

**Falling at the first hurdle: Undergraduate students' readiness to navigate the graduate recruitment process.**

**Author Note**

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## **Abstract**

Making the transition from university to employment is a challenging process for many students. One common method used by recruiters to sift through graduate applications is the use of psychometric tests which typically consist of numerical and verbal reasoning tasks. To explore how frequently these tests are used by graduate employers, an audit of the Times Top 100 graduate schemes selection processes was conducted. To identify how well-prepared students are to navigate these assessments, an experiment tested whether 169 undergraduate finalist students can pass either a verbal or numerical reasoning test. Two one-sample t-tests show that more than 50% of students failed the verbal and numerical reasoning tests (53.53% vs 83.57%). The only predictor of an increased likelihood of passing the numerical reasoning tests was having previous experience with those tests. This study highlights that more training needs to be given to help students navigate two common selection methods.

**Keywords:** Career Development, Psychometric Tests, Numerical Reasoning, Verbal Reasoning, Career Services.

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## 1. General Introduction

In many developed countries like the United Kingdom (UK), Australia and the United States of America (USA) there has been a large increase in the number of graduates in the workforce over the last decade (Office for National Statistics 2017; Brundage 2017; Australian Bureau of Statistics 2017; OECD 2018). More graduates in the workforce means increased competition for graduate jobs with more applications per vacancy (High Fliers 2018a, 2019) and this presents a challenge to employers in terms of how they can efficiently identify a small number of candidates that will be a good fit for the organisation (Carless 2007). One solution favoured by employers is the use of psychometric tests, typically in the form of numerical or verbal reasoning tests since these allow a large number of candidates to automatically be rejected from the selection process (Branine 2008). This study aims to a) find out how frequently these tests are used in graduate schemes, b) objectively assess how well-prepared finalist students are to pass common psychometric tests and c) identify what factors predict increase likelihood of passing. To the best of the authors' knowledge, no previous work has measured how prepared finalist students are for psychometric tests nor are we aware of research that explores predictors of successful completion of psychometric tests. This research is of vital importance to current students looking to gain employment (Kandiko and Mawer 2013) and also to universities since employment metrics play a key part in university league tables like the Global University Employability Ranking (Times Higher Education 2018), the *Quacquarelli Symonds World University Rankings (QS Top Universities 2014)*, or the *Centre for World University Rankings (Center for World University Rankings 2019)*. In the following literature review we provide an overview how employers select candidates for graduate schemes, how universities are attempting to assist students with their employability prospects and then introduce the current study.

## 2. Literature Review

### How are employers selecting graduates?

A range of selection methods are commonly employed by recruiters, for instance, online application forms, interviews, psychometric tests, assessment centres etc., to help them differentiate between job candidates (e.g., Talent Planning survey, CIPD 2017). Perhaps the most common selection method employed by organisations (Macan 2009), is the interview because it preferred by Human Resource practitioners (Steiner & Gilliland 1996; Topor, Colarelli & Han 2007) and candidates perceive it as being a fair selection method (Hausknecht, Day & Thomas 2004). Regardless of country or occupation the interview is the most likely selection method to be employed in the recruitment process and is often crucial to determining a candidate's chances of being recruited (Wilk and Peter 2003). Despite this, however, a number of studies over the course of the last 100 years have identified potential issues with the interview as the primary form of selection. For instance, studies have identified that interviews have the potential to be biased by the interviewers' own perceptions (e.g., Baxter et al. 1981; Arvey and Campion 1982) and that interviews may well lack reliability and validity in determining the candidate most suitable for the job (e.g., Ulrich and Trumbo 1965; Macan 2009). In light of this many organisations have sought to employ additional methods alongside the interview in order to more accurately identify candidates who would be best suited to the job. The additional method most commonly employed in the last 40 years or so has been the completion of psychometric tests which typically consist of cognitive ability tests and personality tests (Keenan 1995; Jenkins 2001; Branine 2008). Indeed, in many cases the successful completion of these tests is paramount to proceeding to the interview stage and these tests appear to be increasingly common. Notably a survey by Branine, (2008) of 326 UK firms revealed that upto 72% employed cognitive tests as part of the application process and even lower estimates have identified that approximately just

under half of companies surveyed employed cognitive ability tests. For instance, a survey by Carless, of 50 Australian companies, revealed that 40% of these companies employed cognitive tests as a selection method.

The uptake in usage of these methods by large companies appears sensible as performance on these tests has been identified as one of the most valid predictors of overall job performance (Hunter and Hunter 1984; Schmidt and Hunter 1998; Hunter and Schmidt 2004; Bertua, Anderson, and Salgado 2005). In a review of available meta-analyses Schmidt and Hunter (1998) revealed that “general mental ability” (GMA), often tested by tasks such as cognitive ability tests, had the highest predictive validity ( $r = .56$ ) of overall performance in job training programs out of 10 selection methods, including employment interviews ( $r = .35$ ), conscientiousness tests ( $r = .30$ ) and peer ratings ( $r = .36$ ). These authors also noted that the three combinations of selection methods which had the highest validity and utility for job performance each involved GMA. For instance, GMA and integrity test had a mean predictive validity of .65, whilst GMA and a work sample test and GMA and a structured interview both had a mean validity of .63. The inclusion of these tests also has a number of additional benefits alongside their predictive validity. For example, these tests are cost and time effective relative to other forms of selection methods such as interviews and assessment centres, they are accessible, with mobiles increasingly being used to complete online psychometric tests (e.g., Illingworth, Morelli, Scott & Boyd, 2015), and they can be used to predict performance in candidates whom have little relevant work experience for the job which they have applied for (Ree and Earles 1992). This latter point is of particular relevance to graduates as it is often the case that they may lack relevant work experience for the job.

Given the high validity and utility of these tests it is important to consider what they consist of. Typically, most cognitive tests contain numeracy, verbal and abstract or logical reasoning questions (Bertua, Anderson & Salgado, 2005), thus reflecting the importance of

these skills to employers. Notably, numeracy and verbal reasoning appear to be of particular importance to employers. For instance, Durrani and Tariq (2012) conducted an online survey with 165 employers which revealed that numeracy tests are often an essential component to employers' selection methods and are crucial in order to gain employment regardless of the candidate's prior subject discipline. The authors also note that despite employers citing numeracy skills and tests as being vital to successfully gaining employment, only 1 in 5 students were aware of the tests commonly employed by organisations to measure numeracy abilities. Graduates' verbal reasoning and communication skills also appear to be of key importance for employers. For instance, Andrews and Higson (2008) conducted fifty semi-structured interviews across four countries (Austria, Romania, Slovenia and the United Kingdom). Thirty of these interviews were conducted with business graduates whilst the remaining twenty were conducted with employers. Both employers and graduates agreed upon the central role of verbal and communication skills in determining graduate employment, with the authors noting that communication skills were the most important generic competency required of graduates. Thus, given the above it is clear that numeracy and verbal reasoning skills are important to employers and likely to be the primary psychometric tests employed by organisations. Just how frequently these specific tests form part of the cognitive ability or psychometric tests employed by organisations is unclear. Although previous audits have identified the usage of psychometric or cognitive ability tests, the content of these tests is also important to consider. As such, the first aim of the current research is to identify how frequently numerical and verbal reasoning tasks are indeed used as part of the psychometric tests employed by graduate employers. In particular, in order to identify the frequency of these tests, an audit of the United Kingdom's Times Top 100 Graduate Employers will be performed and relevant information relating to the type of cognitive tests applicants will be required to complete will be recorded. This information will

be invaluable to universities and graduates to help them prepare for the graduate recruitment process.

### **How are universities currently attempting to improve employability?**

Universities' strategy to employability can be crudely categorised into three models: an embedded approach, a bolt-on approach or a parallel approach to employability (Cranmer 2006). An embedded approach involves placing the teaching of employability at the heart of learning and teaching policies, processes and practices within the curriculum of a course (Higher Education Academy 2015). This ideally occurs throughout a student's course of study at university involving multiple stakeholders: academics, careers services, support staff, students and the students' union. A bolt-on approach is where employability related modules are attached to the curriculum of course and tend to encourage the development of specific and generic employability skills (Cranmer 2006; Pegg et al. 2012). Parallel development is markedly different than the other two approaches as it places the learning and teaching of employability outside the curriculum either within the purview of the careers and employability services or within award programmes that are in addition to a student's degree program (Cranmer 2006).

Bradley, Quigley and Bailey, (2019) showed that the majority of UK psychology departments have a parallel approach to employability with low levels of engagement with the careers service. Andrews and Russell (2012) also found that despite the career services best efforts, students' knowledge of the events they regularly ran was poor indicating a lack of engagement by some students with the careers service. These findings are puzzling since many university career services offer excellent resources to help students navigate employers' recruitment process (i.e. workshops on CV's, applications, interviews and psychometric tests etc.). This is a cause of concern for universities since according to

Bridgstock's (2009) Career Management for Maximum Employability model an essential feature of graduate employability is the ability to develop these career building skills.

Bridgstock (2009) defines career building as the student's ability to find information about careers, develop labour market knowledge and be able to locate, apply, secure and maintain work. Thus, an essential feature of Bridgstock's (2009) career building skills is the ability to effectively apply, and obtain work which means being able to navigate successfully a typical graduate selection process including psychometric tests. Yet according to Bradley, Quigley, and Bailey (2019) and Andrews and Russell (2012) many students may well be missing out on developing those important career building skills. One possible reason that engagement with these careers services is low could be because students already have the knowledge and skills to navigate the recruitment process or have accessed information from other resources via the internet, and therefore, they do not need to rely upon the resources provided by the careers service. To explore this explanation, we tested students on their ability to pass two types of psychometric tests that assess skills which employers deem crucial in the recruitment process: verbal and numerical reasoning.

### **Current Study**

The present research has three aims. First, to review the frequency with which graduate recruiters utilize psychometric tests within their selection process. To explore this question an audit of the top 100 recruiters listed in the Times Top Hundred Graduate Employers was conducted. The second aim explores how prepared psychology undergraduate students are to complete these tests, with participants in Study 1A completing a verbal reasoning test, and participants in Study 1B completing a numerical reasoning test. We predict that the majority, more than 50%, of students will fail the verbal and numerical reasoning tests, particularly given that the majority of students are unaware that organisations employ these tests (Durrani & Tariq, 2012). The third aim looks at what factors predicted

passing or failing the psychometric tests. We predict that prior experience of psychometric tests will predict an increased likelihood of passing verbal and numerical reasoning tests.

### **Audit of Top Graduate Employers**

An audit of 100 graduate employers within the UK was conducted in order to identify the popularity of different selection techniques within the application processes used by employers. Each employer's recruitment website was accessed to identify and record whether or not they employed psychometric or cognitive ability tests and whether they specified what these tests consisted of (i.e., numerical or verbal reasoning tasks). The 100 graduate employers selected were those featured in The Times Top 100 Graduate Employers guide 2018-19, which is an annual guide that collates and ranks the UK's 100 most in-demand graduate employers (The Times 2018). The guide was created by asking 19,147 finalists in the summer of 2018 "which employer do you think offers the best opportunities for graduates?" (The Times 2018). This question was open-ended with the student being shown no list of employers at any point during the interview. The finalists named more than 1,500 different organisations that varied from small local businesses to multinational companies. The resulting list of the Top 100 graduate employers represents those recruiters that finalists' mentioned most when responding to the above question (i.e., which employer do you think offers the best opportunities for graduates?). The Times Top 100 Graduate Employers is a good list to audit as it clearly represents a large list of popular organisations that finalist students are interested in applying to. Notably, graduate recruiters in the 2017-2018 Top 100 Graduate Employers list received around 40 applications per vacancy in that recruitment season.

The audit revealed that 53 employers explicitly stated that they employed psychometric tests or 'online tests' measuring cognitive abilities, including numeracy, verbal,

and logical reasoning tasks, situational judgement tasks and personality/behavioural tests. All 53 employers which stated that cognitive tests or online tests formed part of the application process, identified numerical reasoning tasks as a component of these tests. In addition, 39 of the 53 employers (73.5%) who explicitly stated the use of online tests or tests of cognitive ability employed verbal reasoning tests. Abstract or logical reasoning were noted as forming part of the tests by 28 of the 53 employers, perhaps highlighting employers' focus on numerical and verbal reasoning skills. It is also worth noting at this point that the number of employers using psychometric tests is likely to be higher than the reported figure here, as often insufficient information was available from employers to determine if a successful application would result in psychometric tests being required at a subsequent stage (i.e. an employer may not report these details on their website but still use the tests). Regardless, it is clear that employers are using cognitive tests to help select candidates in a competitive job market and they are often using psychometric tests to help them in their selection processes.

### **Study 1a and Study 1b**

The results of the audit indicate that just over half (53 organisations) of the Times Top 100 Graduate Recruiters use numerical reasoning tests and 39 organisations used verbal reasoning tests. These tests clearly play an important role in the initial stages of the graduate selection process in reducing the potential pool of candidates to a feasible number to interview and test at assessment centres (Jenkins 2001; Bartram and Dave 2008). Studies 1A and 1B identify how prepared our psychology undergraduate students are to take and pass these tests. Previous research has shown that many students are unaware and do not engage with a wide range of services offered by the Career Services such as application, psychometric, interview and assessment workshops (Andrews and Russell 2012; Bradley, Quigley, and Bailey 2019). In studies 1A and 1B we explore whether the majority of our students can pass these commonly used psychometric tests and what predicted the likelihood

of passing these tests.

### **3. Method**

#### **Participants**

Study 1A comprised of eighty-four third year undergraduate psychology students. The sample contained seventy (83%) females and had an average age of 20.57 (SD = 1.07). Seventy-one (84.5%) participants were native English speakers with 38.10% studying English up to General Certificate of Secondary Education (GCSE) level, and 61.90% up to Advanced Subsidiary level (AS) or Advanced level (A-level) or equivalent. 27% had some prior exposure to psychometric tests used in recruitment although this is not specific to verbal reasoning tests so this number could include numeracy, situational judgement test or personality tests. Study 1B comprised of eighty-five third year undergraduate psychology students. The sample had an average age of 20.82 (SD = 1.20) with seventy-seven (90.6%) females participating. Fifty-nine participants had taken Maths to GCSE level (69.4%), 4 (4.7%) to AS levels and 22 (25.9%) to A Level. On this occasion, we refined our prior experience of psychometric test to those who had prior experience of numeracy tests of which only 14 out of 85 (16.5%) had.

#### **Design**

A cross-sectional correlation design was used for both study 1A and 1B. In Study 1A a verbal reasoning test was used and in Study 1B a numerical reasoning test was used with both tests being sourced from Graduate First; a well-known psychometric test consultancy firm (Graduate First 2007). Both studies used the same two dependent variables: scores on psychometric test and number of pass/fail on the psychometric tests. Predictors of passing or failing varied slightly between studies to better capture the potential factors influencing performance on verbal or numerical reasoning tests. For example, high levels of maths

anxiety are likely to negatively affect performance on maths tests but it is unlikely to influence scores on a verbal reasoning test. Alternatively, vocabulary size might affect performance on verbal reasoning tasks, but not numerical reasoning tasks. The main predictors in Study 1A were age, gender, highest education level in English (GCSE, and A-Level), native English Speakers (Yes, No), vocabulary size (sum score on Schmitt, Schmitt, & Clapham, (2001) Vocabulary Levels Test) and prior experience of psychometric tests (Yes, No). The main predictors of passing in Study 1B were age, gender, highest education level in maths (GCSE, AS-Level and A-Level), maths anxiety (sum score of Hopko, Mahadevan, Bare, & Hunt, (2003) Abbreviated Maths Anxiety Scale) and prior experience of numerical psychometric tests.

## **Procedure**

All participants were fully informed about the nature of the study and were asked to consent before participating. Participants in studies 1A and 1B took an online psychometric test. Participants in study 1A took a verbal reasoning test lasting 12 minutes with a total of 24 questions to complete. The test contained 5 textual passages that the participant read and then they had to decide whether a series of statements relating to that passage is either true, false or cannot say. In study 1B, participants took a 15-minute numerical reasoning test with a total of 20 questions to complete. The test consisted of 5 graphs/tables used to assist them in choosing the correct answer to a series of questions. Each question had five answers to choose between. Participants were encouraged to use calculators when required. After participants completed the psychometric test they were asked to complete a short questionnaire capturing demographic (age, gender, education level on English/Maths) and control factors (i.e. maths anxiety, vocabulary scores and prior experiences of psychometric tests).

## 4. Results

The data was analysed in Rstudio's version 1.1.453 using R version 3.5.0. The analysis script and datasets are available from the Open Science Framework (OSF) at: [Link to be made public on acceptance.](#)

### Study 1A

#### Do the majority pass?

A pass was defined by Graduate First, (2007) as a raw score equal to 12 correct answers (out of 24 questions) which would place you in the 33<sup>rd</sup> percentile of those that had taken the test. The mean average score for our sample of participants on the verbal reasoning test was 11.25 (SD = 2.76) which is below the pass mark. A one sample t-test showed there was a significant difference between the average mark and the pass mark ( $t(83) = -2.49, p = 0.015$ ) with the majority failing the test (45 out of 84; 53.57%).

#### What factors predict passing?

A binary logistic regression was conducted to identify if age, gender, native English speakers, highest level of English qualification, vocabulary size or prior testing experience (all types of psychometric tests) predicted passing the verbal reasoning test. The overall model was non-significant compared to the null model ( $\chi^2(6) = 9.71, p = .137$ ) suggesting none of these predictors accounted for much of the likelihood in failing or passing the test (see Table 1). Although, vocabulary size was a significant predictor of passing or failing (OR = 1.69,  $p = 0.046$ ) with those with high vocabulary scores being more likely to pass the test.

### Study 1B

#### Do the majority pass?

For the numeracy test Graduate First, (2007) defined a pass as a raw score of 8 correct

answers (out of 20 questions) which equates to being in the 33<sup>rd</sup> percentile of those that have already taken the test. The average score on the test was 5.85 correct answers (SD = 1.74) which is below the required pass mark. A one sample t-test indicated that there was a significant difference between the average mark and the pass mark ( $t(84) = -11.43, p < 0.01$ ) with the majority of participants failing the test (71 out of 85; 83.53%).

### **What factors predict passing?**

A logistic regression was conducted to explore whether age, gender, highest level of maths qualifications, maths anxiety and prior testing experience (specific to the experience of numeracy tests) predicted an increased likelihood of passing. The overall model was a better fit than the empty model ( $\chi^2(6) = 19.18, p < .001$ ) with prior testing experience as the only significant predictor (OR = 11.53,  $p < .01$ ) (see Figure 1). This finding suggests that those who had previous experience of online numeracy tests had increased odds of passing the numerical reasoning test by 11.53 (see Table 1.).

## **5. Discussion**

This study has three main findings. First, we show that psychometric and personality tests are commonly used selection methods for example over half of the companies use numerical reasoning tests and over a third use verbal reasoning tests. Second, we show that the majority of students in their final year of study of a Psychology undergraduate degree programme cannot pass an online numerical or verbal reasoning test. Third, prior testing experience had a substantial impact on increasing the likelihood of passing numerical reasoning tests. The following paragraphs discuss these findings in more detail.

Estimates of the level of psychometric test use vary in the literature from as high as

72% (Branine 2008) to as low as 38% (CIPD 2017). This wide range of estimates can be explained by a) the size of the companies being audited, with large companies being more likely to use graduate tests; and b) whether the survey broke down tests into aptitude/general cognitive tests or more specifically into numeracy and literacy tests, with surveys that collate all the tests together yielding higher estimates (Jenkins 2001; Branine 2008; Durrani and Tariq 2012). The findings reported here of 53 companies using numerical reasoning tests and 39 using verbal reasoning compare well with Durrani and Tariq (2012) who found 51 percent of companies out of 165 companies used numeracy tests, and with the CIPD (2017) who found that 38 percent of 691 respondents used literacy or numeracy tests. The implication of the current study is that if students do struggle to pass these tests their applications will be rejected from at least half of the Top 100 graduate recruiters. This raises the question of how participants fared with the graduate tests and what might explain these findings.

The results indicated that the majority of students failed verbal reasoning and numerical reasoning tests. Given the fact that so few students had prior experience of these tests (verbal reasoning: 27%, numerical reasoning 17%) this suggests that many students are unprepared to face the graduate recruitment selection procedure. Theoretically, this would indicate that students are not developing Bridgstock's (2009) career building skills required to allow them to effectively gain employment. Empirically, this finding is in line with those of Durrani and Tariq (2012) who noted that only 1 in 5 students were aware of the common numeracy tests employed by organisations. Similarly, these results are also consistent with Andrews and Russell, (2012) who showed that many students were unaware of the range of resources on offer at the university career service despite their efforts around raising awareness. Furthermore, Bradley et al., (2019) showed that students overall level of engagement with workshops designed to improve their skills on core stages of the selection process (i.e. application, psychometric tests, interview and assessment centres) were poorly

attended by undergraduate psychology students. Alternatively, one could argue that the majority of the students failed these tests because they are designed to be hard and are used to differentiate between graduates, therefore these results merely illustrate that the tests are fulfilling their intended purpose. However, this alternative account neglects the fact that those students who had previous experience in the numerical study were much more likely to pass the test suggesting it is not so much the difficulty of the test but the student's lack of previous experience of performing numerical tests. If the difficulty of the test was the issue, we might expect students who had higher level mathematics abilities (i.e. A-Levels in Mathematics) to outperform those of low mathematics abilities (i.e. GCSE Mathematics) yet the results do not support this interpretation. There are two key implications of this result: first, it suggests that many students could be getting rejected from graduate schemes not because they do not have the right abilities but due to their poorly developed career building skills, making it difficult for them to find and obtain graduate level employment (Bridgstock 2009). Second, at a time when there is an expectation from key stakeholders (i.e. students, parents, governments) that universities and their career services do more to develop and support students whilst at university in taking their next step after graduation, these results suggest that more effort should be focussed on developing students preparedness to navigate the graduate selection process (Kandiko and Mawer 2013; Dey and Cruzvergara 2014; Department for Business Innovation & Skills 2016).

The finding that the majority of students failed the test raises the question of how we can help students to pass these tests to allow their applications to proceed further down the selection process (i.e. interviews and assessment centres). The only predictor to really explain students passing or failing psychometric tests was prior testing experience with numerical tests. Prior testing was not a successful predictor of success or failure on the verbal reasoning tests probably because the prior testing item used in Study 1A only captured all kinds of

previous psychometric testing experience. For example, if a student had taken a personality test or situational judgement test that would have been classified as having had prior testing experience. Clearly, prior experience of doing an online personality or situational judgement test probably would not help you pass an online verbal reasoning test. One perhaps surprising null result is that studying Maths or English to A-level as opposed to GCSE had no significant effect on student's likelihood of passing or failing the test. The good news about this set of findings is that it does suggest that the only thing students really need to do to increase their likelihood of passing is to practice the psychometric tests before sitting them in a graduate scheme selection programme. Many university careers and employment services already offer free practice psychometric tests. Unfortunately, previous research suggests students either have not heard or do not engage with these services (Andrews and Russell 2012; Bradley, Quigley, and Bailey 2019). Universities that adopt either a bolt-on or embedded approach to employability may consider including practice psychometric tests into their course curriculum. Universities with a parallel employability strategy could attempt to increase awareness through advertising campaigns using social networking sites (Junco, Heiberger, and Loken 2011; Osborn and Lofrisco 2012) or through the adoption of gamification techniques like leader boards, points or progress bars to increase engagement with career-related events (Scholtz, Raga, and Baxter 2016).

### **Limitations**

One potential limitation of psychometric tests such as verbal and numeracy is that they do not guarantee that candidates are completing the tests by themselves without the help of friends or without the use of the internet to search for answers (Sackett and Lievens 2008). However, in the current study participants were supervised whilst completing the test so we can be certain that participant scores are attributable to their own performance not the help of friends or the Internet. This study only addresses numerical reasoning and verbal reasoning

tests, yet there are other forms of psychometric tests such as situational judgment, and logical reasoning tests. It remains to be seen whether undergraduate students are also unprepared for these and if students would find these as challenging. A similar argument could also be extended to other stages within the selection procedure (i.e. interviews, assessment centres etc.) and therefore, future research should explore students' level of preparedness and competence to navigate common graduate recruitment selection procedures. Finally, one should be cautious about extrapolating the findings of the audit of the Times Top 100 graduate recruiters beyond UK recruiters since a number of past studies has shown that selection methods have a considerable variation across countries (Shackleton and Newell 1991, 1994; Hodgkinson and Payne 1998).

## **Conclusions**

An audit of the Times Top 100 Graduate Recruiters showed that over half of these companies use numerical reasoning tests and over a third use verbal reasoning tests. Two experimental studies assessing how prepared undergraduate psychology students are to pass online psychometric tests indicated that over half of students failed these tests with 53.57% failing verbal reasoning tests and 83.53% failing numeracy tests. These results are concerning as they highlight how many undergraduate students may well struggle to pass the initial stages of the graduate selection process. Further analyses showed that prior test experience was the main predictor of passing numeracy tests suggesting that increasing students' experience of online psychometric tests could be an important factor in students passing the initial stages of the graduate selection process. These findings have broader implications for university departments and university careers services as they suggest that more needs to be done to engage and support students in developing their career building skills, in part through practising online psychometric tests.

## References

- Andrews, Georgina, and Marilyn Russell. 2012. "Employability Skills Development: Strategy, Evaluation and Impact." *Higher Education, Skills and Work-Based Learning* 2 (1): 33–44. <https://doi.org/10.1108/20423891211197721>.
- Andrews, Jane, and Helen Higson. 2008. "Graduate Employability, 'soft Skills' versus 'Hard' Business Knowledge: A European Study." *Higher Education in Europe* 33 (4): 411–22. <https://doi.org/10.1080/03797720802522627>.
- Arvey, Richard D., and James E. Campion. 1982. "The Employment Interview: A Summary and Review of Recent Research." *Personnel Psychology* 35 (2): 281–322. <https://doi.org/10.1111/j.1744-6570.1982.tb02197.x>.
- Australian Bureau of Statistics. 2017. "Australians Pursuing Higher Education in Record Numbers." Media Release. 2017. <https://www.abs.gov.au/AUSSTATS/abs@.nsf/mediareleasesbyReleaseDate/1533FE5A8541D66CCA2581BF00362D1D?OpenDocument>.
- Bartram, Dave, and Bartram Dave. 2008. "Internet Recruitment and Selection: Kissing Frogs to Find Princes." *International Journal of Selection and Assessment* 8 (4): 261–74. <https://doi.org/10.1111/1468-2389.00155>.
- Baxter, James C., Barbara Brock, Peter C. Hill, and Richard M. Rozelle. 1981. "Letters of Recommendation: A Question of Value." *Journal of Applied Psychology* 66 (3): 296–301. <https://doi.org/10.1037/0021-9010.66.3.296>.
- Bertua, Cristina, Neil Anderson, and Jesús F. Salgado. 2005. "The Predictive Validity of Cognitive Ability Tests: A UK Meta-Analysis." *Journal of Occupational and Organizational Psychology* 78 (3): 387–409. <https://doi.org/10.1348/096317905X26994>.

- Bradley, Alex, Martyn Quigley, and Kate Bailey. 2019. "How Well Are Students Engage with the Career Services." *Studies in Higher Education*.  
<https://doi.org/10.1080/03075079.2019.1647416>.
- Branine, Mohamed. 2008. "Graduate Recruitment and Selection in the UK." *Career Development International* 13 (6): 497–513.  
<https://doi.org/10.1108/13620430810901660>.
- Bridgstock, Ruth. 2009. "The Graduate Attributes We've Overlooked: Enhancing Graduate Employability through Career Management Skills." *Higher Education Research and Development* 28 (1): 31–44. <https://doi.org/10.1080/07294360802444347>.
- Brundage, Vernon. 2017. "Spotlight on Statistics Profile Of The Labor Force By Educational Attainment." 2017.  
<https://www.abs.gov.au/AUSSTATS/abs@.nsf/mediareleasesbyReleaseDate/1533FE5A8541D66CCA2581BF00362D1D?OpenDocument>.
- Carless, Sally A. 2007. "Graduate Recruitment and Selection in Australia." *International Journal of Selection and Assessment* 15 (2): 153–66. <https://doi.org/10.1111/j.1468-2389.2007.00377.x>.
- Center for World University Rankings. 2019. "METHODODOLOG." World University Rankings,. 2019. <https://cwur.org/methodology/world-university-rankings.php>.
- CIPD. 2017. "Survey Report Resourcing and Talent Planning 2017." *CIPD Survey Report*, 1–49. <https://doi.org/10.1108/PR-12-2012-0212>.
- Cranmer, Sue. 2006. "Enhancing Graduate Employability: Best Intentions and Mixed Outcomes." *Studies in Higher Education* 31 (2): 169–84.  
<https://doi.org/10.1080/03075070600572041>.

- Department for Business Innovation & Skills. 2016. "Success as a Knowledge Economy: Teaching Excellence, Social Mobility and Student Choice." <https://doi.org/ISBN9781474132862>.
- Dey, Farouk, and Christine Y. Cruzvergara. 2014. "Evolution of Career Services in Higher Education." *New Directions for Student Services* 2014 (148): 5–18. <https://doi.org/10.1002/ss.20105>.
- Durrani, Naureen, and Vicki N. Tariq. 2012. "The Role of Numeracy Skills in Graduate Employability." *Education and Training* 54 (5): 419–34. <https://doi.org/10.1108/00400911211244704>.
- Graduate First. 2007. "About Us." 2007. <https://www.graduatesfirst.com/about/>.
- Hausknecht, John P., David V. Day, and Scott C. Thomas. 2004. "Applicant Reactions to Selection Procedures: An Updated Model and Meta-Analysis." *Personnel Psychology* 57 (3): 639–83. <https://doi.org/10.1111/j.1744-6570.2004.00003.x>.
- High Fliers. 2018. "The Graduate Market in 2018." 2018. [https://www.highfliers.co.uk/download/2018/graduate\\_market/GMReport18.pdf](https://www.highfliers.co.uk/download/2018/graduate_market/GMReport18.pdf).
- . 2019. "The Graduate Market in 2019." 2019. <http://www.highfliers.co.uk/download/GM10Report.pdf>.
- Higher Education Academy. 2015. "Frame WORKS: Embedding Employability in Higher Education." <https://www.heacademy.ac.uk/system/files/downloads/embedding-employability-in-he.pdf>.
- Hodgkinson, Gerard P, and Roy L Payne. 1998. "Short Research Note Graduate Selection in Three European Countries." *Journal of Occupational and Organizational Psychology* 71: 359–65.

- Hopko, Derek R., Rajan Mahadevan, Robert L. Bare, and Melissa K. Hunt. 2003. "The Abbreviated Math Anxiety Scale (AMAS)." *Assessment* 10 (2): 178–82.  
<https://doi.org/10.1177/1073191103010002008>.
- Hunter, John E., and Ronda F. Hunter. 1984. "Validity and Utility of Alternative Predictors of Job Performance." *Psychological Bulletin* 96 (1): 72–98.  
<https://doi.org/10.1037/0033-2909.96.1.72>.
- Hunter, John E, and Frank L Schmidt. 2004. *Methods of Meta Analysis: Correcting Error and Bias in Research Findings*. Second Edi. London: Sage.
- Illingworth, A. James, Neil A. Morelli, John C. Scott, and Scott L. Boyd. 2015. "Internet-Based, Unproctored Assessments on Mobile and Non-Mobile Devices: Usage, Measurement Equivalence, and Outcomes." *Journal of Business and Psychology* 30 (2): 325–43. <https://doi.org/10.1007/s10869-014-9363-8>.
- Jenkins, Andrew. 2001. "Companies' Use of Psychometric Testing and the Changing Demand for Skills: A Review of the Literature." *Centre of the Economic of Education*, no. May.  
[http://eprints.lse.ac.uk/19541/1/Companies\\_use\\_of\\_psychometric\\_testing\\_and\\_the\\_changing\\_demand\\_for\\_skills\\_A\\_review\\_of\\_the\\_literature.pdf](http://eprints.lse.ac.uk/19541/1/Companies_use_of_psychometric_testing_and_the_changing_demand_for_skills_A_review_of_the_literature.pdf).
- Junco, R., G. Heiberger, and E. Loken. 2011. "The Effect of Twitter on College Student Engagement and Grades." *Journal of Computer Assisted Learning* 27 (2): 119–32.  
<https://doi.org/10.1111/j.1365-2729.2010.00387.x>.
- Kandiko, Camille B., and Matt Mawer. 2013. "Student Expectations And Perceptions Of Higher Education."  
<https://www.kcl.ac.uk/study/learningteaching/kli/People/Research/DL/QAARReport.pdf>.

- Keenan, Tony. 1995. "Recruitment in Britain: A Survey of Selection Methods Used by Organizations." *Journal of Organizational Behavior* 16 (4): 303–17.  
<https://www.jstor.org/stable/2488560>.
- Macan, Therese. 2009. "The Employment Interview: A Review of Current Studies and Directions for Future Research." *Human Resource Management Review* 19 (3): 203–18.  
<https://doi.org/10.1016/j.hrmr.2009.03.006>.
- OECD. 2018. *Education at a Glance 2018: OECD Indicators*. Paris: OECD Publishing.  
<https://doi.org/http://dx.doi.org/10.1787/eag-2018-en>.
- Office for National Statistics. 2017. "Graduates in the UK Labour Market - Office for National Statistics."  
<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/graduatesintheuklabourmarket/2017>.
- Osborn, Debra S, and Barbara M Lofrisco. 2012. "The Career Development Quarterly How Do Career Centers Use Social Networking Sites?" *The Career Development Quarterly* 60 (September): 263–72.
- Pegg, A, J Waldock, S Hendy-Isaac, and R Lawton. 2012. "Pedagogy for Employability." 2012.  
[http://www.heacademy.ac.uk/assets/documents/employability/pedagogy\\_for\\_employability\\_update\\_2012.pdf](http://www.heacademy.ac.uk/assets/documents/employability/pedagogy_for_employability_update_2012.pdf).
- QS Top Universities. 2014. "QS Stars: Methodology." 2014.  
<https://www.topuniversities.com/qs-stars/qs-stars-methodology>.
- Ree, M, and J Earles. 1992. "Intelligence Is the Best Predictor of Job Performance." *Current Directions in Psychological Science* 1 (2): 86–89.

<https://doi.org/https://doi.org/10.1111/1467-8721.ep10768746>.

Sackett, Paul, and Filip Lievens. 2008. "Personnel Selection." *Annual Review of Psychology* 59: 419–50. <https://doi.org/10.1146/annurev.psych.59.103006.093716>.

Schmidt, Frank L, and John E Hunter. 1998. "The Validity and Utility of Selection Methods in Personnel Psychology: Practical and Theoretical Implications of 85 Years of Research Findings." *Psychological Bulletin* 124 (2): 262–74.

<https://static1.squarespace.com/static/5abc0743710699dd7ac56a81/t/5c3ce1746d2a73d48107fdfb/1547493750231/Schmidt+%26+Hunter%2C+1996.pdf>.

Schmitt, Norbert, Diane Schmitt, and Caroline Clapham. 2001. "Developing and Exploring the Behaviour of Two New Versions of the Vocabulary Levels Test." *Language Testing* 18 (1): 55–88. <https://doi.org/10.1177/026553220101800103>.

Scholtz, Brenda, Larissa Raga, and Gavin Baxter. 2016. "Design and Evaluation of a " Gamified " System for Improving Career Knowledge in Computing Sciences." *The African Journal of Information and Communication The African Journal of Information and Communication (AJIC)* 18 (18): 7–32.

Shackleton, Viv, and Sue Newell. 1991. "Management Selection: A Comparative Survey of Methods Used in Top British and French Companies." *Journal of Occupational Psychology* 64 (1): 23–36. <https://doi.org/10.1111/j.2044-8325.1991.tb00538.x>.

———. 1994. "European Management Selection Methods: A Comparison of Five Countries." *International Journal of Selection and Assessment* 2 (2): 91–102. <https://doi.org/10.1111/j.1468-2389.1994.tb00155.x>.

Steiner, D, and S Gilliland. 1996. "Fairness Reactions to Personnel Selection Techniques in France and the United States." *Journal of Applied Psychology* 81 (2): 134–41.

<https://doi.org/10.1111/j.0965-075X.2004.00273.x>.

The Times. 2018. *Top 100 Graduate Employers*. Edited by Martin Birchall. 20th ed. London: High Fliers Publications Limited.

Times Higher Education. 2018. “Best Universities for Graduate Jobs: Global University Employability Ranking 2018.” *The World University Rankings*,. 2018.

<https://www.timeshighereducation.com/student/best-universities/best-universities-graduate-jobs-global-university-employability-ranking>.

Topor, David J., Stephen M. Colarelli, and Kyunghye Han. 2007. “Influences of Traits and Assessment Methods on Human Resource Practitioners’ Evaluations of Job Applicants.” *Journal of Business and Psychology* 21 (3): 361–76. <https://doi.org/10.1007/s10869-006-9033-6>.

Ulrich, Lynn, and Don Trumbo. 1965. “The Selection Interview since 1949.” *Psychological Bulletin* 63 (2): 100–116. <https://doi.org/10.1037/h0021696>.

Wilk, Steffanie, and Cappelli. Peter. 2003. “Understanding the Determinants of Employer Use of Selection Methods.” *Personnel Psychology* 56 (1): 103–24. <https://doi.org/10.1007/BF02761491>.

## Tables

Table 1.

Logistic Regression exploring factors associated with passing Verbal Reasoning (Study 1A) and Numerical Reasoning test commonly used in graduate selection.

	Log Odds	Odds Ratio's	Standard Error	z values	P
<b>Study 1A</b>					
Intercept	-13.87	0.01	9.32	-1.49	0.137
Gender	0.19	0.87	0.68	-0.51	0.782
Age	-0.12	1.20	0.24	0.28	0.614
Native English	0.26	1.30	0.67	0.39	0.695
GCSE vs A-Level English	0.15	1.16	0.54	0.28	0.782
Vocab score	0.53	1.69	0.26	1.99	0.047*
Prior Testing Experience	0.95	2.58	0.54	1.75	0.081
<b>Study 1B</b>					
Intercept	-9.96	0.01	5.63	-1.77	0.077
Gender	0.74	2.10	1.06	0.70	0.484
Age	0.35	1.42	0.28	1.27	0.203
GCSE vs AS-Level Maths	0.25	1.28	1.06	0.14	0.892
GCSE vs A-Level Maths	0.57	1.77	1.85	0.74	0.458
Maths Anxiety	-0.003	1.00	0.06	-0.06	0.951
Prior Testing Experience	2.45	11.53	0.80	3.07	0.002**

Note 1. Study 1A the overall model was not a better fit than the null model ( $\chi^2(6) = 9.71, p = .137$ ). Study 1B the overall model was a better fit than the number model ( $\chi^2(6) = 19.18, p < .001$ ). \* =  $p < .05$ , \*\* =  $p < .01$ .

## Figures

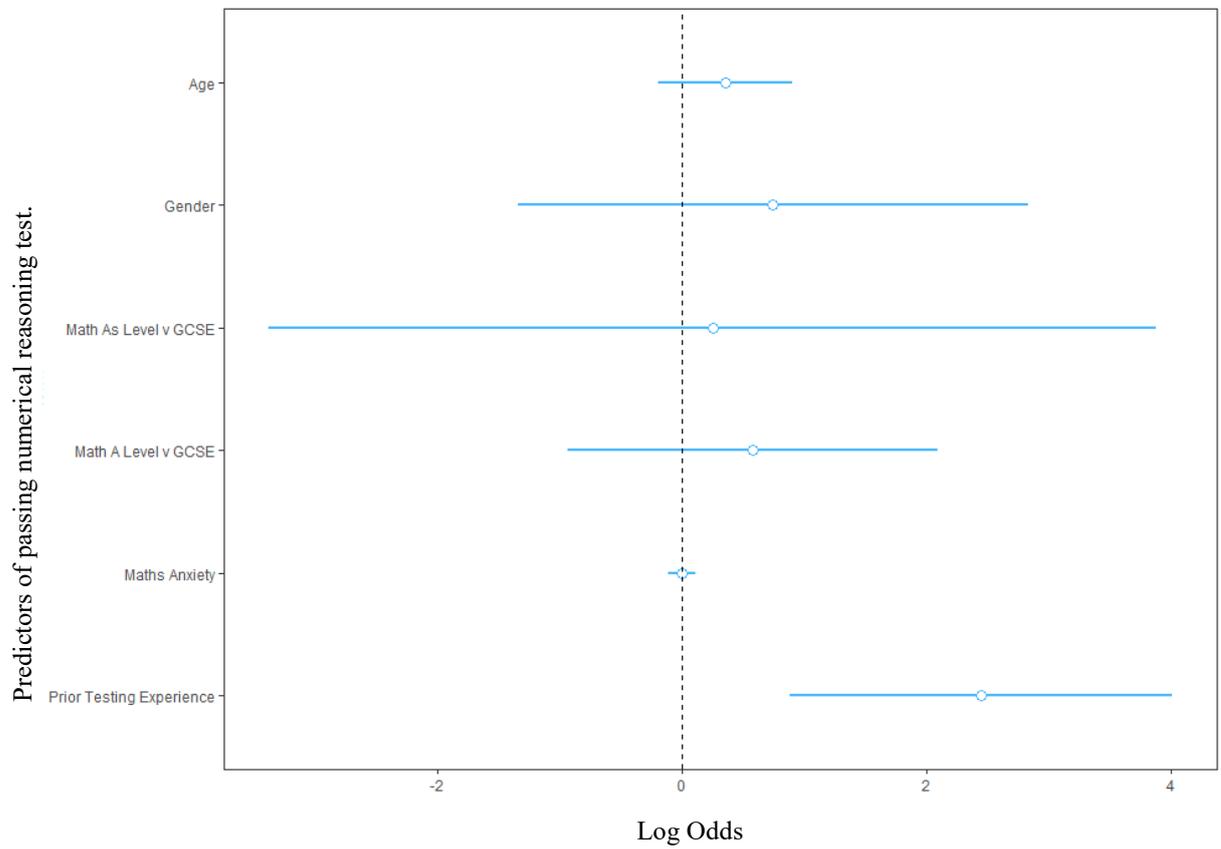


Figure 1. Predictors of passing the online numerical reasoning test.