure 5: Skills Perception on Employers' Demand — Treatment and Control Before and After Treatment

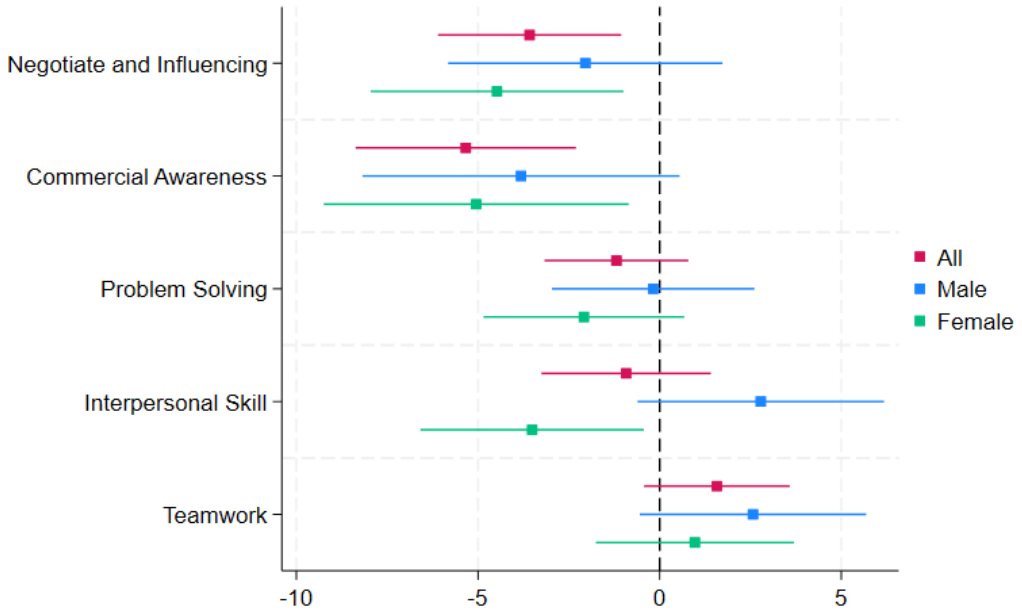


Figure 6: Treatment Effect on Self-rating on Skills
Note: 95% CI reported

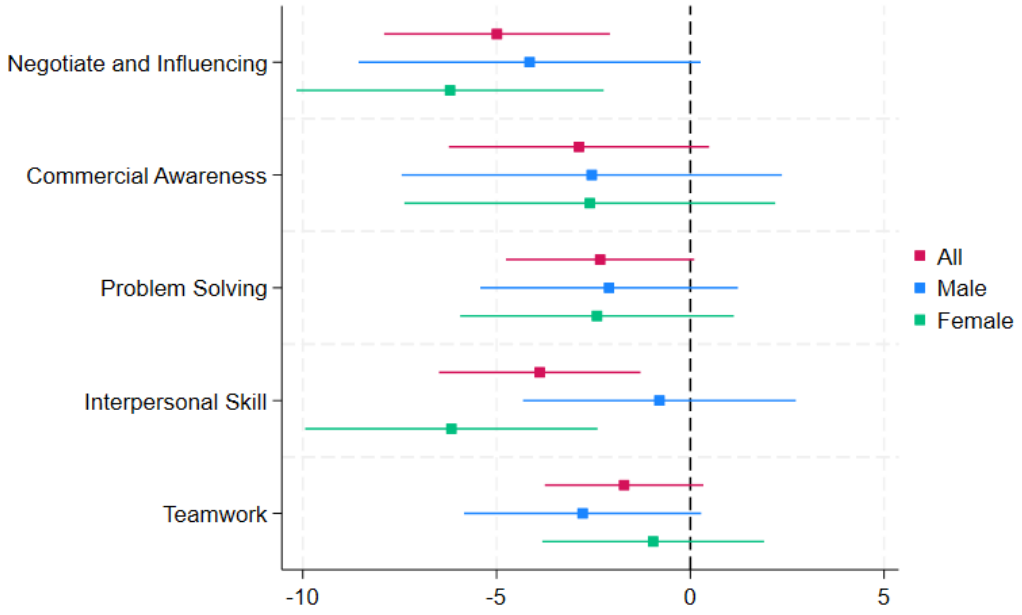


Figure 7: Treatment Effect on Self-rating on Signalling Skills
Note: 95% CI reported

Table 1: Characteristics of Participants

	(1) Entire Cohort	(2) BOOST survey	(3) BOOST in Year 3	(4) Wave 10	(5) Wave 910	(6) Wave 91011	(7) Wave 1014
Basic characteristics							
Female	0.50	0.52	0.54	0.57	0.57	0.59	0.60
Non-Mature (≤ 21)	0.90	0.92	0.92	0.94	0.94	0.94	0.95
British/ EU	0.85	0.86	0.82	0.85	0.85	0.85	0.91
White	0.59	0.57	0.54	0.54	0.55	0.56	0.56
High-SES	0.36	0.38	0.39	0.40	0.40	0.40	0.43
Low-SES	0.21	0.23	0.22	0.23	0.22	0.22	0.25
Mark (Year 1)	59.19	59.19	62.06	61.43	61.72	61.75	61.91
Tariff Quintile							
First (Lowest)	0.15	0.15	0.14	0.15	0.15	0.14	0.16
Second	0.16	0.17	0.18	0.19	0.18	0.17	0.19
Third	0.13	0.13	0.14	0.13	0.13	0.14	0.14
Fourth	0.16	0.16	0.16	0.17	0.17	0.17	0.19
Fifth (Highest)	0.15	0.15	0.14	0.15	0.16	0.15	0.14
Department							
Social Sciences	0.40	0.40	0.40	0.38	0.39	0.39	0.36
Science	0.32	0.32	0.32	0.35	0.34	0.33	0.35
Humanities	0.28	0.28	0.29	0.27	0.27	0.28	0.29
Observations	2621	2005	1046	770	677	601	437

Notes: Column (1) refers to students in the target population (enrolled). Column (2) refers to students who signed up to participate in the survey, while column (3) applies to BOOST participants who have progressed to Year 3. Columns (4)-(7) show our analytical samples. The proportion of students with missing SES is not shown here.

Table 2: Baseline Balancing

	(1) Target Population	(2) BOOST Sample	(3) p-value
Basic Characteristics			
Female	0.563	0.574	0.758
Non-Mature (≤ 21)	0.944	0.939	0.753
British/EU	0.840	0.870	0.244
High-SES	0.391	0.402	0.761
Low-SES	0.239	0.229	0.747
Tariff Quintile			
First (Lowest)	0.155	0.144	0.663
Second	0.193	0.184	0.740
Third	0.129	0.136	0.800
Fourth	0.170	0.176	0.841
Fifth (Highest)	0.165	0.138	0.302
Department			
Social Sciences	0.381	0.380	0.991
Science	0.343	0.348	0.867
Humanities	0.277	0.271	0.867
Self-rating on Skills			
Negotiate and Influencing	68.240	69.351	0.413
Commercial Awareness	63.874	64.071	0.891
Problem Solving	75.083	75.578	0.695
Interpersonal Skill	77.060	77.052	0.995
Teamwork	79.754	80.877	0.397
Average	72.802	73.222	0.688
Proportion of Employers Demanding Skills			
Negotiate and Influencing	73.517	73.714	0.882
Commercial Awareness	73.766	73.077	0.614
Problem Solving	80.111	81.031	0.462
Interpersonal Skill	78.594	80.006	0.296
Teamwork	82.809	83.280	0.709
Average	77.759	78.222	0.669
Experiences and Academic Performance			
Had experiences related to study/desired career	0.294	0.311	0.642
Had other employment/non-academic experiences	0.746	0.738	0.830
The BigE Award enrollment	0.369	0.369	0.986
Hours in experiences related to study/desired career	3.207	3.355	0.863
Hours in other employment/non-academic experiences	11.027	8.537	0.046**
Hours in the BigE Award	3.788	2.363	0.104
Number of Career Events attended[b]	0.883	0.888	0.963
Study time (Hours per week)	15.070	14.303	0.359
Attendance (%)[b]	0.655	0.645	0.507
Attendance (Hours per week)[b]	5.136	4.977	0.317
Mark (Year 1)	61.638	61.220	0.557
Observations	394	376	770

Notes: [b] indicate statistics computed using administrative data from the third year before treatment. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Table 3: Descriptive Statistics

	All	Male	Female	p-value
Panel A: Elicited Subjective Beliefs				
Proportion of employers demand skills				
Negotiate and Influencing	73.61	72.92	74.14	0.37
Commercial Awareness	73.43	72.49	74.15	0.23
Problem Solving	80.55	79.50	81.36	0.15
Interpersonal Skill	79.27	78.39	79.95	0.26
Teamwork	83.04	81.97	83.85	0.15
Average	77.98	77.05	78.69	0.14
Self-rating on skills				
Negotiate and Influencing	68.78	70.41	67.53	0.03**
Commercial Awareness	63.97	66.20	62.27	0.01***
Problem Solving	75.32	75.72	75.02	0.58
Interpersonal Skill	77.06	75.07	78.57	0.01***
Teamwork	80.30	78.08	81.99	0.00***
Average	73.01	72.91	73.08	0.88
Self-rating on signalling skills[a]				
Negotiate and Influencing	66.60	68.15	65.43	0.07*
Commercial Awareness	62.37	65.00	60.37	0.01***
Problem Solving	76.29	77.93	75.05	0.02**
Interpersonal Skill	77.4	77.24	77.57	0.79
Teamwork	85.23	84.77	85.57	0.45
Average	73.58	74.61	72.81	0.07*
Panel B: Investment in Employability Skills				
Had experiences related to study/desired career	0.30	0.26	0.33	0.06*
Had other employment/non-academic experiences	0.74	0.67	0.80	0.00***
The BigE Award enrollment	0.37	0.23	0.48	0.00***
Hours in experiences related to study/desired career	3.28	3.38	3.20	0.85
Hours in other employment/non-academic experiences	9.83	8.89	10.54	0.23
Hours in the BigE Award	3.10	1.79	4.11	0.01***
Number of Career Events attended[bc]	0.89	0.81	0.94	0.23
Observations	770	332	438	770

Continued on next page

	All	Male	Female	p-value
(Continued)				
Panel C: Academic Inputs and Outcomes				
Mark (Year 3)[c]	64.36	63.97	64.66	0.33
Degree mark[c]	63.79	63.66	63.89	0.71
First Class[c]	0.26	0.28	0.24	0.24
Upper Second Class (or above)[c]	0.75	0.75	0.76	0.73
Study time (Hours per week)	14.70	13.37	15.72	0.01***
Attendance (%)[bc]	0.65	0.60	0.69	0.00***
Attendance (Hours per week)[bc]	5.06	4.94	5.15	0.21
Observations	769	331	438	769
Panel D: Job Search and Labour Market Outcomes[d]				
Job application submitted	0.33	0.33	0.34	0.85
Job offer secured	0.10	0.09	0.10	0.52
Employed within 3 months of grad	0.68	0.69	0.67	0.78
Employed within 6 months of grad	0.77	0.77	0.77	0.96
Postgrad ed/training within 10 months	0.32	0.29	0.34	0.34
Fixed/Long-term contract	0.85	0.87	0.84	0.47
Temporal/Short-term contract	0.13	0.11	0.14	0.49
Annual gross earnings	21813.38	23703.24	20491.29	0.02**
Observations	693	291	402	693

Notes: [a] indicates data from Wave 10 lab session (after intervention). [b] indicates administrative data from the third year before treatment. [c] indicates administrative data from the third year. [d] indicates survey data from Waves 11 and 14. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Table 4: Treatment Effects on Subjective Beliefs

	(1) All	(2) Male	(3) Female
Panel A: Average rating on the importance of skills to employers			
Treatment	0.90	-0.01	2.18
	(0.99)	(1.50)	(1.37)
N	651	285	366
P-value			0.26
Panel B: Average self-rating on skills			
Treatment	-1.80**	-0.13	-2.82***
	(0.76)	(1.13)	(1.03)
N	652	286	366
P-value			0.06*
Panel C: Average self-rating on signalling skills			
Treatment	-3.14***	-2.49*	-3.64***
	(0.98)	(1.39)	(1.41)
N	744	324	420
P-value			0.54

Notes: All regressions control for basic characteristics and stratification variables. Panel A and B refer to students who attended both Wave 10 and 9 (Wave 9 baseline). Panel C includes only students who attended Wave 10 (no baseline). P-value reports test of equality of coefficients across genders. *, **, and *** denote statistical significance at the 10%, 5%, and 1%.

Table 5: Treatment Effects on Employment-Related Outcomes

	(1) All	(2) Male	(3) Female
Panel A: Study/Desired Career Related Experience			
Treatment	-0.00	-0.07*	0.03
	(0.03)	(0.04)	(0.04)
N	577	242	335
P-value			0.05**
Panel B: Other Employment/Non-Academic Experience			
Treatment	-0.06	-0.07	-0.04
	(0.04)	(0.06)	(0.05)
N	577	242	335
P-value			0.68
Panel C: The BigE Award Enrollment			
Treatment	0.05*	0.04	0.06
	(0.03)	(0.04)	(0.04)
N	577	242	335
P-value			0.67

Notes: All regressions control for basic characteristics and stratification variables. Sample includes respondents from Wave 10 who also participated in both Wave 9 (baseline) and Wave 11 (outcomes). P-value refers to test of equality of coefficients across genders. *, **, and *** denote statistical significance at the 10%, 5%, and 1%.

Table 6: Treatment Effects on Employability Investment (Hours)

	(1) All	(2) Male	(3) Female
Panel A: Career-Study Experiences			
Treatment	0.12	-1.43	0.74
	(0.58)	(1.26)	(0.49)
N	577	242	335
P-value			0.08*
Panel B: Other Employment/Non-Academic Experience			
Treatment	0.25	-2.17	1.98
	(1.37)	(1.61)	(2.14)
N	577	242	335
P-value			0.10*
Panel C: The BigE Award Enrollment			
Treatment	-0.56	-0.12	-0.92
	(0.74)	(1.05)	(0.95)
N	575	242	333
P-value			0.54

Notes: All regressions control for basic characteristics and stratification variables. Sample includes Wave 10 participants who also responded in both Wave 9 (baseline) and Wave 11 (outcomes). P-value refers to test of equality of coefficients across genders. *, **, and *** denote statistical significance at the 10%, 5%, and 1%.

Table 7: Treatment Effects on Career Events

	(1) All	(2) Male	(3) Female
Treatment	0.07	-0.15	0.27**
	(0.09)	(0.12)	(0.13)
N	744	324	420
P-value			0.01***

Notes: All regressions control for basic characteristics and stratification variables. Sample refers to students who received treatment in Wave 10. Baseline is the number of career events attended in the third year (2017/18), prior to treatment. P-value tests equality of treatment effects across genders. *, **, and *** denote statistical significance at the 10%, 5%, and 1%.

Table 8: Treatment Effects on Academic Outcomes

	(1) All	(2) Male	(3) Female	(4) All	(5) Male	(6) Female
	Year 3 Mark			Degree Mark		
Treatment	0.44	-0.29	1.10*	0.44	-0.28	1.08*
	(0.57)	(1.08)	(0.66)	(0.45)	(0.81)	(0.55)
N	715	310	405	717	310	407
P-value			0.25			0.14
	(7) All	(8) Male	(9) Female	(10) All	(11) Male	(12) Female
	First Class			Upper Second Class or Above		
Treatment	0.05*	0.01	0.08**	-0.01	-0.05	0.02
	(0.03)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)
N	717	310	407	717	310	407
P-value			0.18			0.22

Notes: All regressions control for basic characteristics, stratification variables, and Year 1 marks. Sample refers to students who received treatment in Wave 10. P-value refers to test of equality of coefficients across genders. *, **, and *** denote statistical significance at the 10%, 5%, and 1%.

Table 9: Treatment Effects on Attendance and Study Hours

	(1) All	(2) Male	(3) Female
Panel A: Attendance (%)			
Treatment	-0.02	-0.03	-0.01
	(0.01)	(0.02)	(0.01)
N	743	323	420
P-value			0.36
Panel A: Attendance (%) — Alternative Cutoff			
Treatment	-0.01	0.01	-0.03
	(0.01)	(0.02)	(0.02)
N	743	323	420
P-value			0.17
Panel B: Attendance (Hours per Week)			
Treatment	-0.02**	-0.03*	-0.01
	(0.01)	(0.02)	(0.02)
N	743	323	420
P-value			0.24
Panel B: Attendance (Hours per Week) — Alternative Cutoff			
Treatment	-0.02	0.00	-0.03*
	(0.01)	(0.02)	(0.02)
N	743	323	420
P-value			0.24
Panel C: Study Hours per Week			
Treatment	-0.02	0.83	-0.31
	(0.84)	(1.12)	(1.26)
N	573	241	332
P-value			0.47

Notes: All regressions control for basic characteristics and stratification variables. Sample refers to Wave 10 students unless otherwise noted. Cutoff dates: Panel A and B use 22/01/2018 (first lab day), while the alternative uses 10/02/2018 (last lab day). Panel C includes students from Waves 9, 10, and 11. P-value reports test of equality of coefficients across genders. *, **, and *** denote statistical significance at the 10%, 5%, and 1%.

Table 10: Treatment Effects on Job Applications and Secured Jobs

	(1) All	(2) Male	(3) Female	(4) All	(5) Male	(6) Female
	Job Application Sent			Job Offer Secured		
Treatment	-0.00	0.11*	-0.08	0.03	0.06*	0.01
	(0.04)	(0.06)	(0.05)	(0.02)	(0.04)	(0.03)
N	629	260	369	629	260	369
P-value			0.01			0.22

Notes: All regressions control for basic characteristics and stratification variables. Sample includes students in Waves 10 and 11. P-values refer to tests of equality of treatment effects across genders. *, **, and *** denote statistical significance at the 10%, 5%, and 1%.

Table 11: Treatment Effects on Employment Outcomes

	(1) All	(2) Male	(3) Female	(4) All	(5) Male	(6) Female
	Employed within 3 Months			Employed within 6 Months		
Treatment	0.02	-0.09	0.09	0.02	-0.06	0.09
	(0.04)	(0.08)	(0.06)	(0.04)	(0.07)	(0.05)
N	419	171	248	419	171	248
P-value			0.06*			0.07*
	(7) All	(8) Male	(9) Female	(10) All	(11) Male	(12) Female
	Fixed / Long-term Contract			Casual / Short-term Contract		
Treatment	-0.06	-0.12	-0.02	0.03	0.13**	-0.04
	(0.04)	(0.08)	(0.06)	(0.03)	(0.05)	(0.05)
N	383	157	226	383	157	226
P-value			0.26			0.01***
	(13) All	(14) Male	(15) Female	(16) All	(17) Male	(18) Female
	Post-Education Training			Gross Annual Earnings (log)		
Treatment	-0.06	0.02	-0.15**	0.01	-0.06	0.10
	(0.04)	(0.07)	(0.06)	(0.06)	(0.09)	(0.08)
N	419	171	248	380	159	221
P-value			0.05**			0.17

Notes: All regressions control for basic characteristics and stratification variables. Sample refers to students in Waves 10 and 14. P-values report tests of equality of coefficients across genders. *, **, and *** denote statistical significance at the 10%, 5%, and 1%.

Table 12: Treatment Effects on Attrition

	(1)	(2)
	Probability of Being in Wave 14	
Treatment	0.01	0.05
	(0.04)	(0.06)
Treatment × Female		-0.08
		(0.07)
N	744	744

Notes: Estimates are obtained from regressing the conditional probability of attending Wave 14 on treatment status, gender, their interaction, and stratification controls. *, **, and *** denote statistical significance at the 10%, 5%, and 1%.

Table 13: Treatment Effects Using Inverse Probability Weighting (IPW)

Outcome	All	Males	Females
Panel A: Outcomes Collected in Wave 11			
Study/Desired Career Related Experience	-0.001	-0.054	0.026
	(0.024)	(0.036)	(0.033)
Other Employment/Non-Academic Experience	-0.045	-0.023	-0.045
	(0.039)	(0.062)	(0.048)
The BigE Award Enrollment	0.052	0.068	0.038
	(0.037)	(0.052)	(0.051)
Study/Desired Career Related Experience (Hours)	0.029	-1.086	0.759
	(0.534)	(1.069)	(0.535)
Other Employment/Non-Academic Experience (Hours)	-0.045	-0.023	-0.045
	(0.039)	(0.062)	(0.048)
The BigE Award (Hours)	-0.871	0.015	-1.480
	(0.711)	(1.023)	(0.983)
Study Hours per Week	-0.400	0.093	-0.619
	(0.939)	(1.297)	(1.287)
Job Application Sent	-0.015	0.074	-0.077
	(0.037)	(0.059)	(0.048)
Job Offer Secured	0.021	0.052	0.002
	(0.024)	(0.032)	(0.032)
Panel B: Outcomes Collected in Wave 14			
Employed within 3 Months After Graduation	0.016	-0.069	0.082
	(0.044)	(0.067)	(0.059)
Employed within 6 Months After Graduation	0.023	-0.045	0.069
	(0.039)	(0.060)	(0.055)
Fixed/Long-term Employment	-0.051	-0.159***	0.040
	(0.034)	(0.046)	(0.043)
Casual/Short-term Employment	0.028	0.145***	-0.064
	(0.032)	(0.043)	(0.042)
Post-Education Training	-0.068	0.016	-0.127**
	(0.043)	(0.067)	(0.058)
Gross Annual Earnings (log)	0.010	-0.087	0.110
	(0.061)	(0.084)	(0.078)

Notes: ATE estimates obtained using inverse probability weighting (IPW). Standard errors in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 14: Treatment Effects on Wave 10 Group Assignment

	(1)	(2)
	Probability of Being Assigned to Wave 10 Group	
Assigned to Wave 10 Lab Session Group	0.01	0.01
	(0.03)	(0.04)
Female $\times$ Wave 10 Group Assigned		0.00
		(0.05)
N	1462	1462

Notes: Estimates are obtained by regressing the probability of assignment to the Wave 10 group on gender, assignment status, and their interaction, controlling for stratifying variables. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

A Appendix - incomplete

A.1 Treatment video - transcript

"So the degree of graduate studies isn't really important at all. We take you from any degree discipline, and the reason for that is we are looking for a diverse organisation. We are looking for people to bring lots of different perspectives to that work and that means we want people that are studying a wide variety of different topics. The key is to get a good degree grade, and so to be getting a 2:1 degree in any subject is absolutely what we are looking for. The skills that students need to be developing beyond their academics whist at university as things like getting some work experience perhaps, doing some work with some societies or clubs while at university and that could be sports societies, cultural societies and it doesn't have to be related to the job they want to go into. It's more about developing their abilities and their skills through doing other things and that what we are looking for. So work experience is becoming more and more important to student these days. A lot of competition for jobs and having a bit of insight into business before they join an organisation is really really helpful, especially develop that commercial awareness that we are looking for. And that work experience doesn't have to be related to the workplace they are joining and certainly in my own experience I had worked in factories, as a waitress in a bar. Nothing related to the office environment at all. What it does teach you is a lot of skills that you can transfer to the workplace. Things like dealing with customers, dealing with difficult situations, thinking on your feet and working in teams, training and developing other people and all of those skills are really useful in any work environment so it can be really related to the new job that they apply to."

A.2 BigE Award - message in intervention

"The BigE Award is the University's Employability Award. The award will recognise the activities that you have completed by providing you a verified certificate that employers can see. It aims to help identify the skills you've developed over your time at university so that you can show future employers why they shou hire you. It provides you a chance to showcase these skills by having concrete examples when employers ask you in an interview: "Tell me about a time when you showed the ability to ... negotiate or work in team," such as when you've: Gained interpersonal skills by being a mentor. Gained negotiating skills by being a faculty convenor. Gained commercial awareness by taking part in a crowdfunding project. Gained teamwork skills by helping to organise a big event"