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Equity implications of non-ATAR pathways: Participation, academic outcomes, and student experience

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Abbreviations

ATAR	Australian Tertiary Admission Rank
DESE	Department of Education, Skills and Employment
GPA	Grade Point Average
NESB	Non-English-Speaking Background
SES	Socioeconomic status
SESurv	Student Experience Survey
STAT	Special Tertiary Admissions Test
STEM	Science, Technology, Engineering, and Mathematics
TAFE	Technical and Further Education
TEQSA	Tertiary Education Quality and Standards Agency
VET	Vocational Education and Training
WAM	Weighted average mark

Executive summary

There have been expansionary policies aimed at widening participation in higher education in developed countries worldwide. In Australia, increasing participation among underrepresented groups is a national priority. This has led to the formation of six official student equity groups whose access, participation, and outcomes in higher education have been specifically targeted since 2008. More recently, the development of alternative entry pathways has been encouraged to boost higher education enrolments among these equity groups. There is, however, relatively scarce evidence on trends in admission to university study through alternative pathways and on the comparative outcomes of students from various pathways.

This study aimed to fill these policy gaps and addressed four research questions:

1. What are the proportions of students entering undergraduate study through Australian Tertiary Admission Rank (ATAR) and non-ATAR pathways in Australian universities?
2. What are the proportions, numbers, and trends over time—by equity group status—of those who access university education through non-ATAR and ATAR pathways?
3. How are equity students from non-ATAR pathways distributed across courses, and are there observable trends and patterns?
4. Do student outcomes (retention, progression, student experience, academic performance, work readiness) differ based on the type of entry pathway and equity group status?

This study found that, while the ATAR pathway was still the most common pathway to university, there has been a gradual decline in the last decade in the proportion of students accessing university this way. Conversely, alternative pathways, such as the completion of another higher education course, entry via Vocational Education and Training (VET) courses, and other pathways (e.g., access schemes and enabling programs), are increasingly being used by students to gain admission into universities. The growth in alternative entry pathways was stronger for students from all equity groups except for Indigenous students. There were also trends in enrolments by field of study, with disciplines such as engineering seeing a proportional decline in student enrolments while disciplines such as health experienced growth. These enrolment trends were observed for the student body as a whole, and for the various equity groups examined.

Students who accessed higher education through non-ATAR pathways generally experienced poorer outcomes compared to students from ATAR pathways. Students who entered university through VET, mature age provisions, or on an “other basis” were found to have lower retention rates both in the first year and over their course enrolment and also lower first-year and course weighted-average marks. There were, however, positive findings for students from some other alternative entry pathways. Those who entered university through pathway providers or enabling programs had stronger retention outcomes and higher marks.

Students who gained admission through the completion of another higher education course experienced a mix of outcomes, with lower retention rates but better weighted-average marks than students from ATAR pathways. These findings call for better support of students who enter through VET, mature age provisions, or other admission pathways.

For retention, the findings also call for better support for students who enter through the completion of another higher education course. At the same time, the positive findings regarding students from pathway providers and enabling programs endorse further growth of these admission pathways.

The weaker academic outcomes for students from alternative pathways were, in some cases, exacerbated for students enrolled in science, technology, engineering, and mathematics (STEM) courses. Similarly, more pronounced weaker outcomes in STEM fields were observed for some equity groups, such as Indigenous and non-English-speaking background (NESB) students. This indicates the need to provide particular attention and support to alternative pathway and equity group students enrolled in STEM fields, especially as there has been governmental support for increasing student growth in these discipline areas.

This study revealed differences in various aspects of student experience by entry pathway. Students from alternative entry pathways broadly reported a less positive student experience than students entering directly from secondary school. There were also differences observed between the different non-ATAR pathways. For example, compared to students from ATAR pathways, students from other higher education courses had a poorer student experience, but those articulating through the “other basis” pathway had better outcomes.

Student experience also differed across equity groups. Mature age students and those with disability had poorer student experience outcomes. By contrast, Indigenous students, those from regional and remote areas, NESB students, and women in STEM fields generally reported higher levels of student satisfaction. Given that the student experience is associated with academic performance and is important in its own right, these outcome gaps need to be addressed.

Analysis of the intention to drop out indicated that students from most equity groups, except NESB students and women in STEM, were more likely to consider dropping out from their studies. In contrast, students from alternative entry pathways had a comparable—if not reduced—likelihood of considering leaving university study. This was a positive finding. Nevertheless, an examination of the factors prompting the consideration of dropping out from study revealed that, for all students and regardless of entry pathway, social and personal factors were influential.

Among certain entry pathway groups, some factors were also particularly influential in the intention to drop out. For instance, health and financial reasons were important for students from VET and mature age provision pathways, while academic/institutional factors underpinned the attrition of students from ATAR pathways and other higher education courses. Workload was also important for VET entry students, while disposition or attitude towards studies was a barrier to retention among ATAR pathway students.

These reasons for the intention to discontinue study highlight the importance, for the entire student body, of strategies that facilitate connection among peers and of the development of social capital. Clearly, strategies need to be further tailored to address the different factors that are important for students entering through different pathways.

Recommendations in response to the main findings of this study have been developed and are presented in the following section.

Recommendations

Recommendation 1: Alternative pathways to university study provide opportunities for higher education participation, particularly for students from equity groups. Efforts to widen participation in higher education should continue to leverage and expand alternative pathways in encouraging under-represented individuals to participate in higher education.

Recommendation 2: Initiatives to engage Indigenous students, such as targeted intervention in schools, reduced ATAR scores and early, unconditional offers, should be prioritised.

Recommendation 3: Interventions for widening participation should consider the prioritisation of fields of study to target equity groups, particularly groups that are severely underrepresented in those disciplines.

Recommendation 4: The needs and experiences of transfer students, students coming from substantively different prior academic environments, and/or mature age students need to be better understood and are worthy of further investigation.

Recommendation 5: Students from access pathways need to be supported in the middle and later stages of study beyond targeted interventions in the first year.

Recommendation 6: Admission pathways through pathway providers and enabling programs could be expanded based on the positive retention and weighted average marks of students from these pathways.

Recommendation 7: Higher education institutions should consider more detailed stratification of admission pathways to support the granular analysis of outcomes by pathway and discipline.

Recommendation 8: Strategies to address issues with student experience or satisfaction should be mindful of the challenges particular student groups face and be tailored accordingly.

Recommendation 9: Strategies and programs to address students' disconnectedness and lack of belonging are important and needed for both equity group students and students from ATAR pathways.

Recommendation 10: Better academic and administrative support for higher education students is required in tandem with strategies to boost work readiness and employability.

Recommendation 11: Further action to improve the retention and academic performance of Indigenous students is required.

Recommendation 12: Strategies to improve the retention and academic performance outcomes for low–socioeconomic status students and students with disability are still required, as are strategies to improve the student experience of students with disability. The education of academics and support staff on the varying needs of equity groups is critical.

Introduction

In recent years, there have been expansionary policies aimed at widening participation in higher education across developed countries. Successive governments in Australia have adjusted higher education systems and funding mechanisms to promote greater equity and access, encouraging representation across six student equity groups considered to be underrepresented (Department of Education and Training, 1990). These six equity groups are students 1) from regional and remote areas, 2) who identify as Indigenous, 3) are of low socioeconomic status (SES), 4) have disability, 5) are from non-English speaking backgrounds (NESBs), or are women from non-traditional areas of study, including science, technology, engineering, and mathematics (STEM; Dawkins, 1990).

Examples of government policy to widen participation include the shift from capped to demand-driven funding in 2010 to enhance access for all students (Cunninghame et al., 2016) and the introduction of performance-based funding in Australia, whereby universities receive additional moneys based on their graduate employment outcomes, student success (attrition), student experience (satisfaction), and participation by certain equity groups (Department of Education, Skills and Employment, 2019).

The Australian Government set a goal that by 2020, 40% of those aged 25–34 years will have attained a bachelor-level qualification and that 20% of domestic undergraduate enrolments will have come from low-SES backgrounds (Bradley et al., 2008). The rationale for these targets was to expose more youth to the benefits of higher education, including the development of both discipline-based and generic skills and knowledge to enhance career opportunities and labour market success (Productivity Commission, 2019). Further, greater participation in higher education would help to advance the nation's economy through increased productivity, growth, and innovation (Australian Government, 2016; Organisation for Economic Co-operation and Development, 2016). Growing participation among international students, although not the focus of this report, is also critical given its significant contribution to the Australian economy, although this is likely to be eroded due to travel restrictions from COVID-19.

Progress towards these higher education access and participation goals in Australia for equity groups has been made in the past decade. Koshy (2019), for instance, reported an overall growth in domestic student enrolments at Australian universities of almost 13% between 2013 and 2018. Additionally, over the same period, enrolments by students from low-SES backgrounds grew by 21%; those with disability, by 50%; and Indigenous students, by 42%. Students from disadvantaged backgrounds, however, remain underrepresented in Australian higher education, and Koshy (2019) reported only very modest growth in equity student enrolments since 2016. Access and participation in higher education thus remain priorities for policy (Harvey et al., 2016).

The push for widening participation has come with changes in higher education policy that encourage the development of alternative entry pathways into universities (Martin, 2015). The most common pathway for domestic students' admission to university undergraduate courses in Australia has been by obtaining an Australian Tertiary Admission Rank (ATAR). However, an increasing number of students have accessed higher education through non-ATAR pathways (Tertiary Education Quality and Standards Agency [TEQSA], 2019). Alternative entry pathways include the use of achieved qualifications in Technical and Further Education (TAFE) institutions; the successful completion of a university preparation or bridging course, sometimes to a certain standard; or a portfolio pathway, whereby demonstrated work and life experience and the acquisition of particular skills and knowledge allow entry for mature university applicants.

Collectively, these alternative entry pathways provide a “second chance” for higher education, particularly for non-traditional students (Diamond & O’Brien-Malone, 2018), resulting in increasingly diverse student populations in the Australian higher education sector. There has, however, been some concern that students, particularly those from low SES equity groups, entering higher education via these pathways are inadequately prepared for university. For example, the Productivity Commission (2019) found that non-traditional students entering university—around two-thirds of whom did not enter via ATAR routes and one-third of whom were low SES—had less-developed literacy and numeracy skills.

While there is a large body of research comparing the completion rates, academic success, and labour market outcomes of equity group graduates with their more privileged peers (e.g., Pitman et al., 2016), there is less research evaluating the experiences and outcomes of those entering via different pathways, particularly for different study areas and student groups. This lack of systematic and national empirical exploration of the effect of different pathways on student outcomes led to our current study, which addressed some fundamental questions around the equity implications of non-ATAR pathways to Australian university study. We drew on existing data to quantify the number and proportion of students entering university study nationally through ATAR and non-ATAR pathways, examining and comparing their outcomes based on their entry pathway and equity group membership and across a range of disciplines and courses.

We explored a range of outcomes, including course retention, progression, student experience, academic performance, and work readiness, contributing to the limited evidence base on higher education equity policy and alternative admission pathways. The findings of this study inform the sector’s understanding of the relative success of alternative entry pathways in boosting higher education participation by equity group, indicating where gaps might lie and identifying practical strategies for improvement. We add to the evidence base on the relationship between alternative admission pathways and student outcomes, which is critical for students seeking a transformational experience with positive outcomes when investing in university education, including developing their work readiness to enhance their employment prospects after graduation.

Additionally, the study’s findings enhance universities’ understanding of the effect of different admission pathways and where and how they can better support students from different entry pathways. This understanding is critical both from an equity perspective and for sustaining institutional funding, given that this is now partially determined by student outcomes. Finally, the study created and documented an innovative approach to using existing data to examine student participation in Australian universities through ATAR and non-ATAR pathways across different courses and disciplines and the effect of different entry pathways on student outcomes by equity group status. This approach allows the sector to benchmark and monitor changes in equity group participation and outcomes in higher education via different entry pathways.

Our research questions were as follows:

1. What are the proportions of students entering undergraduate study through ATAR and non-ATAR pathways in Australian universities?
2. What are the proportions, numbers, and trends over time—by equity group status—of those who access university education through non-ATAR and ATAR pathways?
3. How are equity students from non-ATAR pathways distributed across courses, and are there observable trends and patterns?
4. Do student outcomes (retention, progression, student experience, academic performance, work readiness) differ based on the type of entry pathway and equity group status?

Background

Equity group participation in higher education

The benefits of participating in higher education are significant, including increased earnings, superior career outcomes, engagement with lifelong learning and personal development, and enhanced wellbeing (Lamb & Huo, 2017). Higher education has long been recognised as providing participants with a competitive advantage in the labour market, affirmed by stronger full-time employment outcomes among degree holders than those completing Vocational Education and Training (VET) or school leavers who transition straight to work (Organisation for Economic Co-operation and Development, 2019). These are important both individually and for universities, given the increasing focus on league tables that rank institutions based on their full-time job achievement, such as *The Good Universities Guide* (Good Education Group, 2020).

There has been increased demand for higher education across equity groups that traditionally have not participated. This has been catalysed by government policies in Australia, such as the abolition of higher education fees in 1974. This was later replaced by the Higher Education Contribution Scheme following significant reforms in the sector (Dawkins, 1990) due to the fiscal burden of growing student demand. The shift from capped student places to a demand-driven system was a key initiative from the Bradley Review of Australian higher education (Bradley et al., 2008), with the intention that 40% of Australians aged 25–34 years would hold a bachelor's degree by 2025 (compared with 30% in 2008) and that 20% of the higher education cohort in 2020 would be low-SES students (compared with 15%).

Unfortunately, student equity groups can experience greater difficulties than others in accessing higher education. This may be attributed to relatively weakly developed social capital and to equity students lacking the professional and social networks to understand higher education (Harvey-Beavis & Robinson, 2000), which negatively affects their aspirations to attend and their confidence and ability to navigate increasingly complex application and admission processes (Cardak et al., 2015). Another challenge is geography: cultural tensions and logistical challenges may make it difficult for remote and regional students to leave their close communities and relocate for study (O'Shea, 2019). Further, certain equity groups, particularly students of low SES, are challenged in accessing, transitioning, and remaining at university, which has a distinct culture that heavily reflects the middle classes (Keddie et al., 2008) and may be largely unfamiliar to them (Gale & Parker, 2011).

Much has been done to better support students from equity groups in accessing higher education, including the introduction of alternative entry pathways (see the section entitled "Alternative Entry Pathways" below). Initiatives such as developing positive student–teacher relations, facilitating talks from university/VET providers, and engaging school students in group career discussions have helped to encourage low-SES and regional and remote students to enter higher education (Tomaszewski et al., 2017). Community outreach programs may also help to support at-risk individuals in entering higher education: one example outlined by Scull and Cuthill (2010) is a program targeting non-English speakers and low-SES prospective students in Pacific island communities.

Data from the Longitudinal Surveys of Australian Youth have indicated that the proportion of people attending university by age 22 increased from 53% in 2010 to 60% in 2016 (Productivity Commission, 2019). Of those additional students, a greater proportion than the existing student body was first-in-family to university and/or had a low-SES background. The shift from capped places to the demand-driven system did not, however, increase participation among regional and remote or Indigenous students. Other interventions to

increase equity group enrolments in higher education include scholarships, regional study hubs, and the Higher Education Participation and Partnerships Program, which funds strategies to improve access to undergraduate study and retention rates among equity groups (ACIL Allen Consulting, 2017).

While the increase in participation among certain equity groups is positive, equity groups have overall remained underrepresented (Productivity Commission, 2019), and the Bradley Review's 20% target for low-SES students has remained elusive (Koshy, 2019). Diamond and O'Brien-Malone's (2018) insightful review highlighted how changes in government policies and a greater appetite for higher education among traditionally excluded groups have not always translated to increased higher education enrolments due to a lag in universities adjusting their admission processes.

Entry pathways into university

Entry from secondary school

In Australia, although a majority of students now enter university via an alternative entry pathway, the single most common pathway into higher education remains direct entry from secondary school using the ATAR (TEQSA, 2019). Students who complete ATAR subjects in Year 12 are provided with a percentile rank up to 99.95 in 0.05 increments, comparing them with students also finishing school that year (Higher Education Standards Panel, 2016). In 2014, entry into university based on ATAR accounted for 31% of domestic undergraduate admissions, falling to 26% in 2016. Although minimum ATAR requirements vary across universities and courses (Palmer et al., 2011), a lower-threshold ATAR is often 70, a rank deemed consistent with success at university (Knipe, 2013; see Pilcher & Torii, 2018). Data from the Department of Education show that, in 2018, 28% of undergraduate offers were for students with an ATAR above 70 (Department of Education, 2019).

The ATAR system for transitions from school to higher education has been criticised for reducing students' capabilities and achievements into a single score (Pitman et al., 2015), for discouraging skill development beyond the curriculum, and for creating stress among students (Shergold et al., 2020). Further, the system has been considered to disadvantage certain equity groups (Productivity Commission, 2019), given the complex university application processes (Cardak et al., 2015), further perpetuating existing social inequalities in the education system (see Pilcher & Torii, 2018). Its predictive capability for gauging students' potential success at university has also been questioned, particularly for students in the middle bands (Palmer et al., 2011).

This pathway includes adjusted entry requirements for competitive courses such as medicine and dentistry, which may require an additional interview or written application. Notably, some universities operate access schemes whereby students from certain schools or equity groups receive bonus points to their ATAR, or the ATAR entry requirement is lowered (Pilcher & Torii, 2018). Early offer programs also enable schools to directly select equity students for early offer, unconditional entry to university. While these interventions can enhance diversity, Blyth (2014) has argued they can cause confusion against advertised minimum ATAR cut-offs, and selection processes may not always be transparent. This secondary school pathway also includes secondary education undertaken in the vocational education sector or in another higher education institution (Australian or overseas).

Alternative entry pathways

Diamond and O'Brien-Malone (2018) reviewed how the Australian Government had encouraged universities to introduce a broader range of entry pathways—beyond direct transition from secondary school—to cater for students from all backgrounds. They noted similar encouragement in other developed countries, such as the United Kingdom, parts of Europe, and New Zealand. A result of this encouragement has been the significant growth of

alternative pathways in recent years (TEQSA, 2019), with more than half of all undergraduates having entered university through offers not based on the ATAR, particularly in health and education (Pilcher & Torii, 2018).

Indicative of the growing number of alternative entry pathways, direct applications to universities—most of which were not from Year 12 students—doubled from 2009 to 2017, compared with only 17% growth for those entering via ATAR (Productivity Commission, 2019). Longitudinal Surveys of Australian Youth data have also indicated that, of the additional 7% of students aged under 22 years, from 2010 to 2016 (Productivity Commission, 2019), a greater proportion than the existing student body had not received an ATAR (or it was below 70). Although gauging equity student participation in alternative pathways in Australia has been constrained by data access limitations (Diamond & O'Brien-Malone, 2018), alternative entry pathways have appeared to widen participation and increase diversity among student cohorts in other countries (e.g., Turner et al., 2012).

Table 1 summarises the alternative entry pathways in Australia. Each pathway has particular strengths and weaknesses. The transition from VET to university, for example, has been described as complicated, despite established processes for formal credit transfer and recognition of prior learning (see Griffin, 2014). Meanwhile, Palmer et al. (2011) have argued that the mature age provision can be effective in identifying students with the potential to succeed at university and in encouraging participation among equity groups — although there are concerns for the transparency of such selection processes (Harvey et al., 2016). Despite this, the VET pathway has been described as particularly successful in enabling low-SES and regional and remote students to access higher education (Catterall et al., 2014).

Table 1. Alternative entry pathways into university

Type	Pathway detail
Higher education transfer	Students enter university by transferring from one university course to another, both domestic and overseas.
Vocational Education and Training	Articulation through courses offered through the public Technical and Further Education system or via private registered training organisations. This includes sub-bachelor programs, such as associate or foundation degrees, where successful students transition to the second year of undergraduate programs. This pathway includes international post-secondary qualifications.
Mature age special entry	Typically, applicants aged above 20 years can enter certain courses if they have completed secondary school education and successfully complete the Special Tertiary Admissions Test, designed to demonstrate aptitude for learning in the tertiary education environment.
Professional qualification	Mature age students enter university via a professional qualification, such as hospital-based nursing certificates or qualifications from a professional body.
Portfolio entry	Mature age students access university based on accrued employment and/or life experience, evidenced by a resume, personal statement, assessment, interview, or similar. For private universities, this may include community and church involvement (Productivity Commission, 2019).
Enabling programs	Also known as foundation, bridging, or preparation programs, these are typically conducted over a single semester period after secondary school with no tuition fees for domestic students, funded by the Commonwealth Grants Scheme and with largely unrestricted access (Pitman et al., 2016). Enabling programs can also be undertaken during secondary school years. They are largely focused on developing academic skills, such as referencing, writing style, researching, and paraphrasing (Hodges et al., 2013).
Pathway providers	Most students enrolling in pathway colleges or non-university higher education provider institutions are international students who undertake a diploma course, equating to one year of full-time study at university, enabling them to enter in the second year of university. A popular educational model in Australia is the partnering of a private pathway provider with a public university (Velliaris, 2018).
Access entry	Specific entry arrangements for equity groups, such as regional and remote and Indigenous students. An example is students being given access to a course and awarded an unconditional offer if they pass the first two of four units.
Other	This includes other arrangements whereby students enter university with no academic requirements, through an unlisted qualification, or with English proficiency only.

Enabling programs transition proportionately more equity group students to higher education than other alternative entry pathways, accelerated by the absence of fees common to other pathways (Pitman et al., 2016), and are favoured by mature students (Whannell, 2013). They are diverse in content, length, and delivery mode, and greater consistency may further enhance transferability and take-up across the sector (Pitman et al., 2016). Those of higher SES are likely to have greater access to family and peer support and advice, and knowledge about higher education (Gale et al., 2013), to decipher the different enabling program offerings and admission processes.

Participating students who perform sufficiently well may be accepted into their preferred university course at that, or a different, institution. Some universities guarantee entry into their courses based on the completion of the preparation course (Productivity Commission, 2019). Approximately one-half of participants tend to successfully complete enabling programs (see Chesters & Watson, 2016). However, some have argued that enabling programs create expectations of undergraduate success that may not be warranted (e.g., Cocks & Stokes, 2012), and programs have been criticised for their heavy focus on developing academic skills, rather than enhancing motivation for study, which may underpin poor early academic performance (Connor et al., 2018).

Entry pathways and student success

With widening participation comes the need to support students from diverse backgrounds, helping them to feel they belong so that they can succeed at university (Brooman & Darwent, 2014). Once at university, equity students often feel alienated and uncomfortable because they have not developed the necessary cultural capital from their social interactions and find it difficult to adjust to expectations (Meuleman et al., 2015). Meuleman et al. (2015) found they are often less supported by family, have less access to resources, and feel inhibited in engaging with other students, which affects their informal learning and can lead to feelings of isolation and early withdrawal. They are also more likely to experience financial hardship (Pollard, 2018) and have underdeveloped professional networks for internship and employment purposes (Peach et al., 2016).

Policies and practices for widening participation in higher education and providing greater access for student equity groups through alternative entry pathways have inevitably generated interest in how these different groups fare during their university years. However, sector-wide metrics comparing ATAR and alternative pathways are not common, given that some forms of entry are institution-specific (Habel et al., 2016). Diamond & O'Brien-Malone (2018) argued that the lack of metrics for the purposes of comparison is confined mainly to academic performance, specifically the comparison of achieved course averages across groups entering higher education through different pathways. Diamond and O'Brien-Malone (2018) noted a concern that inadequately prepared students have been allowed to enter university, potentially resulting in poor academic outcomes, pressure on university teaching resources, and academics feeling the need to pass weaker students, which may lower the perceived value of degree education.

Academic performance

Comparisons between students entering Australian universities via VET and ATAR pathways have shown a positive association between ATARs and first-year weighted average marks (WAMs) — stronger for those entering directly from school than via VET (Diamond & O'Brien-Malone, 2018). Interestingly, however, those with lower ATARs but who attended TAFE performed better at university, which was attributed to skill acquisition and maturation during the additional time between completing the ATAR and achieving first-year marks (O'Brien-Malone & Diamond, 2015). This finding supports the use of alternative pathways for students with lower ATARs.

In their study of over 500 undergraduates who had entered an Australian university through a VET pathway, Lovat and Darmawan (2019) found that older students performed better in terms of their first-semester grade point averages (GPAs; the average result of grades achieved in a course); for those aged under 23 years, women performed better than men. The latter finding was attributed to maturity and non-cognitive factors, in line with other research (e.g., Calvin et al., 2010). This gender effect was negated by maturity, the overall trend being that older students within the VET cohort outperformed younger students.

Harvey and Simpson's (2012) review of early offer programs for disadvantaged students found that these students performed relatively well at university, although ATARs remained a better predictor of academic achievement than school recommendations. Offers based on the perceptions of teachers who worked closely with students was highlighted as important, along with selection criteria that focused on predictors of future achievement (e.g., participation in volunteering and community work), rather than solely academic performance.

Several studies have reported comparable academic performance—typically using GPAs—among those entering university via school and those entering through alternative pathways (e.g., Palmer et al., 2011).

Conversely, in Chesters and Watson's (2016) examination of the association between academic achievement and entry pathways into one Australian university, those entering via VET and enabling programs all achieved significantly lower average grades than those entering directly from secondary school. This finding was echoed by a similar study by Anderton and Chivers (2016). Additionally, Pitman et al. (2016) found that equity students transitioning into higher education via sub-bachelor pathways experienced barriers to passing academic units, although this was less so for those entering through associate degrees, advanced diplomas, and diplomas.

Many assert that previous academic performance—evidenced by the ATAR—strongly predicts success at university (e.g., Messinis & Sheehan, 2015). Tranter (2011), however, argued that low-SES students could perform comparably at university irrespective of how they entered.

Retention

Retention—or the completion of courses—has become a key focus and measure of success in higher education (Higher Education Standards Panel, 2018). Many have found that those entering university as a non–school leavers are associated with higher levels of attrition and are less likely to complete their degree studies (Chesters & Watson, 2014). Edwards and McMillan's (2015) study of more than 650,000 domestic bachelor students found that 78.8% of university entrants who had completed secondary schooling completed university, compared to 69.4% of those who had entered through another pathway (VET, prior higher education qualification, or a professional qualification). They reported a positive association between ATARs and completion levels; this finding has been both supported (e.g., Kemp & Norton, 2014; Marks, 2007) and contradicted by others (e.g., Knipe, 2013). There has been some evidence that students with no or low ATARs are more at risk of failing or dropping out than those with high ATARs (Walker-Gibbs et al., 2019).

Long et al. (2006) found that those entering university via alternative pathways, particularly through VET, were at greater risk of not completing university. However, others have noted successful transitions among VET entrants when the pathway is collaboratively arranged and supported by both the VET and university sectors (e.g., Walls & Pardy, 2010). Enabling programs have shown positive effects on student retention: Thomas (2014), for example, found retention rates similar to those entering via traditional school pathways. Chesters and Watson (2016) reported that students entering via enabling problems were the least likely to discontinue their studies than all others from different pathways in that particular institution, after controlling for GPA.

Connor et al. (2018) found that students entering a particular university course through Special Tertiary Admissions Test (STAT) results had less academic success and lower retention and completion rates than those entering via other pathways — this was particularly so for school leavers who completed the STAT due to their low ATAR. While Coates and Friedman's (2010) study of mature age students found STAT results produced predictive estimates of first-semester academic performance comparable to those achieved by Year 12 marks, Connor et al. (2018) found that their ATARs better predicted university performance than their STAT results. The Higher Education Standards Panel (2018) found that the higher education institution had a greater influence on student attrition rates than achieved ATAR or the basis of admission, although it reported higher attrition among non-university education providers than universities.

The Productivity Commission (2019) found that non-traditional students entering higher education were—since 2010 (when demand-driven funding began)—more likely to drop out (23%) than other students (12%). The Commission attributed this to weaker foundational skills on commencement, starting at an older age (due to working after school), and being more likely to study part-time and work.

Edwards and McMillan (2015) found that student membership of equity groups was associated with lower completion rates — further intensified if students belonged to multiple groups. For example, SES positively predicted completion rates for students entering via secondary school and alternative pathways: the higher a student's SES, the more likely they were to complete their degree. Secondary school entrants, including those of low SES, had completion rates higher than high-SES students entering via other pathways. However, others have found that, once low-SES students enter university, their completion rates are similar to those of other students (Marks, 2007).

Edwards and McMillan (2015) also found that university completion rates were worse for remote and regional students; their metro-based peers had superior completion rates both for those entering via secondary education and for those entering through alternative pathways. The effect of region reduced with higher ATARs, suggesting that, once students have demonstrated prior academic achievement, this becomes a more important predictor of completion than their location.

Methods

Equity group definitions

This study considered seven equity groups, which are defined in detail in Appendix A: Indigenous students, students with disability, low-SES students, students from regional and remote Australia, students from NESBs, women in STEM fields of study, and mature age students.

These equity groups were typically analysed as dichotomous variables, where 1 indicated group membership and 0 otherwise. Individual students may identify as belonging to more than one equity group.

Admission pathways

In the Australian higher education sector, information on students' admission pathways is contained within the "New Basis for Admission to Current Course" dataset,[1] which is reported by institutions to the Department of Education, Skills and Employment (DESE) as a requirement for the annual Higher Education Student Data Collection. The admission pathway codes are summarised in Table 2. For this study, "secondary education" was synonymous with the ATAR pathway.

Table 2. DESE and detailed institutional admission pathway categories

Label	Meaning
DESE categories	
Secondary education	Secondary education undertaken at school, VET, or other higher education provider (Australian or overseas equivalent)
Higher education course	A higher education course (Australian or overseas equivalent; complete or incomplete)
VET/TAFE award course	A VET award course other than a secondary education course (Australian or overseas equivalent; complete or incomplete)
Mature age entry provisions	Mature age special entry provisions
Professional qualification	A professional qualification
Other basis	Other basis
Institutional admission pathways	
Other: Access	Entry through equity schemes, not based on ATAR (including non–mature age special entry)
Other: Portfolio	Admission is based on a portfolio approach, including employment experience, exam, assessment, interview, etc.
Other: Pathway	Higher education college/pathway provider
Other: Enabling	Enabling program (e.g., bridging and preparation programs)

Note. DESE = Department of Education, Skills and Employment; VET = Vocational Education and Training; TAFE = Technical and Further Education; ATAR = Australian Tertiary Admission Rank.
Source: DESE (2021) and eight participating institutions.

[1] Higher Education Information Management System, Data Element 327.

In addition to these admission pathway categories, some institutions maintain a more detailed internal classification of students' admission pathways, which are subsequently mapped to DESE classifications for the purpose of government reporting. In connection with our data request to institutions (further discussed below), we obtained detailed admission pathway information from eight of the 16 participating institutions, with the remaining eight reporting the DESE basis for admission codes.

Based on a comprehensive review of the institutional pathway data, the "other basis" category could be further disaggregated, in some cases, for the institutions that provided internal pathway information (see Table 2). Internal admission pathways with a clear analogue in the DESE classification were coded accordingly. For the institutions that provided only DESE pathway codes, the "other basis" category was not further broken down, and Code 29 was used instead.

Admission pathway categories were included in our statistical analysis as a set of dichotomous variables, where 1 indicated that a student entered university via the specified pathway, and 0 indicated otherwise. "Secondary education" (i.e., entry via the ATAR pathway) was the omitted reference category against which the other admission pathways were compared.

Data sources

This study was based on three key data sources:

- enrolment data from the DESE Higher Education Statistics Collection
- students' responses to the 2019 Student Experience Survey (SESurv)
- data on students' academic performance from 16 participating institutions.

Each of these data sources is detailed below.

DESE enrolment data

To examine patterns and trends in admission pathway usage over time and to investigate the retention and course progression of equity students entering university through different pathways, a set of custom data tables was obtained from DESE. These data tables included the following statistics, all of which were based on commencing domestic students in bachelor pass degrees at public and private universities ("Table A" and "Table B" providers according to the Higher Education Support Act 2003):

- the number of students in each equity group and overall, stratified by university and admission pathway (DESE categories)
- the number of students in each equity group and overall, stratified by broad field of education and admission pathway
- retention[2] and success rates[3] for students in each equity group and overall, stratified by university and admission pathway.

Data from these custom tables are presented primarily as descriptive statistics in this report. However, the large number of retention and success rate observations (for university, equity group, admission pathway, and year variables)—12,760 and 14,384 group-level observations, respectively—meant that these data could also be used for statistical modelling of students' academic performance by equity group and admission pathway to

[2] The new adjusted attrition rate for year(x) was the proportion of students who commenced a course in year(x) and neither completed in year(x) nor in year(x + 1) nor returned in year(x + 1).

[3] The success rate for year(x) is the proportion of actual student load (equivalent full-time student load) for units of study that were passed divided by all units of study attempted (passed + failed + withdrawn).

provide an all-of-sector complement to our analyses of data from selected higher education institutions. Our methodology for this is detailed in Appendix B.

Student experience survey

The key data source for the student experience and work readiness components of our investigation was the 2019 SESurv, an annual national survey on the experiences of commencing and later-year students studying onshore at an Australian university. The SESurv is typically administered in August of each year, with students eligible to participate if they have completed at least one semester of study. The response rate to the 2019 SESurv was 42.6%, equivalent to 277,868 valid responses from domestic and international undergraduates and postgraduates. Restricting this to our population of interest—that is, commencing domestic undergraduates—yielded a sample of 90,655 responses.[4]

This study considered eight student experience indicators derived from the SESurv, all of which were measured by way of a dichotomous variable, where 1 indicated a positive response and 0 otherwise (excluding missing data). Additional information on the SESurv is available in the published research report (Social Research Centre, 2020).

The eight student experience indicators considered in this study were as follows:

- **learner engagement**—the extent to which students engaged with their studies and their learning community
- **teaching quality**—students' perceptions of the quality of teaching and course design
- **learning resources**—students' perceptions of the quality of learning resources (e.g., teaching spaces, library facilities, textbooks, and online learning materials)
- **student support**—students' judgements on the quality of support services
- **skills development**—the extent to which students felt that their course developed their general and subject-specific skills
- **sense of belonging**—the extent to which students felt a sense of belonging to their university in the survey year
- **overall satisfaction**—the extent to which students were satisfied with the quality of their overall educational experience
- **dropout intention**—students' responses to a yes/no question asking whether they had seriously considered leaving their university in the survey year.

Logistic regression was used to estimate the relationship between students' admission pathways, equity group membership, and each of these student experience indicators (see Appendix B).

In addition to these student experience indicators, students who reported that they seriously considered dropping out of their university were asked to indicate—from a list of 30 possible (and non-exclusive) reasons—what contributed to their consideration. These responses were grouped into six broad categories for this study (see Table C1 in Appendix C for a mapping of items to these categories): financial, health or stress, academic/institutional, social/personal, workload, and disposition (i.e., attitude towards study).

To understand whether the factors contributing to students' consideration of dropping out varied by admission pathway, the percentages of students who provided an affirmative response in each of these categories are presented by admission pathway in the Findings section.

In addition to these student experience variables, the SESurv dataset contained a range of student demographic and enrolment information, which we included in our statistical analyses as explanatory variables. These included attendance mode, attendance type, study

[4] Owing to missing data on individual survey questions, this full sample was not used in every analysis.

area, the grouping of institution attended, and grades achieved to date. Equity group and admission pathway variables (DESE categories) were as previously defined.

Institutional data

To supplement the group-level data on student academic performance obtained from the Higher Education Statistics Collection, the present authors approached all public and private universities and requested student-level data on students' marks and enrolment status, along with information on their admission pathway, equity group membership, and course details. Ultimately, 16 universities agreed to participate in the study (see Table C2 in Appendix C for a list of the participating universities), with data pooled across institutions for analysis and reporting.

This dataset essentially tracked the cohort of domestic students who commenced a bachelor pass degree in 2015 over the 2015–2019 period. For each year under investigation, students' WAMs[5] and total student load were calculated, and an enrolment status variable was constructed, which reflected each student's status at the end of 2019:

1. Student completed the course originally commenced in 2015
2. Student completed a different bachelor pass course
3. Student is currently enrolled in the course originally commenced in 2015
4. Student is currently enrolled in a different bachelor pass course
5. Student neither completed nor is currently enrolled in a bachelor pass course.

As discussed previously, admission pathways generally reflected the DESE classifications. However, a more detailed breakdown of the "other basis" category was available for the eight institutions that provided internal pathway information.

Four academic performance measures were used in our analysis of institutional data:

- **first-year WAM**—a continuous variable measuring the WAM that students achieved in their first year of enrolment. Because different universities used different grading schemes, WAMs were standardised (i.e., converted to *z* scores) separately for each institution. As such, individual students' WAMs were measured in standard deviations relative to the institutional mean WAM, where the mean was equal to 0
- **course WAM**—a continuous variable measuring the WAM that students achieved across all unit attempts in bachelor pass courses over the 2015–2019 period, standardised at the institution level
- **first-year retention**—a dichotomous variable taking the value of 1 if a student had a non-zero student load in both 2015 and 2016, but 0 if a student had a non-zero student load in 2015 and zero student load in 2016
- **completed/enrolled as at 2019**—a dichotomous variable taking the value of 1 if a student's enrolment status (as defined in the list above) reflected either completion (Points 1 or 2) or continued enrolment (Points 3 or 4), and 0 otherwise (Point 5).

Ordinary least squares regression was used to estimate the relationship between students' admission pathways, equity group membership, and their first-year and course WAMs. Logistic regression was used to estimate the relationship between these same explanatory variables and the two dichotomous measures of student academic performance (i.e., retention and completed/enrolled status; see Appendix B).

[5] *WAM* = (sum(*Unit Points* × *Unit Mark*))/(sum(*Unit Points*)).

Findings

Entry pathways

This section addresses the study's first three research questions, the first of which is, "What are the proportions of students entering undergraduate study through ATAR and non-ATAR pathways in Australian universities?".

Proportions of students entering undergraduate study by pathway

Table 3 presents the admission data for the pathway groupings identified in the study. The first pathway, secondary education, was, for the purposes of this study, synonymous with the ATAR pathway. The next five pathways are those used by the DESE. The four "other" pathways (access, portfolio, pathway, and enabling) were established based on a comprehensive review of the pathway data provided by eight of the participating institutions and within the broader context of common university entry pathways identified in the literature. For the institutions that provided only DESE pathway codes, the "other basis" pathway was not broken down further.

Table 3. DESE and institutional admission pathways and data for commencing domestic bachelor's degree students in 2015, completing by 2019

Pathway	Description	Pathway classification			
		Institutional		DESE	
		n	%	n	%
Secondary education	Secondary education undertaken at school, VET, or other higher education provider (Australian or overseas equivalent)	27,916	57.7	15,140	45.2
Higher education course	A higher education course (Australian or overseas equivalent; complete or incomplete)	8,263	17.1	6,046	18.0
VET/TAFE award course	A VET award course other than a secondary education course (Australian or overseas equivalent; complete or incomplete)	4,377	9.1	3,867	11.5
Mature age entry provisions	Mature age special entry provisions	1,057	2.2	4,904	14.6
Professional qualification	A professional qualification	39	0.1	110	0.3
Other basis	All other pathways not classifiable under the abovementioned categories (as per DESE definitions)	4,018	8.3	3,446	10.3
Other sub-categories based on institutional data					
Other: Access	Entry through equity schemes, not based on ATAR (including non–mature age special entry)	329	0.7		
Other: Portfolio	Admission is based on a portfolio approach, including employment experience, exam, assessment, interview, etc.	226	0.5		
Other: Pathway	Higher education college/pathway provider	451	0.9		
Other: Enabling	Enabling program (e.g., bridging and preparation programs)	1,649	3.4		
Total other		6,673	13.8	3,446	10.3
Total		48,361	100.0	33,513	100.0

Note. DESE = Department of Education, Skills and Employment; VET = Vocational Education and Training; TAFE = Technical and Further Education; ATAR = Australian Tertiary Admission Rank.
Source: DESE (2021) and authors' analysis of institutional pathway information.

The institutional data presented in Table 3 essentially tracks the cohort of domestic students who commenced a bachelor pass degree in 2015 over the 2015–2019 period. For this cohort, approximately one-half of students entered via an ATAR and this was the most popular pathway into university. Around one-fifth entered on the basis of studying at another higher education institution; and a lesser proportion, on the basis of VET study or a professional qualification. Only a small proportion transitioned via mature age special entry provisions. For the additional "other" groupings (information for which was provided by eight institutions), the most popular pathway was the enabling program, followed by pathway providers, access programs, then portfolio entry.

Table 4 presents the proportions of students commencing bachelor's degree studies in Australia over time. The number of students admitted to university through the secondary education pathway—the ATAR pathway—declined over time from 51.0% in 2011 to 45.3% in 2019. However, it remained the most common admission pathway.

Most of the non-ATAR pathways were observed to account for an increasing share of admissions over time, with the exception of the mature age entry provision, admissions through which declined over time. Admissions through the higher education and VET/TAFE pathways increased slightly over the period. The "other basis" category was observed to have strong growth over time, increasing from around 9% of admissions in 2011 to 14% in 2019. The proportion of those entering through professional qualification was consistently low at around half a per cent.

Table 4. Admission pathway proportions for commencing domestic bachelor's degree students (%), 2011–2019

Pathway	2011	2012	2013	2014	2015	2016	2017	2018	2019
Secondary education	51.0	49.9	48.3	46.2	43.3	42.5	45.0	44.6	45.3
Higher education course	22.4	22.8	22.8	23.7	25.1	25.4	24.3	23.7	24.2
VET/TAFE award course	11.8	11.8	12.3	12.6	12.9	13.2	12.8	12.8	13.0
Mature age entry provisions	5.5	5.4	6.3	6.1	5.8	4.4	3.7	3.3	3.0
Professional qualification	0.5	0.6	0.6	0.6	0.5	0.5	0.5	0.4	0.4
Other basis	8.8	9.5	9.8	10.8	12.4	14.0	13.7	15.2	14.1
Total (*n*)	193,822	212,596	223,834	227,020	216,415	214,993	217,525	215,271	210,948

Note. VET = Vocational Education and Training; TAFE = Technical and Further Education.

Access to university education through non-ATAR and ATAR pathways by equity groups over time

The second research question asked, "What are the proportions, numbers, and trends over time—by equity group status—of those who access university education through non-ATAR and ATAR pathways?". Table 5 presents the proportions of students within each equity group (and overall) who entered through a non-ATAR pathway. The proportion of all students entering through non-ATAR pathways increased over time, from around 49% in 2011 to around 55% in 2019.

This trend towards non-ATAR university entry pathways was reflected for most equity groups, except Indigenous students, for whom the proportion declined over time. For the remaining equity groups, the growth in entry through non-ATAR pathways was substantial,

ranging from around three to six percentage point increases. The majority of mature age students accessed university through non-ATAR pathways, with proportions in excess of 90% throughout the time period observed.

Table 5. Commencing domestic bachelor's degree students entering university through a non-ATAR pathway, by proportion of equity group (%)

Equity group	2011	2012	2013	2014	2015	2016	2017	2018	2019
Indigenous	78.8	76.2	75.6	75.7	76.5	78.2	76.3	74.8	75.3
Disability	56.4	58.4	60.1	60.2	63.1	63.5	62.1	61.8	62.5
Low SES	56.0	57.0	59.3	61.9	64.1	65.0	62.8	62.6	62.3
Regional/remote	52.1	52.7	55.2	57.4	59.2	60.5	58.4	58.7	60.2
NESB	54.5	55.1	56.7	57.9	60.9	62.0	60.4	58.7	57.0
Women in STEM	48.2	48.3	50.2	52.1	54.6	56.1	54.5	54.6	54.0
Mature age	91.7	92.3	93.1	92.4	92.6	93.1	92.6	93.6	94.0
All students	49.0	50.1	51.7	53.8	56.7	57.5	55.0	55.4	54.7

Note. ATAR = Australian Tertiary Admission Rank; SES = socioeconomic status; STEM = science, technology, engineering, and mathematics

Distribution of equity students from non-ATAR pathways across courses over time

Finally, the third research question asked, "How are equity students from non-ATAR pathways distributed across courses, and are there observable trends and patterns?". To answer this, the proportions of students from non-ATAR pathways by broad field of education over time were calculated for all students and for each equity group. Corresponding statistics for students from ATAR pathways were also calculated for comparison.

The proportions of enrolments by field of education for all students are presented in Table C3 in Appendix C. The enrolment proportions in Table C3 are presented separately for ATAR and non-ATAR pathways. While there were year-to-year changes in the share of enrolments across the period, the changes in patterns were particularly stark for the fields of engineering and related technologies and for health. The share of enrolments in engineering and related technologies declined over time: around 4.5% of all students being from non-ATAR pathways in 2011 to only around 1.4% in 2015. The drop was particularly acute from 2014 to 2019, and this pattern was mirrored for the students from the ATAR pathway. In contrast, there was a gradual increase in enrolment share via non-ATAR pathways for health: around 18.7% in 2011 to around 22.8% in 2019.

The bottom panel of Table C3 presents the ratio of proportions of enrolments in non-ATAR pathways over ATAR pathways, for each field of study. This allows us to assess if the proportion of enrolments in each field of study are similar by entry pathway (ratios of one indicate identical proportions), or dissimilar (ratios above one indicate non-ATAR pathway more prevalent, while ratios below one indicate non-ATAR pathway less prevalent). The ratios in Table C3 indicate that fields such as Health and Education have proportionately more students entering through non-ATAR pathways than ATAR pathways. Conversely, fields such as Natural and Physical Sciences and Engineering are relatively dominated by ATAR pathway entrants. Further, for most fields of study, the proportion of non-ATAR to ATAR pathway enrolments do not change over time. The exceptions are Engineering, with indications of increasing proportions of non-ATAR entry over time (0.6 in 2011 to 0.8 in 2019) and Architecture and Building with indications of decreasing trend in proportions of non-ATAR entry (1.0 in 2011 to 0.7 in 2019).

The remaining tables in Appendix C (Tables C4 to C10) present the yearly enrolment shares and ratio of non-ATAR to ATAR enrolment proportions for the seven equity groups of interest. One general observation was that the enrolment trends for equity groups appeared

to reflect overall enrolment trends (i.e., for all students; see Appendix A, Table A1). Specifically, the decline in enrolments for engineering was also observed for all equity groups, and, similarly, the trend of increasing enrolments in health was also reflected in all equity groups, except for mature age students. Further, it was also noteworthy that, for women in STEM, a similar trend of decreasing enrolments in engineering was also observed.

In terms of enrolment share, students from all equity groups, except for those with disability, appeared to be better represented in the field of health. Education was another field with strong representation from equity group students, except for students with disability or from NESBs. Students from some equity groups also tended to be better represented in the field of society and culture: Indigenous students, students with disability, and, to a lesser extent, mature age students, were better represented in this field relative to all students. In contrast, NESB students appeared to be less represented in society and culture, with an enrolment share nearly 10% less compared to all students. Further, students with disability were better represented in the field of creative arts.

Observations could also be drawn around trends in non-ATAR and ATAR enrolment proportions for equity groups. For Indigenous students, there appear to be a positive trend towards ATAR pathway entry over time, particularly for the fields of Architecture and Building, Agriculture and Environment, Engineering, and Creative Arts. For students with disability, there appeared to be a positive trend towards non-ATAR pathway entry for Engineering, and a downwards trend away from non-ATAR pathways for Architecture and Building and Agriculture and Environment. The proportions of enrolments for low SES students in non-ATAR pathways increased over time relative to ATAR pathways for the field of Engineering, but declined for the fields of Architecture and Building and Agriculture and Environment. For students from regional and remote areas, there appeared to be a positive trend towards non-ATAR pathway entry for Information Technology and Engineering, and a downwards trend away from non-ATAR pathways for Architecture and Building, Agriculture and Environment and the Creative Arts. NESB students had increased entry via non-ATAR pathways over time in the fields of Agriculture and Environment and Education, and showed declining trends through non-ATAR pathways for Information Technology, Engineering, and Society and Culture. Mature aged students had declining enrolment proportions in non-ATAR pathways over time for the fields of Architecture and Building, Agriculture and Environment, and Creative Arts, and increasing proportions for Health and Education.

Student outcomes by pathway and equity group status

This section addresses the fourth research question: “Do student outcomes (retention, progression, student experience, academic performance, work readiness) differ based on the type of entry pathway and equity group status?”.

Retention

Table 6 presents the logistic regression model estimates of retention in the first year of university study. Note that two sets of logistic regression results are presented in Table 6: the left panel, titled “Institutional Pathway Codes”, presents results for the eight institutions that provided detailed pathway data, and the right panel, titled “DESE Pathway Codes”, presents results for all 16 institutions who provided data. Models were also run separately for the full sample, for students enrolled in STEM degrees, and for students enrolled in humanities, arts, and social sciences (HASS) degrees.

Table 6. Results of the logistic regression models for first-year retention

	Institutional pathway codes			DESE pathway codes		
	All (1)	STEM (2)	HASS (3)	All (1)	STEM (2)	HASS (3)
Admission pathway (excluding secondary education)						
Higher education course	–0.051***	–0.090***	–0.008	–0.018***	–0.045***	0.011**
	(0.006)	(0.010)	(0.008)	(0.004)	(0.007)	(0.006)
VET/TAFE award course	–0.062***	–0.087***	–0.052***	–0.032***	–0.066***	–0.012*
	(0.008)	(0.013)	(0.010)	(0.005)	(0.009)	(0.007)
Mature age entry provisions	–0.099***	–0.092***	–0.078***	–0.020***	–0.027***	–0.006
	(0.017)	(0.023)	(0.023)	(0.006)	(0.009)	(0.008)
Other basis (no further information)	–0.056***	–0.043***	–0.052***	–0.006	–0.014*	0.010
	(0.008)	(0.013)	(0.010)	(0.005)	(0.008)	(0.006)
Other: Access	0.011	–0.051	0.086***			
	(0.026)	(0.037)	(0.033)			
Other: Portfolio	–0.090***	–0.153***	–0.048			
	(0.028)	(0.048)	(0.036)			
Other: Pathway	0.042**	0.046	0.061***			
	(0.018)	(0.028)	(0.023)			
Other: Enabling	0.055***	–0.031	0.092***			
	(0.009)	(0.021)	(0.011)			
Equity group (excluding those not in an equity group)						
Indigenous	–0.063***	–0.101***	–0.049**	–0.047***	–0.060***	–0.042***
	(0.015)	(0.024)	(0.020)	(0.011)	(0.018)	(0.015)
Disability	–0.009	–0.036***	0.011	–0.012**	–0.022**	–0.003
	(0.008)	(0.011)	(0.010)	(0.006)	(0.009)	(0.008)
Low SES	–0.013**	–0.007	–0.021**	–0.005	–0.011*	–0.002
	(0.006)	(0.009)	(0.009)	(0.004)	(0.006)	(0.006)
Regional/remote	–0.007	–0.017*	0.002	–0.006	0.004	–0.018***
	(0.006)	(0.010)	(0.008)	(0.004)	(0.006)	(0.006)
NESB	0.032***	0.016**	0.036***	0.007*	0.010*	–0.001
	(0.006)	(0.007)	(0.008)	(0.004)	(0.005)	(0.006)
Women in STEM (1) / Women (2, 3)	0.031***	0.006	0.013**	0.039***	0.012**	0.009**
	(0.005)	(0.006)	(0.006)	(0.004)	(0.005)	(0.004)
Mature age	–0.011	0.005	–0.026**	–0.017***	0.010	–0.041***
	(0.008)	(0.012)	(0.010)	(0.006)	(0.009)	(0.009)
Observations (*n*)	48,361	19,674	28,687	81,874	34,321	47,553
Pseudo-R^2	0.068	0.072	0.071	0.056	0.053	0.060
Controls						
Age (continuous)	Yes	Yes	Yes	Yes	Yes	Yes
Attendance mode	Yes	Yes	Yes	Yes	Yes	Yes
Broad field of education	No	Yes	Yes	No	Yes	Yes
University group	Yes	Yes	Yes	Yes	Yes	Yes

Note. DESE = Department of Education, Skills and Employment; STEM = science, technology, engineering, and mathematics; HASS = humanities, arts, and social sciences; VET = Vocational Education and Training; TAFE = Technical and Further Education; SES = socioeconomic status; NESB = non-English-speaking background. Standard errors are reported in parentheses. Reference groups for the respective equity groups are: i) non- Indigenous; ii) no disability; iii) not low SES; iv) not from regional or remote area; v) ESB; vi) males and women from non-STEM in model 1, males in models 2 and 3, and; vii) non-mature aged.
***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively.

The results in Table 6 indicate that there were statistically significant differences for first-year retention outcomes according to the university entry pathway. Looking first at the models for the standard DESE pathway codes, it can be seen that students who were admitted to university on the basis of non-ATAR pathways had lower likelihoods of first-year retention by around two to three percentage points relative to students from ATAR pathways. This negative association with first-year retention was observed for those who entered university study through another higher education course, a VET/TAFE award course, and mature age entry. There was no statistically significant result for those who were admitted on an "other basis". These results were also observed for both STEM (along with the addition of a negative effect associated with other pathways) and HASS students, although many of the estimated marginal effects were reduced in magnitude and/or were statistically non-significant when considering only the HASS cohort. Additional models were also estimated where all non-ATAR categories were grouped and entered as a single dichotomous variable in the estimating equations. These models indicated that students from non-ATAR pathways (collectively) had reduced likelihoods of retention by four percentage points in the full sample, and reduced likelihoods of retention by three and two percentage points in the STEM and HASS samples, respectively.

Turning now to the results for the models for detailed admission pathways, there were broadly similar findings. Relative to students admitted to university on the basis of their ATAR, students who were admitted through non-ATAR pathways generally had lower likelihoods of first-year retention. However, the estimated marginal effects were larger than those found in the models for the standard DESE pathway codes. STEM students admitted through another higher education course, for instance, had a reduced likelihood of around 9% for first-year retention. A similarly reduced likelihood of first-year retention was found for those from VET/TAFE award courses (around 6%–9% between the full, STEM, and HASS samples) or mature age entry (around 8%–9% across the three samples).

The results for the various "other" admission categories are of particular interest. STEM students admitted through the "other: pathway" basis had a statistically non-significant difference in likelihood of being retained in the first year compared to students from the ATAR pathway. However, HASS students admitted through this pathway were significantly more likely to be retained than those through the ATAR pathway. The same was observed for HASS students admitted through the "other: access" pathway.

STEM students admitted through the "other: portfolio" entry pathway had a statistically significant reduced likelihood of retention of around 15%. For students from the "other: enabling" pathway, increased likelihoods of retention were observed for HASS students but not STEM students; the former cohort was around 9% more likely to be retained relative to students from ATAR pathways. Students from the residual "other basis" pathway had a 6% reduced likelihood of retention in the first year relative to students from ATAR pathway; similar effect sizes were also observed for HASS and STEM students.

The results of the analysis of first-year retention by equity group were mixed. Compared with their respective comparison groups, Indigenous students had lower likelihoods of retention, as did students from low-SES backgrounds, STEM students with disability, and HASS students of mature age and/or from regional and remote areas. However, it should be noted that, among these equity groups, the estimated effects for Indigenous students were moderate to large at 5%–10%; estimates for other equity groups were generally smaller in magnitude. Of the equity groups under consideration, only women in STEM were more likely to be retained in their first year.

Table 7 presents the results of the logistic regression models of continued enrolment or course completion. That is, the table presents the estimates of longer-term retention or course completion at 5 years after degree study commencement. For brevity, these outcomes will be referred to as longer-term retention or completion. As with the results

presented in Table 6, the left panel presents results for students from institutions that provided detailed admission pathway data, and the right panel presents results for students from all institutions that provided admission pathway data.

Table 7. Results of the logistic regression models for course completion or continued enrolment

	Institutional pathway codes			DESE pathway codes		
	All (1)	STEM (2)	HASS (3)	All (1)	STEM (2)	HASS (3)
Admission pathway (excluding secondary education)						
Higher education course	–0.013**	–0.066***	0.020**	0.011**	–0.031***	0.041***
	(0.007)	(0.011)	(0.008)	(0.005)	(0.008)	(0.006)
VET/TAFE award course	–0.111***	–0.150***	–0.092***	–0.095***	–0.125***	–0.078***
	(0.009)	(0.016)	(0.011)	(0.007)	(0.011)	(0.008)
Mature age entry provisions	–0.282***	–0.312***	–0.246***	–0.091***	–0.082***	–0.084***
	(0.015)	(0.023)	(0.020)	(0.007)	(0.011)	(0.009)
Other basis (no further information)	–0.058***	–0.019	–0.064***	–0.011*	–0.018**	–0.004
	(0.009)	(0.016)	(0.011)	(0.006)	(0.009)	(0.007)
Other: Access	–0.094***	–0.041	–0.121***			
	(0.028)	(0.040)	(0.038)			
Other: Portfolio	–0.208***	–0.230***	–0.187***			
	(0.033)	(0.059)	(0.040)			
Other: Pathway	0.100***	0.021	0.145***			
	(0.021)	(0.037)	(0.026)			
Other: Enabling	0.046***	–0.113***	0.083***			
	(0.011)	(0.029)	(0.013)			
Equity group (excluding those not in an equity group)						
Indigenous	–0.144***	–0.191***	–0.119***	–0.128***	–0.159***	–0.107***
	(0.017)	(0.027)	(0.022)	(0.014)	(0.022)	(0.017)
Disability	–0.035***	–0.048***	–0.011	–0.037***	–0.044***	–0.021**
	(0.008)	(0.012)	(0.011)	(0.007)	(0.010)	(0.009)
Low SES	–0.021***	–0.020*	–0.018*	–0.020***	–0.024***	–0.015**
	(0.007)	(0.012)	(0.010)	(0.005)	(0.008)	(0.007)
Regional/remote	–0.014*	0.001	–0.017*	–0.025***	–0.008	–0.041***
	(0.007)	(0.011)	(0.009)	(0.005)	(0.008)	(0.007)
NESB	–0.001	–0.004	0.007	–0.010**	0.003	–0.023***
	(0.006)	(0.009)	(0.009)	(0.004)	(0.006)	(0.006)
Women in STEM (1) / Women (2, 3)	0.042***	0.051***	0.027***	0.054***	0.050***	0.035***
	(0.005)	(0.007)	(0.006)	(0.004)	(0.006)	(0.005)
Mature age	–0.016*	–0.008	–0.014	–0.021***	–0.007	–0.032***
	(0.009)	(0.015)	(0.012)	(0.008)	(0.012)	(0.010)
Observations (*n*)	48,361	19,674	28,687	80,380	33,400	46,980
Pseudo-R^2	0.059	0.053	0.076	0.039	0.032	0.051
Controls						
Age (continuous)	Yes	Yes	Yes	Yes	Yes	Yes
Attendance mode	Yes	Yes	Yes	Yes	Yes	Yes
Broad field of education	No	Yes	Yes	No	Yes	Yes
University group	Yes	Yes	Yes	Yes	Yes	Yes

Note. DESE = Department of Education, Skills and Employment; STEM = science, technology, engineering, and mathematics; HASS = humanities, arts, and social sciences; VET = Vocational Education and Training; TAFE = Technical and Further Education; SES = socioeconomic status; NESB = non-English-speaking background. Standard errors are reported in parentheses. Reference groups for the respective equity groups are: i) non- Indigenous; ii) no disability; iii) not low SES; iv) not from regional or remote area; v) ESB; vi) males and women from non-STEM in model 1, males in models 2 and 3, and; vii) non-mature aged.
***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively.

It can be seen from the right panel of Table 7 that students from non-ATAR pathways had reduced likelihoods of longer-term retention or course completion relative to students from ATAR pathways. Specifically, students from VET/TAFE award courses, mature age entry, or "other" admission pathways had 10%, 9%, and 1% reduced likelihoods, respectively, of being retained or completing their course in the longer term. The reduced likelihoods for students from these three pathways held when the field of study sub-samples were considered — the disadvantage associated with entering university through a VET/TAFE award course was somewhat greater for STEM students than HASS students. Relative to ATAR pathway students, HASS students from another higher education course had longer-term retention or completion outcomes that were significantly improved (4%), whereas STEM students were significantly less likely to be retained or to have completed their course (–3%).

The results from the models for detailed institutional pathways supported the qualitative findings from the models with broad DESE pathway data. Relative to students from the ATAR pathway, students from non-ATAR pathways generally had lower likelihoods of longer-term retention or completion. The magnitude of these estimated effects were –1% for students from higher education courses, –11% for students from VET/TAFE award courses, and up to –28% for students from mature age entry pathways. Again, the estimated negative effects were generally stronger for students in STEM courses than for students in HASS courses. Compared with ATAR pathway students, HASS students entering university through another higher education course had a slightly but significantly increased likelihood of retention or completion (2%).

For students from the "other" entry pathways, the estimated effects were diverse, with a mix of positive and negative estimates across pathways and broad course disciplines. Specifically, the estimated likelihoods of longer-term retention and completion were negative for those in the "other basis" (–6%), "other: access" (–9%), and "other: portfolio" (–21%) cohorts but positive for those form the "other: pathway" (10%) and "other: enabling" (5%) cohorts. The estimated likelihoods for some students from some of the "other" entry pathways differed when looking at sub-samples by field of study. For "other: access" and the residual "other" category, the estimated negative effects were significant only for HASS students, as was the estimated positive effect associated with "other: pathway". Conversely, the negative effect associated with "other: enabling" was stronger for STEM students than for HASS students.

Longer-term retention and completion outcomes were also found to differ by equity group status. Indigenous students, students with disability, students from low-SES backgrounds, students from regional and remote areas, and mature age students were all found to have reduced likelihoods of being retained in degree study or completing their courses at 5 years after study commencement. These effects ranged from around 1%–2% for students from regional and remote areas, low-SES backgrounds, and mature age students; 4% for students with disability; and up to a very large 14% estimate for Indigenous students. NESB students were not associated with statistically different longer-term retention or completion outcomes, but women in STEM were significantly more likely to have been retained or to have completed their studies.

Academic performance

Table 8 presents the results from the linear regression models of first-year WAMs. Note that the dependent variable, WAM, in these models was standardised by institution. Looking first at the models for the broader DESE admission pathways, the WAMs of students who entered university through VET/TAFE award courses or via mature age provisions were significantly lower than those of ATAR pathway students. In particular, students from VET/TAFE award courses had the greatest reductions in WAMs at around a quarter of a standard deviation below the mean WAM of students in their respective institutions. Once

again, when the effects of the field of study were examined, the negative effect was observed to be more pronounced for STEM students than for HASS students. Smaller but statistically negative associations with WAM were observed for students from mature age entry pathways, at around a tenth of a standard deviation for STEM and HASS students alike. Conversely, a significant positive effect of around a tenth of a standard deviation was observed for STEM students admitted on the basis of another higher education course.

Table 8. Results of the linear regression models for first-year weighted average marks

	Institutional pathway codes			DESE pathway codes		
	All (1)	STEM (2)	All (1)	All (1)	STEM (2)	HASS (3)
Admission pathway (excluding secondary education)						
Higher education course	0.063***	0.213***	0.027	0.016	0.076***	–0.009
	(0.021)	(0.035)	(0.027)	(0.012)	(0.019)	(0.016)
VET/TAFE award course	–0.033	–0.065	–0.061**	–0.252***	–0.348***	–0.218***
	(0.023)	(0.040)	(0.030)	(0.014)	(0.023)	(0.018)
Mature age entry provisions	0.003	0.072	0.039	–0.084***	–0.086***	–0.088***
	(0.084)	(0.138)	(0.103)	(0.015)	(0.023)	(0.020)
Other basis (no further information)	–0.062***	0.067**	–0.116***	–0.006	–0.003	0.007
	(0.021)	(0.033)	(0.027)	(0.012)	(0.020)	(0.016)
Other: Access	0.026	0.032	–0.004			
	(0.096)	(0.132)	(0.134)			
Other: Portfolio	0.329	[a]	0.259			
	(0.267)	[a]	(0.274)			
Other: Pathway	0.010	0.164**	0.040			
	(0.049)	(0.082)	(0.060)			
Other: Enabling	0.282***	0.181**	0.268***			
	(0.029)	(0.089)	(0.032)			
Equity group (excluding those not in an equity group)						
Indigenous	–0.531***	–0.643***	–0.496***	–0.430***	–0.471***	–0.426***
	(0.042)	(0.064)	(0.054)	(0.030)	(0.047)	(0.039)
Disability	0.060***	0.064**	0.003	–0.037**	–0.014	–0.056***
	(0.021)	(0.030)	(0.029)	(0.016)	(0.023)	(0.021)
Low SES	–0.102***	–0.109***	–0.119***	–0.137***	–0.115***	–0.164***
	(0.018)	(0.027)	(0.024)	(0.011)	(0.016)	(0.015)
Regional/remote	–0.025	–0.027	–0.044**	–0.025**	0.010	–0.052***
	(0.016)	(0.024)	(0.021)	(0.011)	(0.016)	(0.015)
NESB	–0.103***	–0.167***	–0.119***	–0.066***	–0.089***	–0.051***
	(0.015)	(0.022)	(0.021)	(0.009)	(0.013)	(0.013)
Women in STEM (1) / Women (2, 3)	0.181***	0.167***	0.149***	0.151***	0.147***	0.121***
	(0.014)	(0.019)	(0.016)	(0.009)	(0.013)	(0.011)
Mature age	0.164***	0.160***	0.175***	0.161***	0.193***	0.131***
	(0.025)	(0.041)	(0.032)	(0.018)	(0.028)	(0.024)
Observations (*n*)	30,048	11,208	18,840	62,306	25,434	36,872
Pseudo-R^2	0.028	0.038	0.051	0.024	0.038	0.023
Controls						
Age (continuous)	Yes	Yes	Yes	Yes	Yes	Yes
Attendance mode	Yes	Yes	Yes	Yes	Yes	Yes
Broad field of education	No	Yes	Yes	No	Yes	Yes

Note. DESE = Department of Education, Skills and Employment; STEM = science, technology, engineering, and mathematics; HASS = humanities, arts, and social sciences; VET = Vocational Education and Training; TAFE = Technical and Further Education; SES = socioeconomic status; NESB = non-English-speaking background. Standard errors are reported in parentheses. Reference groups for the respective equity groups are: i) non- Indigenous; ii) no disability; iii) not low SES; iv) not from regional or remote area; v) ESB; vi) males and women from non-STEM in model 1, males in models 2 and 3, and; vii) non-mature aged.

[a] Insufficient observations for use as a regressor in the model.

***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively.

The findings from the models of first-year WAMs for institutions with detailed pathway information differed somewhat to those from the models for all institutions (i.e., using broad DESE pathway information). The positive effect observed for STEM students entering through higher education courses remained significant but was substantially greater when considering only institutions that provided detailed pathway information. The significant negative effect associated with entry via VET/TAFE award courses was observed only for HASS students. The effects associated with the residual "other" category varied considerably by field; significant positive and negative effects were observed for STEM and HASS students, respectively. Considering the institutions with detailed pathway classifications, students admitted through the "other: enabling" pathway had significantly higher WAMs than those admitted via the ATAR pathway: around 0.3 and 0.2 of a standard deviation for STEM and HASS students, respectively. Further, STEM students admitted on the basis of "other: pathway" had mean WAMs around 0.2 of a standard deviation higher than those admitted via the ATAR pathway; however, the same was not observed for HASS students.

Estimated effects for equity groups were again a mix of positive and negative effects. Indigenous students had mean WAMs around 0.4 of a standard deviation lower than the mean WAMs of non- Indigenous students; this effect was more pronounced for STEM students than for HASS students. For students with disability, no statistically significant effect was found in relation to STEM students, but, in HASS fields, these students underperformed relative to their counterparts with no disability. Students from low-SES backgrounds had mean WAMs around a tenth of a standard deviation lower than their peers from higher-SES backgrounds, while HASS students from regional and remote areas had mean WAMs marginally lower than their counterparts from urban areas (0.05 of a standard deviation). NESB students had mean WAMs around 0.07 of a standard deviation lower than their English-speaking background counterparts. In contrast, women in STEM fields and mature age students performed better academically than men and women in non-STEM fields, and non–mature age students, respectively; both groups had mean WAMs around 0.15 of a standard deviation higher than their respective reference groups.

Table 9 presents results from the models of course WAMs. Generally speaking, the results for the course WAM models complemented those found for first-year WAMs. When looking at the models with DESE pathway information, students from higher education course admission pathways generally performed better academically compared to students from ATAR pathways. Students from the non-ATAR pathways of VET/TAFE award courses, mature age entry, and the residual "other" category generally had lower WAMs, with effect sizes qualitatively similar to those for the first-year WAMs. For instance, students from VET/TAFE pathways appeared to experience the largest academic achievement gap compared to students from ATAR pathways, with mean WAMs around a third and a fifth of a standard deviation lower in relation to STEM and HASS students, respectively. The corresponding effect sizes for mature age and "other basis" pathway students were considerably smaller, with none greater than a tenth of a standard deviation.

Table 9. Results of the linear regression models for course weighted-average marks

	Institutional pathway codes			DESE pathway codes		
	All (1)	STEM (2)	HASS (3)	All (1)	STEM (2)	HASS (3)
Admission pathway (excluding secondary education)						
Higher education course	0.153***	0.197***	0.171***	0.068***	0.091***	0.067***
	(0.017)	(0.029)	(0.022)	(0.012)	(0.018)	(0.015)
VET/TAFE award course	–0.067***	–0.153***	–0.039	–0.255***	–0.341***	–0.214***
	(0.021)	(0.034)	(0.028)	(0.014)	(0.022)	(0.018)
Mature age entry provisions	–0.167**	–0.126	–0.146*	–0.065***	–0.054**	–0.070***
	(0.066)	(0.101)	(0.085)	(0.015)	(0.022)	(0.020)
Other basis (no further information)	–0.088***	–0.001	–0.112***	–0.046***	–0.089***	–0.019
	(0.020)	(0.033)	(0.026)	(0.012)	(0.019)	(0.016)
Other: Access	–0.052	–0.040	–0.046			
	(0.096)	(0.133)	(0.134)			
Other: Portfolio	–0.095	–0.233	–0.013			
	(0.085)	(0.142)	(0.106)			
Other: Pathway	0.068	0.107	0.084			
	(0.049)	(0.083)	(0.061)			
Other: Enabling	0.194***	0.024	0.223***			
	(0.026)	(0.061)	(0.030)			
Equity group (excluding those not in an equity group)						
Indigenous	–0.528***	–0.586***	–0.525***	–0.452***	–0.447***	–0.474***
	(0.040)	(0.061)	(0.052)	(0.029)	(0.046)	(0.039)
Disability	0.041**	0.019	0.027	–0.046***	–0.053**	–0.041**
	(0.020)	(0.029)	(0.028)	(0.015)	(0.023)	(0.021)
Low SES	–0.125***	–0.120***	–0.138***	–0.143***	–0.118***	–0.168***
	(0.017)	(0.026)	(0.023)	(0.011)	(0.016)	(0.015)
Regional/remote	0.004	0.032	–0.026	–0.015	0.032**	–0.050***
	(0.015)	(0.023)	(0.020)	(0.011)	(0.016)	(0.015)
NESB	–0.133***	–0.188***	–0.122***	–0.086***	–0.099***	–0.072***
	(0.015)	(0.021)	(0.021)	(0.009)	(0.013)	(0.013)
Women in STEM (1) / Women (2, 3)	0.188***	0.204***	0.186***	0.169***	0.202***	0.154***
	(0.013)	(0.018)	(0.015)	(0.009)	(0.013)	(0.011)
Mature age	0.099***	0.124***	0.106***	0.126***	0.175***	0.095***
	(0.024)	(0.038)	(0.031)	(0.017)	(0.027)	(0.023)
Observations (*n*)	33,024	12,425	20,599	65,147	26,556	38,591
Pseudo-R^2	0.028	0.037	0.035	0.025	0.041	0.022
Controls						
Age (continuous)	Yes	Yes	Yes	Yes	Yes	Yes
Attendance mode	Yes	Yes	Yes	Yes	Yes	Yes
Broad field of education	No	Yes	Yes	No	Yes	Yes

Note. DESE = Department of Education, Skills and Employment; STEM = science, technology, engineering, and mathematics; HASS = humanities, arts, and social sciences; VET = Vocational Education and Training; TAFE = Technical and Further Education; SES = socioeconomic status; NESB = non-English-speaking background. Standard errors are reported in parentheses. Reference groups for the respective equity groups are: i) non- Indigenous; ii) no disability; iii) not low SES; iv) not from regional or remote area; v) ESB; vi) males and women from non-STEM in model 1, males in models 2 and 3, and; vii) non-mature aged.
***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively.

Turning to the models for institutions with more detailed pathways, students from the higher education course pathway significantly outperformed ATAR pathway students. Additionally, STEM students entering via a VET/TAFE course, and HASS students entering through mature age and the residual “other” pathways, generally had lower course WAMs.
In relation to the detailed “other” categories, the only significant effect was observed in relation to HASS students entering university through the “other: enabling” pathway’. These students achieved mean course WAMs around 0.2 of a standard deviation above the institutional average.

With regard to the effects of equity group membership, similar patterns were observed in comparison to results for first-year WAMs. The academic performance gap was especially large between Indigenous and non- Indigenous students: Indigenous students had course WAMs around half a standard deviation below the mean WAMs for non- Indigenous students in both STEM and HASS fields. Students from some other equity groups had poorer course WAMs in comparison to their respective benchmark student groups, albeit of a smaller magnitude. Specifically, negative associations were observed between equity group membership and course WAMs both for students from low-SES backgrounds (0.14 of a standard deviation) and for NESB students (around 0.1 of a standard deviation). Women in STEM fields and mature age students had superior academic performance in comparison to their respective reference groups — 0.17 and 0.12 of a standard deviation, respectively. Outcomes in relation to regional/remote students varied by field of education, with slight positive and negative effects observed for STEM and HASS students, respectively.

Other aspects of student experience

The results from the logistic regression models of student experience and dropout intention are presented in Table 10. It should be noted that these results are the estimated average marginal effects from the logistic regression models. Each column in Table 10 presents the estimates for various dimensions of student experience; the last column presents the estimates for dropout intention.

Relative to students who gained entry via an ATAR pathway, students who gained entry via the completion of a higher education course were less satisfied with various components of the student experience. This included teaching quality, learning resources, student support, sense of belonging, and overall satisfaction. Effect sizes ranged from two to four percentage points. However, there was one aspect with which these students were more satisfied: their experience of skills development.

For students who gained university entry through the completion of a VET/TAFE award course, two statistically significant differences relative to the ATAR pathway group were observed: a 2% reduced likelihood of satisfaction with learning resources and a 1% increased satisfaction with skills development.

Students who gained entry via mature age entry pathways were associated with reduced probabilities of satisfaction with learner engagement by 2%. However, they were associated with increased probabilities of satisfaction with teaching quality (2%), student support (2%), and skills development (2%). Students who gained entry through professional qualifications were not observed to have any statistically significant differences from the reference group.

Students from the “other basis” entrance pathway had positive probabilities of satisfaction with multiple dimensions of student experience. These were for learner engagement (3%), student support (1%), skills development (2%), and sense of belonging (3%). There was also a statistically significant positive effect on satisfaction with teaching quality for this group; however, the effect size was very small, at 0.8%.

It should also be noted that, apart from students who entered through the completion of a higher education course, none of the non-ATAR entry pathways was associated with any

meaningful effects on overall satisfaction. The effect sizes associated with these entry pathways also tended to be modest, ranging from 1% to 3%. However, there were statistically significant differences in the probability of satisfaction with student experience by equity group membership.

Indigenous students were found to have increased probabilities of satisfaction relative to non- Indigenous students in the areas of student support, sense of belonging, and overall satisfaction, ranging from 3% to 4%. Students with disability had reduced probabilities of satisfaction relative to students without disability for all aspects of student experience except student support, for which no statistically significant effect was observed. That is, for students with disability, there were reduced probabilities of satisfaction with learner engagement (3%), teaching quality (2%), learning resources (3%), skills development (3%), sense of belonging (3%), and overall satisfaction (1%).

For students from low-SES backgrounds, statistically significant results were estimated, but the estimated probability of satisfaction with learner engagement, learning resources, skills development, and overall satisfaction were very small, under 1%. Additionally, a small, 2% increased probability of satisfaction with the sense of belonging was found for this group relative to students from higher-SES backgrounds.

Turning to students from regional and remote areas, positive and statistically significant estimates were calculated for the likelihood of satisfaction in all student experience aspects. Regional and remote students, relative to students from metropolitan areas, were more likely to be satisfied with learner engagement (2%), teaching quality (1%), learning resources (1%), student support (2%), skills development (1%), sense of belonging (3%), and overall satisfaction (1%).

Students from NESBs were more likely to be satisfied in three areas of student experience in comparison to students from English-speaking backgrounds: student support (3%), skills development (3%), and sense of belonging (9%). The results for students from NESBs in other student experience areas were not statistically significant.

Compared to men and women in non-STEM fields, women in STEM fields had a relatively positive assessment of their student experience across the board. That is, women in STEM fields were more likely to report satisfaction with learner engagement (1%), teaching quality (2%), learning resources (2%), student support (2%), skills development (1%), sense of belonging (2%), and overall satisfaction (3%).

Mature age students tended to have reduced likelihoods of satisfaction in the student experience areas examined. However, an exception was for their satisfaction with student support, with an estimated 2% increased likelihood of satisfaction relative to their younger peers. Negative effects were estimated for the remainder of the student experience areas, with statistically significant reductions in satisfaction for learner engagement (–8%), skills development (–4%), sense of belonging (–2%), and overall satisfaction (–1%).

Dropout intention

We now turn to the final column of Table 10, which indicates the likelihood of a student intending to drop out. Of the seven equity groups examined, five were associated with increased likelihoods of the intention to drop out of university study: Indigenous students (3%), students with disability (4%), students from low-SES backgrounds (1%), students from regional and remote areas (2%), and mature age students (2%). Students from NESBs were less likely to consider dropping out of studies by 7%, while no statistically significant results were found for women in STEM. Notably, students from regional and remote areas have increased likelihoods of the intention to dropout while having relatively positive assessments of most aspects in student experience.

Table 10. Results of the logistic regression models for student experience and dropout intention

	Learner engagement	Teaching quality	Learning resources	Student support	Skills development	Sense of belonging	Overall satisfaction	Dropout intention
Admission pathway (excluding secondary education)								
Higher education course	0.004	–0.019***	–0.034***	–0.027***	0.012***	–0.021***	–0.023***	0.001
	(0.005)	(0.004)	(0.004)	(0.005)	(0.004)	(0.005)	(0.004)	(0.004)
VET/TAFE award course	–0.007	–0.005	–0.023***	–0.010	0.010*	0.007	–0.005	–0.005
	(0.007)	(0.005)	(0.005)	(0.007)	(0.006)	(0.007)	(0.005)	(0.006)
Mature age entry provisions	–0.020*	0.015*	0.007	0.022**	0.016*	0.017	0.007	–0.018**
	(0.011)	(0.008)	(0.008)	(0.011)	(0.009)	(0.012)	(0.009)	(0.009)
Professional qualification	–0.014	–0.010	–0.004	0.013	0.027	0.042	–0.007	–0.008
	(0.028)	(0.020)	(0.021)	(0.025)	(0.020)	(0.027)	(0.020)	(0.022)
Other basis	0.026***	0.008**	0.002	0.011**	0.023***	0.027***	0.005	–0.009**
	(0.005)	(0.004)	(0.004)	(0.005)	(0.004)	(0.006)	(0.004)	(0.005)
Equity group								
Indigenous	0.016	0.011	0.001	0.028**	0.012	0.039***	0.029***	0.028***
	(0.012)	(0.009)	(0.009)	(0.011)	(0.010)	(0.013)	(0.009)	(0.011)
Disability	–0.026***	–0.017***	–0.027***	0.006	–0.034***	–0.034***	–0.012**	0.038***
	(0.007)	(0.005)	(0.005)	(0.006)	(0.006)	(0.007)	(0.005)	(0.006)
Low SES	–0.008*	–0.002	–0.007**	0.007	0.007*	0.018***	–0.007*	0.008**
	(0.005)	(0.003)	(0.003)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)
Regional/remote	0.016***	0.010***	0.009***	0.015***	0.007*	0.031***	0.012***	0.015***
	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)
NESB	0.002	0.003	0.000	0.028***	0.028***	0.090***	–0.010	–0.066***
	(0.008)	(0.006)	(0.006)	(0.007)	(0.006)	(0.008)	(0.006)	(0.006)
Women in STEM	0.014**	0.016***	0.015***	0.019***	0.024***	0.022***	0.025***	0.000
	(0.006)	(0.004)	(0.004)	(0.005)	(0.004)	(0.006)	(0.004)	(0.005)
Mature age	–0.079***	–0.001	–0.001	0.015***	–0.041***	–0.021***	–0.012***	0.017***
	(0.006)	(0.004)	(0.004)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)
Observations (*n*)	78,116	78,118	71,796	64,748	78,092	78,060	78,114	77,817
Pseudo-R^2	0.082	0.040	0.019	0.020	0.039	0.019	0.046	0.029
Controls								
Attendance mode (2)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Attendance type	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Study area (20)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Institution group (4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Grade band (5)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note. VET = Vocational Education and Training; TAFE = Technical and Further Education; SES = socioeconomic status; NESB = non-English-speaking background; STEM = science, technology, engineering, and mathematics. Standard errors are reported in parentheses. Reference groups for the respective equity groups are: i) non- Indigenous; ii) no disability; iii) not low SES; iv) not from regional or remote area; v) ESB; vi) males and women from non-STEM in model 1, males in models 2 and 3, and; vii) non-mature aged.
***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively.

Table 11 presents the proportions for reasons behind the intention to leave university study, by admission pathway. Generally, a lower proportion of students who entered university study on the basis of their ATAR (i.e., via secondary education) cited financial and health reasons as reasons for considering degree dropout. However, disposition towards study was a more substantial factor for this group.

Conversely, students from non-ATAR pathways were proportionately more inclined to cite health and financial reasons for considering study dropout. For these students, differences emerged when looking at the proportions for the other categories. A higher proportion of students who gained entry on the basis of the completion of higher education courses and lower proportions of students from VET/TAFE award courses, mature age entry, and "other basis" cited academic/institutional factors for consideration of dropout.

There was some slight variation in the proportions of students who indicated social/personal reasons as the basis for considering dropout across all entry pathways, but all proportions hovered around the mid-60s. Similarly, the proportions of students who considered dropout due to workload reasons only slightly varied between entry pathways, except for a notably higher proportion for those from VET/TAFE award courses.

There were more differences across entry pathways for the category of disposition towards study. As mentioned previously, the pathway with the highest proportion of students indicating disposition towards study as a reason for study dropout was the ATAR pathway. The next highest proportion was for students from "other basis" pathway. For students entering through another higher education course or through the mature age pathway, lower proportions indicated this category as the basis for their intention to discontinue study. Students who entered university study based on VET/TAFE qualifications had the lowest estimated proportion — nearly 20% below the sample mean.

Table 11. Proportion of reasons for the intention to leave university study, by admission pathway

Admission pathway	Financial	Health or stress	Academic/ institutional	Social/ personal	Workload	Disposition	*n*
Secondary education	33.4	42.8	49.8	64.0	42.7	55.5	8,380
Higher education course	43.8	48.3	52.3	60.9	42.6	36.1	3,488
VET/TAFE award course	50.2	48.6	45.7	65.3	51.6	27.6	1,517
Mature age entry provisions	52.0	57.1	38.1	65.4	44.7	31.6	396
Other basis	40.6	46.8	46.9	65.9	45.7	47.2	2,082
Total	38.7	45.4	49.3	63.7	44.0	46.9	15,863

Note. VET = Vocational Education and Training; TAFE = Technical and Further Education.

Discussion

Entry pathways

This study supports earlier evidence that, despite being the most popular route to entering university, the ATAR pathway is declining among bachelor students (e.g., TEQSA, 2019). Evidenced growth in alternative pathways (Productivity Commission, 2019) is further supported in this study, with increasing numbers of students entering courses in other ways. In particular, many students are entering based on their achievements in another higher education course—domestic or overseas—and through VET.

Despite the use of mature age entry provisions declining over the 10 years observed in this study, this does not equate to a fall in mature age student cohorts. The findings affirm that increasing numbers of mature age students are accessing higher education via other entry pathways. It is known, for example, that VET entrants often complete their qualification many years before commencing university (Chesters & Watson, 2016).

Given the Australian Government's encouragement of universities to better support equity students' entry into higher education (Diamond & O'Brien-Malone, 2018), the sizeable increase in admission numbers via non-ATAR pathways is encouraging. It confirms that equity groups, particularly students with disability, of low-SES background, and women in STEM, are making good use of these alternative routes, which were explicitly intended to widen participation in higher education. The lower take-up among Indigenous students could perhaps suggest the need for greater engagement with targeted interventions in schools, such as reduced ATAR scores and early, unconditional offers (Pilcher & Torii, 2018).

It appears that students are leveraging the alternative pathways into university across all disciplines, but particularly so in health. This highlights the importance of these pathways for ensuring an adequate supply of suitably skilled workers to meet the demands for health care amid ageing populations (see Tower et al., 2015) and, more recently, the global pandemic.

Declining engagement with alternative pathways among engineering students, as well as the traditional ATAR route more generally, may reverse in the coming years, given the reduced fees for studying STEM subjects through the Job-Ready Graduates program (DESE, 2020). This may also apply for women in STEM, who have experienced diminishing enrolment numbers.

It appears that there are opportunities among certain disciplines to better attract equity students, although, as noted previously, declining enrolment numbers reflect overall trends among all student groups. Targeted interventions for widening participation—through school-based or alternative pathways, and particularly in engineering and education—may assist the Australian Government to reach equity group participation targets.

Nuanced interventions to encourage certain equity groups into different disciplines appears to be important. For example, creative arts disciplines may wish to investigate how they may better attract Indigenous and regional/remote students, while agriculture, environmental, and related disciplines could consider targeted interventions to recruit students with disability, those in regional and remote areas, mature age students, and women in STEM. Sharing good practice and learning lessons from other fields that are experiencing proportionate rises in equity student numbers via ATAR or alternative pathways, compared with overall enrolments, could prove valuable for enhancing equity and access in higher education.

Student outcomes and pathway

The reported negative associations between non-ATAR pathways and student retention and academic performance broadly supports earlier evidence (Chesters & Watson, 2014, 2016; Edwards & McMillan, 2015).

Specifically, findings indicated that transferring from a different higher education course led to weaker short-term and longer-term retention, including across HASS and STEM areas. Challenges arising from transfer have been documented and largely relate to students feeling disconnected in the receiving institution and finding it difficult to engage with faculty and student peers (see Nuñez & Yoshimi, 2017). This is supported by transferring students' lesser satisfaction with multiple aspects of their university experience, notably their sense of belonging. In support of Tobolowsky and Cox (2012), more attention is needed to understand and address of the needs and experiences of transfer students. On a more positive note, transferring across courses was observed to have no effect on short- or longer-term academic performance compared with ATAR pathway students.

Students entering via mature age provisions (albeit only in the short term), portfolio, and "other" undetermined alternative pathways had reduced odds of retention. Of note, those entering via mature age provisions were more likely to consider dropping out compared to those that did not enter via this pathway. Evidence suggests that students entering through mature age or portfolio entry pathways sometimes feel their work and life experience are undervalued at university (e.g., Murray & Klinger, 2012), which possibly explains the relatively high level of attrition. Supporting this, the mature age entry group in this study was less satisfied in terms of learner engagement, although they were more satisfied with student support than ATAR students.

There were also weaker academic outcomes among those entering via mature age provisions and "other" pathways both in the short and longer term. Findings for the portfolio pathway were less definitive, with significantly lower course averages only reported in the longer term, particularly in STEM courses. Collectively, however, these findings suggest that mature age students can find higher education challenging, described by Mallman and Lee (2017) as "in-between" and struggling with competing demands on their time (work, study, and life) and with identifying and fitting in with higher education culture. However, it is important to remember that, in Australia, a mature age student is a student aged 25 years or above; those using mature age entry provisions, such as the STAT, are not always "older" students (Connor et al., 2018).

Despite the large volume of students transitioning from VET to higher education, this study highlighted some areas of concern: both weaker retention and poorer academic performance outcomes were observed, both in the short and longer term, compared to ATAR students. These students, however, were largely as satisfied with their university experience as their ATAR peers were.

Catterall et al. (2014) suggested that the VET can be more focused on skills and jobs rather than developing academic and critical thinking skills. As this may lead to feelings of unpreparedness and weaker retention, it highlights the importance of clear communication between the VET and higher education sectors on articulation pathways to optimise student outcomes (Walls & Pardy, 2010). Further, purported differences between the two education systems have prompted recommendations for support mechanisms for students transitioning from VET to higher education, including seminars and programs that address academic literacy, critical thinking, research skills, and effective time management and peer contact and mentoring programs (Catterall & Davis, 2012).

In the first year of study, those entering university via access programs experienced broadly similar retention outcomes as those transitioning directly from school but experienced

weaker retention outcomes in the longer term, particularly in HASS courses. This highlights the need for support in the middle and later stages of study beyond targeted interventions in the first year.

While students entering via pathway providers also reported similar retention outcomes to ATAR students in the first year, their retention rate was relatively higher in the longer term. There were also no observed differences in these students' academic outcomes compared with ATAR students. This purports the potential value of Australia's 31 pathway providers (Morgan, 2020) and supports earlier assertions of their positive impact on academic outcomes and success in preparing students for university life (e.g., Baik et al., 2020).

Findings also affirmed that students in enabling programs experience comparable or better odds of remaining at university in the short term (Pitman et al., 2016; Thomas, 2014), although not in STEM courses. Their success is attributed to the programs building resilience, confidence, and a greater sense of purpose among those who have typically achieved lower ATARs, aiding commitment to further study (Coombes et al., 2013). The relatively higher course averages observed both in the first year and longer term, compared with ATAR students, supports Chesters et al.'s (2018) study of students attending a regional university in Australia and adds to the appeal of such programs.

In terms of the effects on retention and academic performance for students entering from alternative pathways, there were notably weaker course completion results and course WAMs in STEM. This highlights the need for granular analysis within institutions and a careful review of support interventions at the discipline level.

Regarding reasons for intending to leave university study, the association between financial and health/stress concerns and non-ATAR pathways is not unexpected, given that more equity group students use these pathways and are known to experience greater financial pressure as they try to balance study and work commitments (Li & Carroll, 2020; Munro, 2011). Health and financial reasons were particularly evident among mature age provision students, and the latter only with VET entrants, perhaps reflecting the additional financial responsibilities that come with age and greater opportunity costs from lost work in lieu of study.

Concerns that VET does not adequately prepare students for the rigour and cognitive challenges of higher education (see Barber & Netherton, 2018) may be reflected in the relatively high proportion of VET students citing workload as a reason for intending to leave university. Interestingly, disposition or attitude to study was highly cited as a reason for intending to leave university study among ATAR students, highlighting the need to be cognisant of generation Z's desire for an engaging and diverse study experience (Loveland, 2017).

Social/personal reasons were cited by the highest proportion of students across all equity groups, possibly evidencing higher education students' feeling of disconnectedness and lack of belonging during study. Efforts to build students' social and cultural capital and their connection with others are therefore critical, particularly given that feelings of isolation can amplify during online learning, which has become increasingly prevalent (Stone & O'Shea, 2019). Interestingly, social/personal reasons were the most highly cited reasons for considering dropout among ATAR students as well, suggesting that those transitioning from secondary school also experience these difficulties, and interventions are generally needed for the wider student body.

Perhaps more specific to equity students, the high incidence of social/personal reasons being cited could also highlight the growing pressures on higher education students to juggle family, caring, and study commitments (Willans & Seary, 2018). This is further aggravated by increasing pressures on students to engage in extracurricular employability-related activities

to differentiate themselves from the growing pool of graduate recruits to help secure employment (Dickinson et al., 2021).

Finally, the relatively high number of students citing academic/institutional reasons for intending to leave university raises concerns with the level of academic and administrative support being given to students. Challenges posed by COVID-19 may affect higher education's ability to deliver a high-quality student experience in future years — as already evident in 2020 (Social Research Centre, 2021). Academic/institutional reasons also encompass student concerns for their career prospects. There are already reports of rising graduate unemployment and underemployment, with the threat of the global pandemic adding further strain to graduate labour markets (Institute of Student Employers, 2020).

Student outcomes and equity group

Student outcomes, both retention and academic performance, were broadly less favourable for those in STEM fields. This is concerning given ongoing attention to directing students to these fields (DESE, 2020). Recent institutional funding initiatives have emphasised the importance of improving outcomes in STEM, highlighting industry engagement as an important pathway for strengthening such outcomes (DESE, 2021).

Relatively lower retention rates, greater likelihood of intending to drop out, and weaker academic performance among Indigenous students echoes earlier research (Uink et al., 2021). Gaps between Indigenous students and their non- Indigenous peers were sizeable and extended into the longer term; these have been attributed to personal circumstances (e.g., finance and housing) and family and community support (Pechenkina et al., 2011). These findings support calls for institution-wide approaches to empower and guide Indigenous students at university, as explored by Uink et al. (2021).

Interestingly, despite some researchers attributing Indigenous students' weaker outcomes on university factors, such as the "hidden curriculum" (Devlin, 2009), Indigenous students reported a higher level of overall satisfaction—and for student support and sense of belonging—than non- Indigenous students. One might tentatively conclude that institutions are making some headway in supporting these students during higher education and also that personal factors may be more at play.

The relatively lower retention rates and increased intentions of leaving university among students of low-SES background and students with disability, both in the short and longer term, supports findings from earlier research (Edwards & McMillan, 2015; Kilpatrick et al., 2017; Li & Dockery, 2015). For students with disability, this finding also aligns with their reduced likelihood of being satisfied with most aspects of the student experience. Low-SES students' comparatively weak academic performance in the first year and beyond echo extant literature (see Rodriguez-Hernandez et al., 2020): additional academic support often helps them to perform better (e.g., Stirling & Rossetto, 2015).

Although there were no reported differences in retention during the first year, the reduced likelihoods of regional and remote students being retained or completing their studies and the increased odds of them intending to drop out align with Edwards and McMillan's (2015) study. These students also reported weaker academic performance throughout their degree. However, they were conversely more likely to be satisfied than their metro-based counterparts, particularly with their sense of belonging. The finding that regional and remote students had increased intention to dropout while being more positive across several student experience aspects points to the existence of potential barriers and challenges they face in staying at university. These barriers potentially include challenges beyond higher education.

Interestingly, being of a NESB led to mixed outcomes. Retention was higher than for English-speaking background students in the short and longer term, and they were less likely to consider dropping out, aligning with the increased likelihood of them feeling satisfied

with their course, with satisfaction notably high for their sense of belonging. Academic performance was, however, poorer throughout these students' degrees.

While retention did not vary among mature age students, they had greater odds of intending to drop out and were less likely to be satisfied with most aspects of the student experience, although they did feel relatively supported. However, compared with their younger counterparts, they performed better academically in the short and longer term. The same trend was evident for women in STEM, who outperformed both men and women in other fields. They were also more likely to be satisfied with several aspects of their student experience.

Collectively, these findings highlight the importance of institutions identifying effective ways to break down barriers that inhibit different student groups and that, ultimately, affect their experience and achievements at university. Importantly, no one size fits all. Mallman and Lee (2017) have attested that strategies to support mature students may not also align with school leavers who underperformed at school and therefore require further consideration.

The overarching aim of improving students' academic performance, wellbeing, and retention (e.g., Thomas, 2014) may be supported by addressing disparities in cultural and social capital. More quickly socialising equity students into the higher education culture and way of life may enable a smoother transition to university (e.g., Kift, 2009), and introducing initiatives that encourage network-building, friendship, and a sense of belonging and community may enhance retention (Wrench et al., 2013). Brinkworth et al. (2009) argued that interventions should be in the early years of study, although our findings illuminate the need for thinking beyond the first-year experience, given the reported longer-term effects for many equity groups.

Further, educating academics and support staff on the varying needs of equity groups is critical. Gravett et al. (2020) highlighted the problems with higher education academics and professional staff viewing equity students through a deficit lens, while others (e.g., Baker & Unwin, 2016) have found a lack of appreciation among staff for the different characteristics and experiences of these students, along with unrealistic expectations about what they can achieve without support.

Conclusion

This study examined issues of higher education participation and outcomes for equity groups, current and emerging, in Australia. Fostering better access to and participation in university study for underrepresented groups has been a governmental priority, and this study sought to inform policy by providing evidence of the outcomes of students who accessed higher education through alternative pathways.

This national study had strengths in several respects. First, the study addressed a contemporary priority area in higher education, within Australia and internationally. Second, the study drew on extant, high-quality data from several sources, including national governmental administrative records, institutional student records, and a national student experience survey. This enabled a comprehensive evaluation of an array of issues and outcomes, producing evidence that can be generalised to the broader higher education sector in Australia. Third, it should also be noted that the institutional student records used in this study were provided from 16 universities, comprising around 40% of the Australian higher education sector. Through this collaborative effort, the provision of rich, sector-representative data could be analysed to fill evidence gaps, which can potentially benefit future students and the higher education sector. Finally, the study was innovative and, to the best of the authors' knowledge, is the first study to examine academic, retention, and student experience outcomes with a dual focus of equity group status and entry pathway.

There were, however, limitations to this study, which should be borne in mind in the interpretation of our findings. It has become increasingly common for students to transfer degree courses in their study. This limitation impacted on our study and analysis in three ways which we outline below. The first implication is that students categorised as entering university study through a higher education course could have entered university study through an ATAR pathway originally. The second implication is that our measure of course completion or retention at 5 years did not distinguish between students who remained enrolled in their original course of study and those who transferred to another course of study. Students were considered to be retained if they had completed or were still enrolled in any bachelor-level course at the end of the 5-year period. The third implication is that course transfers to other institutions were unable to be tracked, given our study design, and would have been considered dropouts in the study.

Further, these limitations also flowed on into our measurement of academic performance through course WAMs, which could potentially be the weighted average of marks across different courses. In addition, there could be potential issues with field of study specific conventions in grading and scoring marks, which were not able to be addressed in our analysis. Finally, we also recognise that the equity student definitions used in this study are not without debate: for example, the use of geographic location to measure SES (see Marks & O'Connell, 2021). A further limitation in our study, and which is prevalent in the literature, is the issue of accounting for individuals who are represented within two or more equity groups.

Notwithstanding the limitations described above, the study has generated several findings of interest, which we summarise below together with recommendations for policy and practice.

The study found that, while the secondary education (i.e., ATAR) pathway was the most common pathway to university, there has been a gradual decline in the use of this path to university while non-ATAR pathways have correspondingly gained utility as a basis of admission over the past decade. Specifically, the completion of another higher education course, a VET/TAFE award, or through an "other basis"—including through equity pathways and enabling programs—have increasingly been used by students as their basis for admission into university study.

The majority of students were found to have gained admission to university through non-ATAR pathways and increasingly so. The majority share of non-ATAR university entry was even more pronounced for all equity group students, with the exception of Indigenous students, whose use of non-ATAR pathways declined over the study period.

> **Recommendation 1**: Alternative pathways to university study provide opportunities for higher education participation, particularly for students from equity groups. Efforts to widen participation in higher education should continue to leverage and expand alternative pathways in encouraging under-represented individuals to participate in higher education.

Broadly, students who accessed university through non-ATAR pathways were less likely to remain and complete university and reported weaker academic performance than those who entered directly from secondary education. This was particularly true for students in STEM areas. There were, however, differences by pathway, with students from pathway providers and enabling programs performing relatively well. While social and personal reasons played a significant role in student intentions to leave university study, there were notable differences in reasons by entry pathway.

> **Recommendation 2**: Initiatives to engage Indigenous students, such as targeted intervention in schools, reduced ATAR scores, and early, unconditional offers, should be prioritised.

This study looked at the share of ATAR and non-ATAR pathways to university by field of study. The field of study trends were consistent across both ATAR and non-ATAR pathways, with fields such as health showing strong growth in equity group representation over time, while fields such as engineering and education appeared to be declining in equity group enrolments. Student take-up of different pathways to university varied across disciplines, presenting opportunities for certain schools and faculties to better engage with equity students. There was a clear underrepresentation of certain equity groups by discipline, such as Indigenous and regional/remote students in the creative arts, students with disability from regional and remote areas, and mature age students or women in STEM in agriculture, environmental, and related disciplines.

> **Recommendation 3**: Interventions for widening participation should consider the prioritisation of fields of study to target equity groups, particularly groups that are severely underrepresented in those disciplines.

In addition to examination of trends in higher education pathways, another focus of the study was on the examination of academic and student experience outcomes, particularly on these student outcomes by entry pathway and equity group status. Specifically, a range of academic and student experience outcomes were examined. The academic outcomes were: retention in the first year of university study; retention or course completion over a 5-year period from course commencement; and WAMs in the first year and over the course. Eight measures of student experience were assessed: learner engagement, teaching quality, learning resources, student support, skills development, sense of belonging, overall satisfaction, and the intention to drop out from university study. The assessment of these outcomes by higher education pathways indicate that our recommendations on widening participation through the use of alternative pathways will require targeted, bespoke programs to support these students in achieving positive outcomes. Specific findings and recommendations are outlined below.

The multivariate analyses evaluating the retention outcomes indicated that students from non-ATAR pathways generally had lower rates of retention than students from ATAR pathways. Students who had gained admission to university through the completion of another higher education course, from VET/TAFE award courses, portfolio entry, or via mature age entry had weaker retention outcomes, both in the short term (i.e., first year) and

longer term (i.e., over 5 years). This finding held for both HASS and STEM fields. It was also found that students from other higher education courses had reported a diminished sense of belonging and that mature age pathway students had lower ratings of learner engagement, relative to their ATAR pathway counterparts. Other studies have identified issues relating to the disconnect felt by students in relation to their teachers, peers, and their academic environment, and these could be targeted to improve retention outcomes for these students.

> **Recommendation 4**: The needs and experiences of transfer students, students coming from substantively different prior academic environments, and/or mature age students should be understood and addressed.

Weaker retention or course completion outcomes at 5 years were found for students from access pathways, although their first-year retention outcomes were similar to those from ATAR pathways. This indicates the need for sustained and possibly more support in the middle and later stages of study for students admitted through access programs.

> **Recommendation 5**: Students from access pathways need to be supported in the middle and later stages of study beyond targeted interventions in the first year.

Students who entered university through higher education colleges, pathway providers, or enabling programs were found to have comparable (for those in STEM courses) or stronger (for those in HASS courses) retention or course completion outcomes both in the first year and over five years, relative to students from ATAR pathways. Further, the analyses of WAMs indicated that these students also performed well academically, relative to ATAR pathway students. Earlier studies have found that pathway and enabling programs prepare students well for subsequent higher education study, building resilience and other positive attributes and preparing students to do well academically.

> **Recommendation 6**: Admission pathways through pathway providers and enabling programs could be expanded based on the positive retention and WAMs of students from these pathways.

It was found that students from the residual “other” pathway category had weaker course completion results and WAMs, particularly in STEM fields. This was a substantial group, accounting for 8% of the institutional sample. A better understanding of the nature of students from this admission pathway is needed to formulate strategies to better support them.

> **Recommendation 7**: Higher education institutions should consider more detailed stratification of admission pathways to support the granular analysis of outcomes by pathway and discipline.

The study also considered the reasons behind students’ intentions to drop out from university study. Health reasons were an influential factor for mature age and VET pathway students, while financial and workload reasons were significant for VET entrants. Factors leading to the intention to drop out for ATAR pathway students were also identified, and these included their dispositions towards study. Social/personal reasons appeared to be an important factor for the student body and across all equity groups. However, the various student groups appeared to face their own challenges in study retention and course completion, and strategies to improve outcomes for each student group should be tailored to their needs.

> **Recommendation 8**: Strategies to address issues with student experience or satisfaction should be mindful of the challenges particular student groups face and be tailored accordingly.

> **Recommendation 9**: Strategies and programs to address students' disconnectedness and lack of belonging are important and needed for both equity group students and students from ATAR pathways.

Further, academic/institutional reasons were cited by a relatively high number of students as factors for their intention to leave university study. This raises concerns with the level of academic and administrative support for students. These issues are particularly pertinent given further higher education challenges in a post-COVID-19 era. Academic/institutional concerns also include student concerns around career and employment in a tightening labour market, particularly for youth.

> **Recommendation 10**: Better academic and administrative support for higher education students is required in tandem with strategies to boost work readiness and employability.

The study also examined outcomes by equity group status. Indigenous students were found to have weaker retention outcomes, a higher likelihood of the intention to drop out of study, and weaker academic performance. These findings indicate that there is still need for approaches to empower and guide Indigenous students in higher education. However, a positive development was found in that Indigenous students reported higher levels of student experience and satisfaction—particularly with student support and belonging—than non-Indigenous students, and the efforts to address these should be commended.

> **Recommendation 11**: Further action to improve the retention and academic performance of Indigenous students is required.

For students from low-SES backgrounds and students with disability, weaker retention and dropout intention outcomes were found. Students from low-SES backgrounds were also found to have weaker academic performance, and students with disability reported a poorer experience at university across multiple aspects, including learner engagement, teaching quality, learning resources, skills development, sense of belonging, and overall satisfaction. NESB students had stronger retention outcomes relative to English-speaking background students but had weaker academic performance. The intention to drop out was stronger for mature age students, and they reported lower levels of satisfaction with their student experience. Women in STEM had stronger academic outcomes and greater satisfaction with their student experience.

> **Recommendation 12**: Strategies to improve the retention and academic performance outcomes for low-SES students and students with disability are still required, as are strategies to improve the student experience of students with disability. The education of academics and support staff on the varying needs of equity groups is critical.

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Appendices

Appendix A: Equity group definitions

This study considered seven equity groups:

- **Indigenous students**—includes all students identifying as Aboriginal and/or Torres Strait Islander
- **students with disability**—includes all students who have a disability, impairment, or long-term medical condition that may affect their studies
- **low-SES students**—includes students whose postcode of permanent home residence is in a low-SES area as defined by the Australian Bureau of Statistics Index of Relative Socio-economic Advantage and Disadvantage
- **students from regional and remote Australia**—includes all students whose postcode of permanent home residence is not within a major city of Australia as defined by the Australian Bureau of Statistics Australian Statistical Geography Standard
- **students from NESBs**—includes all students who use a language other than English at their permanent home residence
- **women in STEM fields of study**—includes all female students enrolled in a course within the broad study fields of natural and physical sciences; information technology; engineering and related technologies, architecture and building; agriculture, environmental, and related studies; and health
- **mature age students**—includes all students who are aged 25 or above at commencement.

It is noted that mature age students are not a formal equity group as defined by the Australian government, but have been recognised in the literature as an underrepresented group in terms of participation, success and retention, and are hence included in our study (Heagney and Benson 2017).

Equity student participation in Australian higher education is summarised in Table A1.

Table A1. Equity group enrolments as a proportion of all commencing domestic bachelor's degree students (%), 2011–2019

Equity group	2011	2012	2013	2014	2015	2016	2017	2018	2019
Indigenous	1.6	1.6	1.6	1.7	1.9	2.1	2.1	2.2	2.3
Disability	4.4	4.6	4.9	5.2	5.7	6.0	6.4	6.9	7.2
Low SES	15.9	16.4	16.6	16.8	17.3	18.6	18.5	18.3	17.9
Regional/remote	22.3	22.0	22.1	22.7	22.9	23.2	22.4	21.7	21.5
NESB	3.6	3.8	3.8	4.0	4.0	4.0	3.9	3.6	3.6
Women in STEM	22.2	22.2	22.3	22.8	23.3	24.6	25.2	25.9	26.5
Mature age	18.0	19.6	20.1	20.9	21.3	21.1	21.6	21.3	20.9
All students (*n*)	193,822	212,596	223,834	227,020	216,415	214,993	217,525	215,271	210,948

Note. SES = socioeconomic status; NESB = non-English-speaking background; STEM = science, technology, engineering, and mathematics.

Appendix B: Methodology and estimating equations

Estimations based on student-level data

For all the binary (i.e., yes/no) dependent variables, specifically those relating to the student experience, dropout intention, first-year retention, and enrolment status as at 2019, a series of logistic regression models were estimated with the general form:

$$ln\ ln\left(\frac{p_i}{1-p_i}\right) = \beta_0 + \beta\mathbf{A}_i + \beta\mathbf{E}_i + \beta\mathbf{X}_i, \quad (1)$$

where p_i is the probability of an affirmative response for observation i; $\mathbf{A}_i$ is a vector containing the binary-coded admission pathway categories; $\mathbf{E}_i$ is a vector containing the binary-coded equity group indicators; $\mathbf{X}_i$ is a vector containing control variables, which are listed at the bottom of each regression table; and β is the coefficients to be estimated. Average marginal effects are reported, which represent the average percentage change in the probability of an affirmative response associated with a particular explanatory variable.

In relation to the estimations based on institutional academic performance data (i.e., first-year retention and enrolment status), separate models were estimated for the subset of institutions that provided detailed admission pathway information (see Table C2) and for all participating institutions, to account for differences in the coding of "other" admission pathways. For the full sample models, the institutional pathway categories were mapped to the standard DESE categories.

For the continuous dependent variables, specifically first-year and all-of-course WAMs, linear regression models of the following form were estimated:

$$Y_i = \beta_0 + \beta\mathbf{A}_i + \beta\mathbf{E}_i + \beta\mathbf{X}_i + \varepsilon_i, \quad (2)$$

where Y_i is the standardised WAM for observation i; ε_i is the error term, and $\mathbf{A}_i$, $\mathbf{E}_i$, $\mathbf{X}_i$, and β are as previously defined. Because the dependent variable was standardised by institution, estimated coefficients in the linear regression models can be interpreted as the average change in WAMs associated with a particular explanatory variable relative to the institutional mean, measured in standard deviation units (*z* scores). For example, an estimated coefficient of –0.592 associated with the Indigenous variable indicates that students in this equity group achieved a mean WAMs around 0.6 of a standard deviation below the mean WAMs of students in the 2015 commencing cohort at their university, holding other factors constant.

Estimations based on group-level data

To estimate the associations between admission pathway, equity group membership, and student academic performance (i.e., retention and success), linear regression models[6] were estimated with the general form:

$$Y_{euat} = \beta_0 + \beta\mathbf{A}_{euat} + \beta\mathbf{E}_{euat} + \beta\mathbf{X}_{euat} + \varepsilon_{euat}, \quad (3)$$

where Y_{euat} is the retention/success rate of students in equity group e, who entered university u through admission pathway a in year t; $\mathbf{X}_{euat}$ is a vector containing control variables, specifically fixed effects for year t and the grouping of university u; and other terms are as previously defined.

[6] As a sensitivity test, we estimated these models using a random effects panel data estimator, with the panel defined at the University × Equity Group × Admission Pathway level and measured over nine periods (2011–2019). Qualitatively identical results were obtained using this methodology.

Appendix C: Tables

Table C1. Reasons for considering leaving the SESSurv concordance

Reason for considering leaving	Reason (categorised)
Fee difficulties	Financial
Financial difficulties	
Government assistance	
Need to do paid work	
Health or stress	Health or stress
Academic support	Academic/institutional
Administrative support	
Career prospects	
Expectations not met	
Institution reputation	
Quality concerns	
Standards too high	
Commuting difficulties	Social/personal
Family responsibilities	
Gap year / deferral	
Moving residence	
Paid work responsibilities	
Personal reasons	
Social reasons	
Travel or tourism	
Workload difficulties	Workload
Study–life balance	
Boredom / lack of interest	Disposition
Change of direction	
Need a break	
Other opportunities	Excluded
Received other offer	
Academic exchange	
Graduating	
Other	

Table C2. List of participating institutions

University	Pathway classification
Australian Catholic University	Institutional
CQUniversity	DESE
Curtin University	Institutional
Edith Cowan University	Institutional
Flinders University	DESE
James Cook University	Institutional
Macquarie University	Institutional
Monash University	DESE
Swinburne University of Technology	Institutional
The University of Adelaide	DESE
The University of Newcastle	DESE
The University of Sydney	DESE
The University of Western Australia	Institutional
University of Southern Queensland	DESE
University of Technology Sydney	Institutional
Western Sydney University	DESE

Note. DESE = Department of Education, Skills and Employment.

Table C3. Admission pathway proportions for commencing domestic bachelor's degree students by field of education (%), 2011–2019

Field of education	2011	2012	2013	2014	2015	2016	2017	2018	2019
ATAR									
Natural and Physical Sciences	13.2	14.0	14.0	14.2	14.3	15.1	15.2	15.7	15.8
Information Technology	3.1	3.1	2.8	3.1	3.4	3.7	3.9	4.1	4.2
Engineering and Related Technologies	7.6	7.3	7.4	5.4	1.9	1.9	1.7	1.8	1.9
Architecture and Building	2.6	2.5	2.4	1.9	1.8	1.8	2.1	2.4	3.1
Agriculture, Environmental and Related	1.5	1.4	1.5	1.4	1.4	1.4	1.1	1.2	1.2
Health	13.9	14.5	14.7	15.6	16.8	17.0	16.9	17.3	17.3
Education	7.9	7.8	7.7	7.9	7.4	6.8	6.8	7.0	6.4
Management and Commerce	17.0	17.2	17.2	17.8	18.9	19.2	19.1	18.6	17.6
Society and Culture	25.1	24.1	24.4	24.9	25.4	24.7	25.2	24.2	24.4
Creative Arts	8.2	8.0	7.9	7.9	8.6	8.5	8.0	7.8	8.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Non-ATAR									
Natural and Physical Sciences	7.8	8.0	7.9	7.8	7.8	8.4	8.2	8.2	8.4
Information Technology	3.2	3.1	3.1	3.4	3.4	3.6	4.1	4.2	4.3
Engineering and Related Technologies	4.5	4.1	4.5	3.5	1.8	1.3	1.3	1.2	1.4
Architecture and Building	2.6	2.5	2.3	1.9	1.7	1.8	1.8	2.0	2.2
Agriculture, Environmental and Related	1.8	1.7	1.6	1.4	1.2	1.3	1.2	1.2	1.3
Health	18.7	18.7	19.4	20.3	21.4	22.1	22.9	23.2	22.8
Education	11.5	12.2	11.5	11.5	10.9	10.3	10.5	9.9	10.4
Management and Commerce	16.0	16.2	15.8	17.5	17.3	17.1	16.3	16.4	15.6
Society and Culture	25.3	25.6	25.4	25.2	26.4	26.4	26.5	26.2	26.0
Creative Arts	8.5	7.9	8.3	7.6	8.0	7.6	7.2	7.5	7.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ratio of Non-ATAR to ATAR									
Natural and Physical Sciences	0.6	0.6	0.6	0.5	0.5	0.6	0.5	0.5	0.5
Information Technology	1.0	1.0	1.1	1.1	1.0	1.0	1.0	1.0	1.0
Engineering and Related Technologies	0.6	0.6	0.6	0.6	0.9	0.7	0.8	0.7	0.8
Architecture and Building	1.0	1.0	1.0	1.0	0.9	1.0	0.9	0.8	0.7
Agriculture, Environmental and Related	1.2	1.2	1.1	1.0	0.9	1.0	1.1	1.1	1.2
Health	1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.3	1.3
Education	1.5	1.6	1.5	1.4	1.5	1.5	1.5	1.4	1.6
Management and Commerce	0.9	0.9	0.9	1.0	0.9	0.9	0.9	0.9	0.9
Society and Culture	1.0	1.1	1.0	1.0	1.0	1.1	1.1	1.1	1.1
Creative Arts	1.0	1.0	1.1	1.0	0.9	0.9	0.9	1.0	0.9

Note. ATAR = Australian Tertiary Admission Rank.

Table C4. Admission pathway shares for commencing domestic bachelor's degree Indigenous students by field of education (%), 2011–2019

Field of education	2011	2012	2013	2014	2015	2016	2017	2018	2019
ATAR									
Natural and Physical Sciences	9.9	9.1	11.0	9.9	9.9	11.0	11.3	12.4	12.5
Information Technology	2.0	1.9	1.9	2.3	2.9	1.9	3.1	2.7	3.1
Engineering and Related Technologies	3.7	3.1	4.6	3.7	1.0	1.0	1.8	1.2	1.2
Architecture and Building	1.1	2.1	1.5	1.0	1.2	1.1	1.1	1.6	2.4
Agriculture, Environmental and Related	1.3	1.2	1.6	1.5	1.5	1.9	1.5	1.7	1.5
Health	16.5	19.9	17.4	19.8	20.8	20.8	18.5	20.3	18.0
Education	15.1	12.7	13.0	15.9	11.4	9.6	11.0	11.0	10.5
Management and Commerce	13.9	13.8	12.6	11.3	10.6	13.4	13.3	11.4	12.4
Society and Culture	27.9	28.9	29.0	29.6	31.8	31.1	29.3	29.7	28.6
Creative Arts	8.6	7.3	7.4	5.1	8.8	8.2	8.9	8.0	9.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Non-ATAR									
Natural and Physical Sciences	5.1	6.0	5.6	5.5	5.8	6.5	6.2	6.1	6.2
Information Technology	1.5	1.4	1.8	1.8	2.0	2.5	2.2	2.3	2.1
Engineering and Related Technologies	1.5	1.2	2.2	1.8	1.1	0.6	0.6	0.9	0.7
Architecture and Building	1.6	1.1	1.3	0.6	0.7	0.8	1.0	0.6	0.9
Agriculture, Environmental and Related	1.5	1.7	1.9	1.2	1.3	1.2	1.7	1.5	1.3
Health	21.4	20.5	21.2	21.3	22.4	23.5	24.8	25.0	25.9
Education	15.9	18.0	15.8	15.2	14.8	13.0	11.9	11.8	12.1
Management and Commerce	10.5	9.9	9.9	11.7	11.4	10.8	11.0	9.9	10.7
Society and Culture	33.3	32.8	33.0	33.5	32.5	33.7	33.4	34.6	33.8
Creative Arts	7.7	7.3	7.2	7.4	7.9	7.4	7.2	7.3	6.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ratio of Non-ATAR to ATAR									
Natural and Physical Sciences	0.5	0.7	0.5	0.6	0.6	0.6	0.5	0.5	0.5
Information Technology	0.8	0.8	1.0	0.8	0.7	1.3	0.7	0.9	0.7
Engineering and Related Technologies	0.4	0.4	0.5	0.5	1.1	0.6	0.3	0.7	0.6
Architecture and Building	1.4	0.5	0.9	0.6	0.6	0.8	0.9	0.4	0.4
Agriculture, Environmental and Related	1.2	1.4	1.2	0.9	0.8	0.6	1.1	0.9	0.9
Health	1.3	1.0	1.2	1.1	1.1	1.1	1.3	1.2	1.4
Education	1.1	1.4	1.2	1.0	1.3	1.4	1.1	1.1	1.2
Management and Commerce	0.8	0.7	0.8	1.0	1.1	0.8	0.8	0.9	0.9
Society and Culture	1.2	1.1	1.1	1.1	1.0	1.1	1.1	1.2	1.2
Creative Arts	0.9	1.0	1.0	1.4	0.9	0.9	0.8	0.9	0.6

Note. ATAR = Australian Tertiary Admission Rank.

Table C5. Admission pathway shares for commencing domestic bachelor's degree students with disability by field of education (%), 2011–2019

Field of education	2011	2012	2013	2014	2015	2016	2017	2018	2019
ATAR									
Natural and Physical Sciences	15.2	14.9	16.2	15.4	15.4	15.9	16.4	16.6	17.0
Information Technology	4.0	3.7	3.6	4.0	3.7	4.4	3.8	4.5	4.2
Engineering and Related Technologies	5.5	5.0	4.7	3.7	1.3	1.6	1.4	1.3	1.2
Architecture and Building	2.2	1.7	1.5	1.3	1.5	1.1	1.6	1.9	2.3
Agriculture, Environmental and Related	1.6	1.2	1.5	1.3	1.6	1.5	1.4	1.4	1.4
Health	12.9	12.9	14.0	13.9	14.7	14.6	15.7	14.5	14.3
Education	7.3	7.8	7.8	7.4	6.1	6.0	5.8	6.3	5.1
Management and Commerce	12.7	13.4	13.2	13.6	14.1	13.5	12.9	13.4	12.1
Society and Culture	29.2	30.4	28.6	30.3	32.4	31.4	32.1	31.1	31.9
Creative Arts	9.6	9.1	8.8	9.3	9.4	10.0	8.9	9.1	10.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Non-ATAR									
Natural and Physical Sciences	9.5	9.5	10.1	9.8	10.6	11.5	10.7	11.3	11.1
Information Technology	4.6	3.7	3.5	4.3	3.8	4.1	4.4	5.0	4.9
Engineering and Related Technologies	3.0	2.6	3.2	2.1	1.4	1.0	1.0	1.0	1.0
Architecture and Building	1.7	1.4	1.3	1.1	1.2	1.4	1.3	1.1	1.4
Agriculture, Environmental and Related	1.9	1.6	1.4	1.5	1.4	1.4	1.2	1.3	1.4
Health	14.8	15.1	16.3	16.6	16.8	17.1	16.7	17.0	17.5
Education	9.7	10.6	9.5	9.4	8.8	8.4	7.9	7.5	7.3
Management and Commerce	10.7	10.8	10.8	11.8	10.8	10.3	11.4	11.1	10.8
Society and Culture	35.0	35.5	34.9	34.6	35.7	35.4	35.7	35.7	34.5
Creative Arts	9.1	9.1	9.0	8.7	9.6	9.4	9.6	9.1	9.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ratio of Non-ATAR to ATAR									
Natural and Physical Sciences	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7
Information Technology	1.2	1.0	1.0	1.1	1.0	0.9	1.2	1.1	1.2
Engineering and Related Technologies	0.5	0.5	0.7	0.6	1.1	0.6	0.7	0.8	0.9
Architecture and Building	0.8	0.8	0.9	0.9	0.8	1.2	0.8	0.6	0.6
Agriculture, Environmental and Related	1.2	1.3	1.0	1.2	0.9	1.0	0.9	1.0	1.0
Health	1.1	1.2	1.2	1.2	1.1	1.2	1.1	1.2	1.2
Education	1.3	1.4	1.2	1.3	1.4	1.4	1.4	1.2	1.4
Management and Commerce	0.8	0.8	0.8	0.9	0.8	0.8	0.9	0.8	0.9
Society and Culture	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1
Creative Arts	1.0	1.0	1.0	0.9	1.0	0.9	1.1	1.0	1.0

Note. ATAR = Australian Tertiary Admission Rank.

Table C6. Admission pathway shares for commencing domestic bachelor's degree students from low-SES backgrounds by field of education (%), 2011–2019

Field of education	2011	2012	2013	2014	2015	2016	2017	2018	2019
ATAR									
Natural and Physical Sciences	13.8	13.5	13.4	13.6	13.6	14.0	14.5	15.4	14.5
Information Technology	3.7	3.7	3.5	3.9	3.9	4.0	4.3	4.6	4.9
Engineering and Related Technologies	7.5	7.6	7.7	5.5	1.9	1.8	1.5	1.7	1.7
Architecture and Building	1.9	1.9	1.9	1.3	1.3	1.4	1.7	1.9	2.8
Agriculture, Environmental and Related	1.4	1.5	1.7	1.2	1.5	1.4	1.1	1.3	1.3
Health	15.8	16.3	17.3	18.0	20.6	21.2	20.2	20.3	20.3
Education	10.8	10.7	10.6	11.5	10.0	9.1	9.1	9.1	8.1
Management and Commerce	15.5	15.5	15.5	15.3	16.2	17.0	17.2	16.3	15.0
Society and Culture	22.8	22.4	21.9	22.7	23.8	23.3	23.7	23.1	24.3
Creative Arts	6.7	7.0	6.6	6.9	7.1	6.7	6.6	6.2	7.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Non-ATAR									
Natural and Physical Sciences	7.0	7.2	7.4	7.1	6.9	8.2	7.9	7.8	8.2
Information Technology	3.6	3.2	3.3	3.5	3.7	3.6	4.2	4.4	4.2
Engineering and Related Technologies	4.0	3.5	4.0	3.0	1.8	1.2	1.1	1.0	1.1
Architecture and Building	1.7	1.7	1.6	1.3	1.3	1.6	1.6	1.7	1.8
Agriculture, Environmental and Related	2.1	1.7	1.6	1.3	1.3	1.3	1.2	1.1	1.1
Health	21.2	20.9	21.0	22.0	22.7	24.0	25.3	25.9	26.1
Education	15.5	16.1	14.6	14.6	13.6	12.2	11.8	11.4	12.5
Management and Commerce	13.8	14.2	14.5	16.7	15.3	15.2	14.3	14.6	13.3
Society and Culture	24.6	25.7	25.4	24.9	26.4	26.9	26.8	26.5	25.9
Creative Arts	6.5	5.7	6.8	5.6	7.0	5.9	5.7	5.7	5.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ratio of Non-ATAR to ATAR									
Natural and Physical Sciences	0.5	0.5	0.6	0.5	0.5	0.6	0.5	0.5	0.6
Information Technology	1.0	0.9	0.9	0.9	0.9	0.9	1.0	1.0	0.9
Engineering and Related Technologies	0.5	0.5	0.5	0.6	1.0	0.7	0.7	0.6	0.7
Architecture and Building	0.9	0.9	0.8	1.0	1.0	1.2	0.9	0.9	0.6
Agriculture, Environmental and Related	1.5	1.2	0.9	1.1	0.9	0.9	1.1	0.8	0.8
Health	1.3	1.3	1.2	1.2	1.1	1.1	1.3	1.3	1.3
Education	1.4	1.5	1.4	1.3	1.4	1.3	1.3	1.2	1.5
Management and Commerce	0.9	0.9	0.9	1.1	0.9	0.9	0.8	0.9	0.9
Society and Culture	1.1	1.2	1.2	1.1	1.1	1.2	1.1	1.1	1.1
Creative Arts	1.0	0.8	1.0	0.8	1.0	0.9	0.9	0.9	0.8

Note. ATAR = Australian Tertiary Admission Rank.

Table C7. Admission pathway shares for commencing domestic bachelor's degree students from regional/remote areas by field of education (%), 2011–2019

Field of education	2011	2012	2013	2014	2015	2016	2017	2018	2019
ATAR									
Natural and Physical Sciences	12.0	12.4	12.7	12.7	12.6	12.6	13.3	13.3	13.7
Information Technology	2.9	2.7	2.9	2.9	2.9	3.2	3.3	3.6	3.4
Engineering and Related Technologies	7.4	7.7	7.2	5.7	2.1	1.8	1.7	1.8	1.7
Architecture and Building	2.0	2.1	1.8	1.5	1.4	1.3	1.5	1.8	2.3
Agriculture, Environmental and Related	2.3	2.2	2.3	2.2	2.5	2.7	2.3	2.4	2.7
Health	18.4	19.0	19.4	19.6	22.3	22.7	21.8	22.6	21.9
Education	10.9	10.8	10.5	11.3	10.1	9.3	9.1	9.5	8.9
Management and Commerce	13.5	13.8	13.7	13.8	14.7	14.8	14.9	15.0	14.1
Society and Culture	22.8	21.9	22.3	22.7	23.4	23.5	24.5	22.8	23.1
Creative Arts	7.6	7.3	7.2	7.5	8.0	8.1	7.5	7.4	8.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Non-ATAR									
Natural and Physical Sciences	7.0	7.2	7.4	6.5	6.8	7.3	7.2	7.2	7.4
Information Technology	2.5	2.4	2.3	2.6	2.4	2.6	3.2	3.3	3.3
Engineering and Related Technologies	3.1	3.1	3.3	2.7	1.6	1.3	1.1	1.1	1.6
Architecture and Building	1.6	1.4	1.3	0.9	0.7	0.9	1.0	1.1	1.1
Agriculture, Environmental and Related	3.3	3.1	2.8	2.3	2.3	2.5	2.5	2.6	2.6
Health	23.6	23.0	22.4	23.3	24.0	26.5	27.8	27.6	27.5
Education	16.7	16.7	14.8	14.4	14.2	13.4	13.0	12.8	12.9
Management and Commerce	11.6	11.8	13.0	17.1	14.9	13.5	13.0	12.8	12.3
Society and Culture	22.9	23.9	23.4	22.4	23.7	23.9	24.8	24.6	24.7
Creative Arts	7.7	7.4	9.3	7.7	9.5	8.0	6.6	6.9	6.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ratio of Non-ATAR to ATAR									
Natural and Physical Sciences	0.6	0.6	0.6	0.5	0.5	0.6	0.5	0.5	0.5
Information Technology	0.8	0.9	0.8	0.9	0.8	0.8	1.0	0.9	1.0
Engineering and Related Technologies	0.4	0.4	0.5	0.5	0.7	0.7	0.6	0.6	0.9
Architecture and Building	0.8	0.6	0.7	0.6	0.5	0.7	0.6	0.6	0.5
Agriculture, Environmental and Related	1.4	1.4	1.2	1.0	0.9	0.9	1.1	1.1	0.9
Health	1.3	1.2	1.2	1.2	1.1	1.2	1.3	1.2	1.3
Education	1.5	1.5	1.4	1.3	1.4	1.4	1.4	1.4	1.4
Management and Commerce	0.9	0.9	0.9	1.2	1.0	0.9	0.9	0.9	0.9
Society and Culture	1.0	1.1	1.1	1.0	1.0	1.0	1.0	1.1	1.1
Creative Arts	1.0	1.0	1.3	1.0	1.2	1.0	0.9	0.9	0.8

Note. ATAR = Australian Tertiary Admission Rank.

Table C8. Admission pathway shares for commencing domestic bachelor's degree non-English-speaking background students by field of education (%), 2011–2019

Field of education	2011	2012	2013	2014	2015	2016	2017	2018	2019
ATAR									
Natural and Physical Sciences	19.3	21.7	20.2	21.9	23.7	23.7	23.5	24.7	24.0
Information Technology	4.5	4.5	4.0	4.3	4.7	5.0	6.5	6.0	6.5
Engineering and Related Technologies	15.9	14.8	15.0	9.9	4.1	3.5	2.7	2.9	3.4
Architecture and Building	2.6	2.3	3.4	2.7	2.9	2.3	2.7	3.4	4.3
Agriculture, Environmental and Related	1.5	1.3	1.6	1.4	1.2	1.1	0.3	0.6	0.3
Health	12.3	13.8	12.8	15.0	16.7	16.0	17.5	17.7	16.5
Education	2.3	2.2	1.9	2.9	3.1	3.1	2.9	3.0	2.6
Management and Commerce	22.8	21.1	22.2	21.5	22.5	23.1	22.6	20.1	19.8
Society and Culture	15.6	15.1	15.2	17.5	17.1	18.3	17.5	17.7	17.8
Creative Arts	3.1	3.2	3.7	2.8	3.9	3.9	3.7	4.1	4.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Non-ATAR									
Natural and Physical Sciences	10.1	10.6	10.7	10.6	11.1	11.3	12.0	12.1	12.3
Information Technology	5.5	5.5	5.3	5.6	5.3	5.1	5.5	5.2	6.6
Engineering and Related Technologies	11.1	10.5	10.5	9.1	3.6	2.2	2.1	2.0	1.9
Architecture and Building	2.6	2.2	2.5	2.4	2.6	2.5	2.4	2.5	3.9
Agriculture, Environmental and Related	0.5	0.6	0.7	0.5	0.4	0.4	0.5	0.2	0.4
Health	23.3	25.4	25.3	28.8	32.5	33.7	34.3	33.4	31.0
Education	3.4	2.8	3.6	3.6	4.1	4.3	4.2	4.8	4.7
Management and Commerce	23.1	22.7	20.9	20.0	20.0	19.4	17.6	19.1	17.5
Society and Culture	17.0	17.0	17.0	16.0	17.3	17.7	17.8	16.4	16.5
Creative Arts	3.4	2.7	3.4	3.5	3.1	3.4	3.6	4.2	5.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ratio of Non-ATAR to ATAR									
Natural and Physical Sciences	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Information Technology	1.2	1.2	1.3	1.3	1.1	1.0	0.8	0.9	1.0
Engineering and Related Technologies	0.7	0.7	0.7	0.9	0.9	0.6	0.8	0.7	0.5
Architecture and Building	1.0	1.0	0.8	0.9	0.9	1.1	0.9	0.7	0.9
Agriculture, Environmental and Related	0.4	0.5	0.5	0.3	0.3	0.4	1.4	0.3	1.2
Health	1.9	1.8	2.0	1.9	1.9	2.1	2.0	1.9	1.9
Education	1.5	1.3	1.9	1.2	1.3	1.4	1.4	1.6	1.8
Management and Commerce	1.0	1.1	0.9	0.9	0.9	0.8	0.8	1.0	0.9
Society and Culture	1.1	1.1	1.1	0.9	1.0	1.0	1.0	0.9	0.9
Creative Arts	1.1	0.8	0.9	1.2	0.8	0.9	1.0	1.0	1.1

Note. ATAR = Australian Tertiary Admission Rank.

Table C9. Admission pathway shares for commencing domestic bachelor's degree women in STEM by field of education (%), 2011–2019

Field of education	2011	2012	2013	2014	2015	2016	2017	2018	2019
ATAR									
Natural and Physical Sciences	30.8	31.5	30.3	30.5	30.2	31.3	31.7	32.1	31.5
Information Technology	2.0	1.9	1.8	1.9	2.1	2.3	2.8	2.8	3.1
Engineering and Related Technologies	5.0	4.7	5.1	4.0	1.2	1.3	1.2	1.4	1.5
Architecture and Building	4.8	4.6	4.4	3.4	3.4	3.1	3.4	3.9	5.1
Agriculture, Environmental and Related	3.7	3.6	3.5	3.2	3.4	3.0	2.5	2.5	2.6
Health	46.0	46.6	47.5	48.9	51.9	50.3	49.5	49.1	47.7
Education	1.2	1.2	0.8	0.9	0.7	0.9	0.9	0.7	0.7
Management and Commerce	2.1	2.1	2.5	2.8	2.5	3.3	3.2	3.3	3.3
Society and Culture	4.2	3.6	3.8	4.0	4.1	4.1	4.4	3.8	4.2
Creative Arts	0.2	0.2	0.2	0.3	0.4	0.5	0.4	0.5	0.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Non-ATAR									
Natural and Physical Sciences	19.2	19.2	18.7	17.9	18.4	18.6	17.5	17.2	17.5
Information Technology	2.0	1.8	2.0	2.1	2.3	2.1	2.7	3.0	3.2
Engineering and Related Technologies	2.6	2.4	2.7	2.1	0.9	0.7	0.6	0.7	0.9
Architecture and Building	4.4	4.0	3.5	2.7	2.5	2.7	2.7	2.9	3.6
Agriculture, Environmental and Related	4.4	4.3	3.9	3.3	2.8	3.0	2.7	2.4	2.9
Health	64.4	65.3	66.3	68.5	69.9	69.6	70.3	70.3	68.0
Education	0.7	0.6	0.5	0.5	0.4	0.5	0.5	0.4	0.4
Management and Commerce	0.8	0.8	0.9	1.1	1.0	1.0	1.1	1.1	1.4
Society and Culture	1.3	1.5	1.4	1.7	1.7	1.6	1.5	1.8	1.9
Creative Arts	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ratio of Non-ATAR to ATAR									
Natural and Physical Sciences	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.6
Information Technology	1.0	0.9	1.1	1.1	1.1	0.9	1.0	1.1	1.0
Engineering and Related Technologies	0.5	0.5	0.5	0.5	0.8	0.5	0.6	0.5	0.6
Architecture and Building	0.9	0.9	0.8	0.8	0.7	0.9	0.8	0.7	0.7
Agriculture, Environmental and Related	1.2	1.2	1.1	1.0	0.8	1.0	1.1	1.0	1.1
Health	1.4	1.4	1.4	1.4	1.3	1.4	1.4	1.4	1.4
Education	0.6	0.5	0.6	0.6	0.6	0.5	0.6	0.6	0.6
Management and Commerce	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.4
Society and Culture	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.5	0.4
Creative Arts	0.5	0.4	0.6	0.4	0.3	0.3	0.4	0.3	0.3

Note. ATAR = Australian Tertiary Admission Rank.

Table C10. Admission pathway shares for commencing domestic bachelor's degree mature age students by field of education (%), 2011–2019

Field of education	2011	2012	2013	2014	2015	2016	2017	2018	2019
ATAR									
Natural and Physical Sciences	7.5	8.0	8.6	8.0	6.6	8.0	8.6	9.0	10.6
Information Technology	3.0	3.0	2.9	3.1	3.8	3.1	4.0	4.4	4.1
Engineering and Related Technologies	4.5	6.1	4.8	3.5	2.0	1.1	1.0	1.2	1.2
Architecture and Building	2.2	2.0	2.2	1.3	1.0	1.0	1.8	1.8	2.3
Agriculture, Environmental and Related	2.1	1.9	1.8	1.8	1.7	1.9	1.6	2.3	2.6
Health	19.1	20.3	21.4	20.6	26.0	25.0	23.0	23.4	21.3
Education	12.9	12.4	12.2	15.7	13.0	11.7	11.1	8.2	9.2
Management and Commerce	15.0	14.0	16.0	15.6	15.8	15.5	16.0	15.6	14.3
Society and Culture	28.4	27.0	25.0	25.1	24.5	26.0	27.0	28.2	28.6
Creative Arts	5.3	5.4	5.1	5.3	5.6	6.6	5.8	5.9	5.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Non-ATAR									
Natural and Physical Sciences	6.7	6.8	6.4	5.7	5.9	6.0	5.7	5.7	6.0
Information Technology	2.6	2.3	2.5	2.5	2.4	2.9	3.7	4.1	4.0
Engineering and Related Technologies	3.6	3.3	3.7	3.1	1.7	1.2	1.1	1.1	1.1
Architecture and Building	2.2	1.9	1.8	1.4	1.2	1.4	1.4	1.6	1.9
Agriculture, Environmental and Related	2.3	2.0	1.8	1.6	1.4	1.3	1.3	1.2	1.4
Health	23.5	22.8	23.2	24.5	25.7	27.7	28.4	29.1	29.1
Education	13.5	15.1	13.6	13.2	13.8	12.4	12.1	11.2	12.1
Management and Commerce	12.4	13.0	13.4	16.5	14.8	13.6	13.1	12.9	11.8
Society and Culture	27.9	27.8	27.8	26.5	27.7	27.9	28.5	28.1	28.0
Creative Arts	5.3	5.0	5.9	4.9	5.4	5.4	4.8	4.9	4.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ratio of Non-ATAR to ATAR									
Natural and Physical Sciences	0.9	0.8	0.7	0.7	0.9	0.8	0.7	0.6	0.6
Information Technology	0.9	0.8	0.9	0.8	0.6	0.9	0.9	0.9	1.0
Engineering and Related Technologies	0.8	0.5	0.8	0.9	0.9	1.1	1.2	0.9	0.9
Architecture and Building	1.0	1.0	0.8	1.1	1.1	1.4	0.7	0.9	0.8
Agriculture, Environmental and Related	1.1	1.1	1.0	0.9	0.9	0.7	0.8	0.5	0.5
Health	1.2	1.1	1.1	1.2	1.0	1.1	1.2	1.2	1.4
Education	1.0	1.2	1.1	0.8	1.1	1.1	1.1	1.4	1.3
Management and Commerce	0.8	0.9	0.8	1.1	0.9	0.9	0.8	0.8	0.8
Society and Culture	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.0	1.0
Creative Arts	1.0	0.9	1.2	0.9	1.0	0.8	0.8	0.8	0.8

Note. ATAR = Australian Tertiary Admission Rank.