



**NCSEHE**  
National Centre for Student  
Equity in Higher Education



**Curtin University**

# DO INDIVIDUAL BACKGROUND CHARACTERISTICS INFLUENCE TERTIARY COMPLETION RATES?

A 2014 Student Equity in Higher Education Research Grants Project

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## Contents

Contents .....	2
Tables, Figures and Boxes .....	4
Acknowledgements .....	5
Key Points .....	6
Executive Summary .....	7
Introduction .....	8
Literature Review .....	10
Introduction .....	10
Background .....	10
Widening Participation .....	11
SES Background and (Non) Completions .....	12
SES and Colleges, Qualifications and Courses .....	12
SES and Completion – United States of America .....	13
SES and completion – Australia .....	13
Increased Inequality .....	15
United States of America .....	15
United Kingdom .....	16
Australia .....	16
Conclusion .....	17
Data and Descriptive Statistics .....	19
Variables .....	19
Outcome Variables .....	19
Commenced University .....	20
Completed University .....	20
Explanatory variables .....	20
Socio-economic Status .....	20
Field of Study of Course Completed .....	21
Average achievement scores .....	23
Gender, Indigenous Status, Language Spoken at Home, School Sector and Regional Status .....	24
Hours Worked While Studying .....	26
Statistical Analysis .....	28
Multi-level Modelling .....	28
Intra-class Correlation .....	29
Results .....	30
Commencing University .....	30
Conclusion .....	32
University Completion .....	33
Academic Achievement .....	34
Gender .....	35
Indigenous Status .....	36

Language Background.....	37
Commencing Field of Study .....	38
School Sector .....	39
Regional Status .....	40
Working While Studying.....	41
Summary of Results .....	42
Discussion and Conclusion .....	44
Reference List.....	45
Appendix A: Cohort Choice? .....	47
Appendix B: Intra-class Correlations .....	49
Appendix C: Regression Results for University Completion .....	50

## Tables, Figures and Boxes

### Tables

Table 1: University status of individuals, 2006 LSAY (XBAC derived field) .....	19
Table 2: Number of individuals in each category of XBAC by wave, LSAY 2003 cohort (unweighted) .....	19
Table 3: University commencements by age 25, LSAY Y03 in 2013 .....	20
Table 4: University completions rates by age 25 years, LSAY Y03 in 2013 .....	20
Table 5: Distribution of SES by university commencement .....	21
Table 6: Field of study (ASCED) for university course completed, LSAY Y03 in 2013 .....	22
Table 7: Summary statistics for remaining explanatory variables .....	25
Table 8: Distribution of hours worked whilst studying, categorical .....	27
Table A1: Levels of 2003 and 2006 LSAY XBAC derived field .....	47
Table B1: Values of ICC on the logistics scale ( $\rho_{h(l)}$ ) given the ICC on the proportion scale ( $\rho_h$ ) and overall prevalence ( $\pi$ ) .....	49
Table C1: Model fit statistics for all models .....	50
Table C2: Fixed effect significance text .....	50
Table C3: Regression coefficients, final model, completion .....	51

### Figures

Figure 1: VET and university participation by age 25 years, LSAY 2003 participants .....	14
Figure 2: Change in university participation by SES quintiles, assuming a 10 per cent growth in university places, % .....	17
Figure 3: Distribution by SES for all Y03 by university commencement .....	21
Figure 4: Distribution of average academic achievement at age 15 .....	24
Figure 5: Average working hours while studying .....	26
Figure 6: Commencing university by explanatory variables .....	30
Figure 7: SES and achievement scores by university commencement status .....	31
Figure 8: Commencing field of study by SES status .....	32
Figure 9: Predicted probability of completion by SES and academic achievement .....	34
Figure 10: Predicted probability of university completion by SES, gender and academic achievement .....	35
Figure 11: Predicted probability of university completion by SES, Indigenous status and TER score .....	36
Figure 12: Predicted probability of university completion by SES, language background and academic achievement .....	37
Figure 13: Predicted probability of university completion by SES, commencing field of study and academic achievement .....	38
Figure 14: Predicted probability of university completion by SES, school sector and academic achievement .....	39
Figure 15: Predicted probability of university completion by SES, regional status and academic achievement .....	40
Figure 16: Predicted probability of university completion by SES, working hours and academic achievement .....	41
Figure A1: Per cent of cohort by study in bachelor degree status .....	47
Figure A2: Non-completion rate of bachelor or higher study, Y03 cohort by wave .....	48

### Boxes

Box 1: Examples of courses within the ASCED classification .....	23
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## Key Points

The Bradley Review of Higher Education (Bradley et al. 2008) showed that Australia will need more well-qualified people if it is to participate and meet the demands of a rapidly changing global economy. As a result, Australian Governments have introduced policy to expand higher education to those that are currently under-represented: Indigenous people, individuals from low socio-economic status (SES) backgrounds and those from regional and remote areas.

This report, funded by the National Centre for Student Equity in Higher Education (NCSEHE) at Curtin University, uses the 2003 cohort of the Longitudinal Surveys of Australian Youth (LSAY) to investigate whether or not low SES students complete university at different rates than their high SES peers. This report investigates the differences in completion probabilities for the sample of students that have commenced university. That is, the impact of SES on completion is over-and-above the effect that SES may have on enrolling in university in the first place.

This report also looks at the relationship between SES and other measures of disadvantage to determine the impact that multiple factors have on completion. Whilst it may not be surprising that low SES students complete at differing rates, it's the case where disadvantage is crossed with advantage where things are more interesting:

- Overall, socio-economic status continues to play an important part in university completions with low SES students having lower completion rates than their high SES peers.
- Those with lower academic achievement at age 15 are further disadvantaged if they are also low SES, whereas higher academic achievement reduces the impact of being low SES.
- The impact of SES is greater for females, with completion rates increasing at a greater rate for females.
- There is a strong relationship between commencing field of study and SES. Low SES students who commence in a technical field have the lowest probability of completion. Commencing field of study has a much smaller impact on high SES students.
- Attending a Catholic or independent school somewhat cushions the impact of being from a low SES background.
- Those from regional areas have much lower completion probabilities than metropolitan students.
- Low SES students have the same chance of completing as high SES students when they work moderate hours (< 20) whilst studying. However, low SES students who don't work whilst studying are much worse off than high SES students who don't work.

This report shows that increasing access to higher education for low SES individuals won't necessarily translate into higher completions. In order to facilitate completions, support for low SES students needs to be provided during their studies, as well as providing greater access to university. An understanding of how other factors of disadvantage influence completions is also needed, together with improved methods for measuring socio-economic status. Support may also be needed for regional students to help them complete their university courses.

## Executive Summary

With a push to increase university undergraduate enrolments, there is the subsequent issue of whether an increase in the enrolment of students from low socio-economic status (SES) backgrounds translates to university completion. This report investigates the issues of university (bachelor degree) completion, and in particular, whether the completion rates of low SES individuals are different from those of high SES individuals. That is, if more people from low SES backgrounds are attending university, are they also completing degrees? And are they completing them at the same rate as their higher SES counterparts?

The key focus of this study was to determine whether there were differences in university completion rates according to socio-economic background.

The study used the Longitudinal Surveys of Australian Youth (LSAY) in conjunction with random effects models to analyse the impact of SES on university completion. The use of LSAY facilitated the application of an individual measure of SES, thus enabling characteristics of the individual to be used, along with a range of background characteristics.

In terms of university completion, the analysis found that the impact of schools is not insubstantial, with schools accounting for around 30% of the variation in university completion. The results showed that school sector continues to influence course completion, with significant differences observed for low SES students. Low SES students attending government schools had lower completion rates than high students attending Catholic and independent schools. Low SES students attending Catholic and independent schools still have lower university completion than their high SES counterparts, but the effect is much less important. Thus, attending a Catholic or independent school cushions the impact that being low SES has on course completion.

Students with an Asian language background were shown to have the highest chance of completing university.

Regionality is directly related to non-completion, with those from regional areas having the lowest probabilities of completion.

The continued push to increase participation in higher education for students from low socio-economic backgrounds should continue; however, low SES students also need to have access to the required support to ensure that their completion rates continue to match their high SES counterparts. This report shows that low SES students from regional areas, who attended government schools and who are female, may need further support to ensure they complete at the same rate as their high SES peers.

## Introduction

In the wake of the Bradley Review of Higher Education (Bradley et al. 2008), the Australian Government introduced policy to expand higher education to include individuals from low socio-economic status backgrounds and other disadvantaged groups. The Transforming Australia's Higher Education System (Commonwealth of Australia 2009) report provided increased payments to higher education institutions for each equivalent full-time student from a low SES background. This loading was initially set to 2%, increasing by a percentage point up to a maximum of 4% in 2012. This was coupled with a government target that, by 2020, 20% of university undergraduate enrolments should be comprised of those from a low SES background.

With a push to increase university undergraduate enrolments, there is the subsequent issue of whether an increase in low SES enrolments translates to university completion. This report investigates the issues of university (bachelor degree) completion, in particular whether the completion rates of low SES individuals are different from those of high SES individuals. That is, if more young people with low SES backgrounds are attending university, are they also completing degrees and are they completing them at the same rate as their higher SES counterparts?

This project uses the 2003 cohort of the Longitudinal Surveys of Australian Youth, whose participants were aged 25 years in 2013, to compare the university completion rates of young people with different background characteristics. Of particular interest to this report were young people's individual socio-economic background, Indigenous status, language background and regional status. Further factors included are school type (government, Catholic and independent) and the influence that schools have on university completion.

The 2003 LSAY cohort enables a robust measure of individual SES to be determined. The 2003 base year of LSAY is linked to the 2003 Programme of International Student Assessment (PISA; Organisation for Economic Co-Operation and Development 2005). This measure uses a range of background characteristics of the individual and the home in which they resided at age 15 years. These characteristics include mother's and father's educational attainment and occupation, the extent of the cultural items held in the home, and the individual's access to study and other resources. Details of this measure of SES are outlined in Lim and Gemici (2011). The individual measure of SES has been found to be more reliable than the usual measure of SES, using geographic measures such as SEIFA (Australian Bureau of Statistics [ABS] 2011) available from other data sources (Karmel & Lim 2013; Lim & Gemici 2011; Lim et al. 2011).

The structure of the LSAY dataset enables the separation of the effect of school from the effect of individuals on university completion, specifically the relevance of school attended once a student has been accepted into university.

The primary research questions being addressed in this project are:

- For the students who commence a bachelor degree level course, do their background characteristics (in particular SES) influence completion of that course?
- If there are substantial differences, what are the size and direction of these differences?

The structure of the report is as follows:

- The first section presents a literature review of what is currently known about university participation and completion for low SES individuals.



Do individual background characteristics influence tertiary completion rates?

- Next, an overview of the data, the descriptive statistics and a short outline of the statistical methodology used, is presented.
- The subsequent section contains the results from the statistical analysis.
- The final section presents the conclusion and discussion.

## Literature Review

### Introduction

The aim of the literature review is to examine recent research on university and college completions, specifically the role that socio-economic status plays in completions. A number of scholars have suggested that the broadening of higher education participation targets has had an adverse impact on the relative rate of higher education participation by low socio-economic status students. The review therefore also looks at some recent research in this area.

The review begins by providing some background to the policy underpinning recent initiatives to expand participation in higher education, particularly Australian efforts in this area. This is followed by discussions of how SES affects completions, focusing on students' choice of university/colleges and courses selected. From here, the situations in the United States of America (the US) and Australia are investigated. The US was selected for inclusion because the vast majority of the available research is focused on the US. Australia is the chief area of interest and the context within which this research applies. The literature review then examines the small amount of material available of the emerging inequalities that appear to be the consequence of efforts worldwide to broaden participation, again, with particular reference to Australia. The conclusion offers a summary of the major themes of the review.

### Background

Generally speaking, throughout the world, by ninth grade most students have developed occupational and educational aspirations strongly related to socio-economic status. These SES-based differences subsequently manifest themselves in differences in attendance at college or university, in persistence, and in degree-attainment rates, all of which are unfavourable to low SES students (Terenzini, Cabrera & Bernal 2001).

There have been major policy pushes in Australia and internationally (Bradley et al. 2008; Marginson 2011; Bologna Declaration 1999) to increase the participation and attainment of individuals from low SES backgrounds in higher education.

From an economic point of view, Australia will need more well-qualified people if it is to participate and meet the demands of a rapidly changing global economy (Bradley et al. 2008). Indicators suggest that the current supply of people with undergraduate qualifications will not keep up with demand. Bradley et al. (2008) in their Review of Australian Higher Education highlighted that in order to meet future demand, Australia needs to increase the participation of groups that are currently under-represented in higher education. These groups are Indigenous people, people with low socio-economic status, and those from regional and remote areas. Issues of equity are also a consideration in attempts to broaden participation.

In response to the Bradley review, the Australian Government, through the Transforming Australia's Higher Education System (Commonwealth of Australia 2009) report, set two major targets for higher education:

By 2025, 40 per cent of all 25 to 34 year olds will hold a qualification at bachelor level or above,

and

By 2020, 20 per cent of higher education enrolments at the undergraduate level will be of people from a low SES background.

The Bologna Declaration (1999) outlines the European Union's participation target: by 2020, 40% of those aged 30 to 34 years should have completed tertiary education or its equivalent.

The previous Australian Government provided an increase of \$5 billion in funding to the higher education and research sector to help to meet these targets. The aim of this funding was to support high-quality teaching and learning, improve access and outcomes for students from low socio-economic backgrounds, build new links between universities and disadvantaged schools, reward institutions for meeting agreed quality and equity outcomes, improve resourcing for research and invest in world-class tertiary education infrastructure (Commonwealth of Australia 2009).

Part of this new funding included \$437 million to fund programs relating to low SES individuals and their institutions, specifically: to fund partnership programs between universities and low SES schools and vocational education and training (VET) providers; financial incentives to universities to expand their enrolment of low SES students; and to fund support programs to improve low SES student completion and retention rates (Commonwealth of Australia 2009).

This initiative underpins the previous (Labor) government's principles of higher education: opportunity for all, especially those from groups under-represented in higher education; access to university based on merit, not ability to pay; academic freedom and autonomy; and research that advances knowledge and critical thinking.

Modelling by the Australian Government has shown that improving access to higher education is likely to lead to an extra 217,000 additional graduates by 2025 (Commonwealth of Australia 2009).

In 2014, the Abbott Government confirmed continued support of disadvantaged students in higher education through the Higher Education Participation Programme (HEPP). This programme has three components: the new Access and Participation Fund; the new Scholarships Fund; and the existing National Priorities Pool (Australian Government 2014).

## **Widening Participation**

For reasons similar to Australia's – to increase productivity and to ensure the labour force is able to meet the demands of an ever-changing, more complex and sophisticated labour market – policies in Europe, the United Kingdom and the United States have been implemented to increase participation in higher education (International Labour Organization 2011). The implementation of these policies has resulted in research investigating the impact of increased participation, although so far this research hasn't extended to investigating the impact on completions. Quinn (2013) states that:

“Most of the existing widening participation data and research across countries relates to access to higher education rather than to completion of study. At a national policy and local institutional level the drive has been to open up higher education to greater numbers of students ... Much less attention has been paid to what happens to them once they enter higher education and how to ensure their success.”

When discussing the expansion of higher education, the aspect of interest is that of widening participation. Successfully widening participation implies that those who are accessing and succeeding in higher education are fully representative of the diversity of the population and that these groups enjoy equality in outcomes. This is distinct from massification, the situation whereby higher education is taken up by large numbers of people (Quinn 2013). Widening participation should lead to greater equality across the different types of higher education institutions and fields of study.

The overseas experience, in particular that of the United States and the United Kingdom, has shown that the expansion in higher education has resulted in overall increases in the numbers of people undertaking higher education, including larger numbers of disadvantaged groups. However, some commentators argue that the

expansion in higher education has resulted in substantial gaps in participation, as well as a widening of the equity gap. As Machin and Vignoles (2004, pg. 120) in their UK study state in their conclusions:

“One can conclude that it is not the most able who have benefited the most from the expansion of the UK education system but rather those from higher-income backgrounds.”

This issue is treated in more detail later in this chapter.

## **SES Background and (Non) Completions**

A number of scholars have argued that widening participation has led to an increase in non-completion rates (Aird et al., 2010, Bailey and Dynarski, 2011, Machin and Vignoles, 2004, Quinn, 2013). Quinn (2013), in a study on drop-out and completion rates in higher education in Europe, showed that widening participation does not necessarily lead to increased drop-out rates. For example, Denmark, which has been very successful in widening participation, has the lowest drop-out rate in Europe, while other countries that have done very little in providing greater access to higher education have considerably higher rates. Ramløe (2011) shows that massification in Poland - such that greater numbers of people have commenced higher education - is leading to an increase in the country's drop-out rate.

A second finding by Quinn (2013) is that in the European Union, as in the United States, coming from a low SES background dominates all other factors in terms of dropping out. It is assumed that this is a consequence of the inequalities generally integral to those from a low SES background. These elements include, among others, a lack of equal access to a good education at school level and subsequent lower qualifications, financial issues, and whether a parent had experience of higher education.

## **SES and Colleges, Qualifications and Courses**

Given the paucity of the research on the impact of widened participation on completions and specifically the role of SES, this literature review looked at research that has investigated the role of SES in higher education participation and completion more generally.

The evidence suggests that those from a low SES background are more likely to attend institutions whose qualifications do not lead to occupations associated with increased earnings, and that they are less likely to attend selective institutions (Bailey, Jenkins & Leinbach 2005; Institute for Higher Education Policy 2010). Research conducted by the Institute for Higher Education Policy (2010) found that approximately one in ten low-income young adult degree-holders in the United States were still classified as poor, indicating other factors, such as the quality of these degrees, were not contributing to improving their economic conditions. Importantly, while a high percentage of low-income young adults were participating, the percentage of low-income young adults who were earning or completing their post-secondary qualifications had remained static; that is, these young adults were not completing the post-secondary qualifications they had enrolled in. Further, in studies of both the United States (Institute for Higher Education Policy 2010) and Europe (Quinn 2013), low SES individuals are also more likely to undertake lower-level qualifications and participate in less prestigious courses and subjects.

In Australia (Marks 2007), as in Europe (Quinn 2013), participation in low-level courses and in less prestigious institutions is likely to lead to higher non-completion of courses, given that the drop-out rate from less highly regarded institutions and courses is higher. A similar situation applies in the US: drop-out rates from elite institutions and subject areas are lower, and those from low SES backgrounds are much less likely to be attending these institutions (Terenzini, Cabrera & Bernal 2001). Moreover, those from low SES backgrounds are less likely to earn a degree from a four-year institution (Terenzini, Cabrera & Bernal 2001).

Radford et al. (2010) showed that for the US, students who first enrolled in four-year colleges (similar to Australian universities), 47% of low-income families had attained a bachelor degree by 2009. However, this is substantially lower than the 76% attainment rate for those who are from the highest income bracket. In terms of parental education, those who had parents with only high school or less had an attainment rate of 40% compared with 69% of those whose parents had a bachelor degree or higher. In relation to other qualifications, Radford et al. (2010) further show that attainment rates for certificates are higher for those with the lowest family income levels and for those whose parents only have a high school (or less) education, confirming that the lower the SES level, the lower the level of the course undertaken.

### **SES and Completion – United States of America**

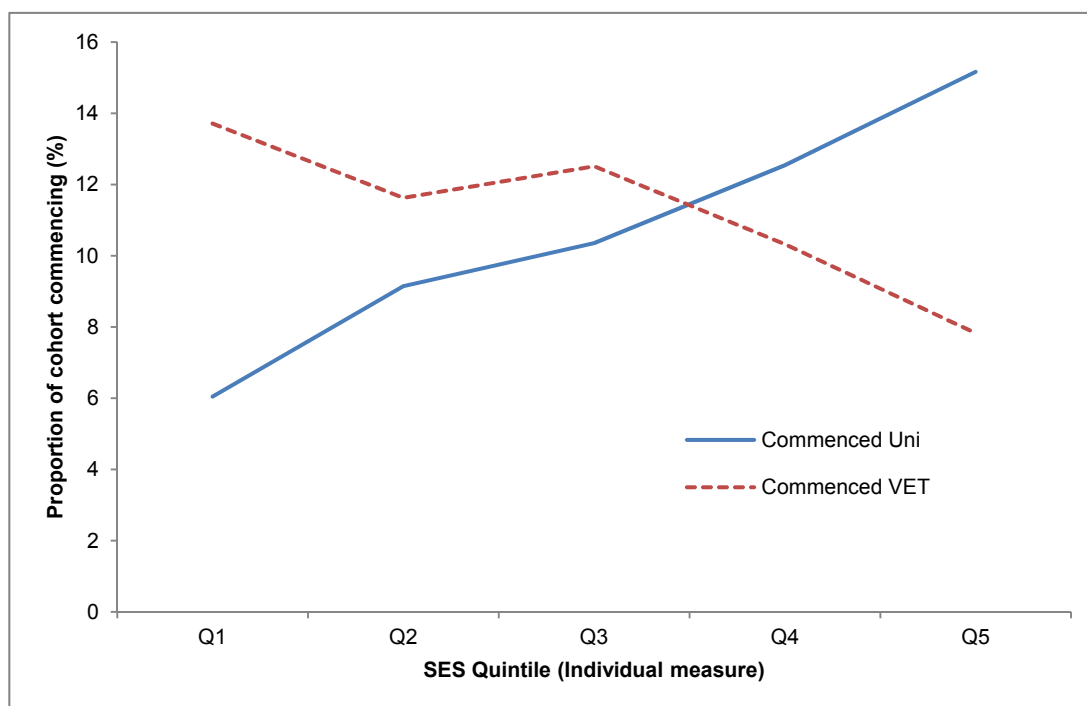
Radford et al.'s (2010) study also demonstrated that for those who commenced in a four-year college, 35% of those whose parents had high school level qualifications or less and 30% of those from low-income families did not complete a qualification. This is compared with 17% for those whose parents had a bachelor degree and 12.5% for those who were from the highest family income bracket (Radford et al. 2010).

Bailey, Jenkins and Leinbach's (2005) research found that of those who enrolled in undergraduate programs in 2000, 60% of those from a high SES background earned a qualification compared with fewer than 40% of those from a low SES background. These various levels of qualifications achieved also demonstrate a disparity: for the high SES individuals, 50% of the qualifications were at bachelor degree level, whereas for the low SES individuals, only 20% were at the bachelor level. Terenzini, Cabrera and Bernal (2001) also showed that students from families with low-income or with parents who did not have a bachelor degree were more likely to drop out of college compared with students from high-income families. Notably, Upcraft and Crissman (1999) show that low SES students have higher graduation rates if they attend institutions with a lower proportion of low SES students attending.

Bailey Jenkins and Leinbach (2005) investigated students enrolled in four-year institutions and found that 52% of low SES students are likely to have taken remedial courses compared with 19% of high SES students. Further, their paper demonstrates that students who took one remedial course completed their courses at a lower rate than those who took no remedial courses, and that the completions that are occurring are in qualifications lower than bachelor degrees.

### **SES and Completion – Australia**

Again, similar to findings in the US, individuals in Australia from a low SES background are more likely to be participating in lower-level qualifications in VET rather than in higher education. Figure 1 shows the proportion of young people who have commenced a VET or university course by age 25 years using the 2003 cohort of the LSAY data. From this figure, it can be seen that those who have lower SES backgrounds are more likely to have commenced a VET (including apprenticeships) qualification, whereas those in the top two SES quintiles are more likely to commence study at university.



Source: LSAY 2003 cohort reports.

Figure 1: VET and university participation by age 25 years, LSAY 2003 participants

Coates (2011), in a rare contrary study, suggests that individuals drop-out of university for psychosocial<sup>1</sup> rather than for more tangible practical or financial reasons. While this report does not address the topic of support for low SES students, Coates (2011) suggests that it is important for students to value enrichment activities: to seek out assistance, take advantage of the range of services provided, and get involved in campus life. However, research from the US suggests that low SES students participate in these activities less than their more affluent peers (Terenzini, Cabrera & Bernal 2001).

McMillan (2005) suggests that course changing and dropping out are not necessarily negative events for the individual; Quinn (2013), discussing non-completion in Europe, agrees with this suggestion. In particular, McMillan (2005) demonstrated that personal interest more than any other factor was a reason people left their courses.

Dobson and Skuja (2002), using a case study from Monash University, showed that performance in first-year university is related to an individual's university entrance score. Their analysis reveals that attendance at independent schools provides students with a relative advantage over their own talent (as measured by university performance in the first year); that is, independent schools are giving their students an advantage and the opportunity to get the tertiary entrance scores required for entry to the hard-to-enter courses. On the other hand, it could be argued that government schools are disadvantaging their bright Year 12 students in terms of university entrance scores. Once individuals reach university, those from government schools outperform those from independent schools after their first year (Dobson & Skuja 2005). Thus, university entrance policies that target high-performing individuals in low SES schools or communities should help to increase the attainment rates of low SES individuals (Li & Dockery 2014).

<sup>1</sup> Psychosocial means relating to the interrelation of social factors and individual thought and behaviour.

The experiences at a regional university in Australia are somewhat different from those from the Monash University study, with Knipe (2013) showing that higher numbers of students from government schools entered university, and with no difference in course completions rates, regardless of school attended. Knipe (2013) also found that at certain levels the ATAR (ENTER/tertiary entrance) scores are not strong predictors of university completion. This finding is in contradiction to that of Marks (2007), who found that the tertiary entrance score was the strongest factor for predicting course completion.

Marks (2007) also found that, if the influence of ENTER scores was ignored, those who attended Catholic schools were more likely to complete university. There was no difference in university completion between government and independent schools, however, once the impact of ENTER is considered. As with the international studies, Marks (2007) also found that course completion rates varied according to field of study, with high-prestige courses having the highest levels of completion. Courses such as Education and Information Technology had low completion rates.

## **Increased Inequality**

The experiences of the United States, European Union, the United Kingdom and Australia are all similar. All have introduced policies with the aim of increasing participation in higher education, with the ultimate aim of increasing the proportion of their population with higher-level qualifications. On the whole, these initiatives have been successful in increasing the number of people participating in higher education, and ultimately greater numbers of people are attaining high-level qualifications.

However, as foreshadowed earlier in this report, the evidence suggests that the increases in participation are widening the equality gap. The most concrete evidence of this is the UK's experience, where the gap between rich and poor young people obtaining higher education qualifications has substantially increased (Machin & Vignoles 2004). In a similar vein, low SES individuals in the US are more likely to attend 'lower-class' institutions and undertake lower-prestige courses (Bailey & Dynarski 2011). These courses also have lower completion and retention rates, and, further, degree completion at these lower-level institutions and courses doesn't necessarily guarantee a successful road out of poverty, one of the enduring aims of increasing access to higher education.

## **United States of America**

Bailey and Dynarski's (2011) research found that there have been substantial increases in college entry and completion across income groups over time in the US, and differences between males and females. Even with this overall increase in participation, they demonstrated that the increases in attainment were differentially dependent upon income quartile and gender. Bailey and Dynarski (2011) also showed that persistence (to complete) rose with income and that those from the top income quartile are more than twice as likely to graduate as those from the bottom quartile. This relationship implies that equal increases in participation in higher education are likely to continue to generate highly unequal increases in college completion. The US has seen an increase in inequality in college outcomes during a period in which access to education increased and educational attainments became more important to employment earnings (Terenzini, Cabrera & Bernal 2001).

Lundberg (2013) found that college completion rates in the United States rose by 18 percentage points for young men and women born around 1980 in high-income families compared with cohorts from the early 1960s, but increased by only four percentage points for low-income youth. Bailey and Dynarski (2011) further found that the income gap in college entry rates has also increased.

## **United Kingdom**

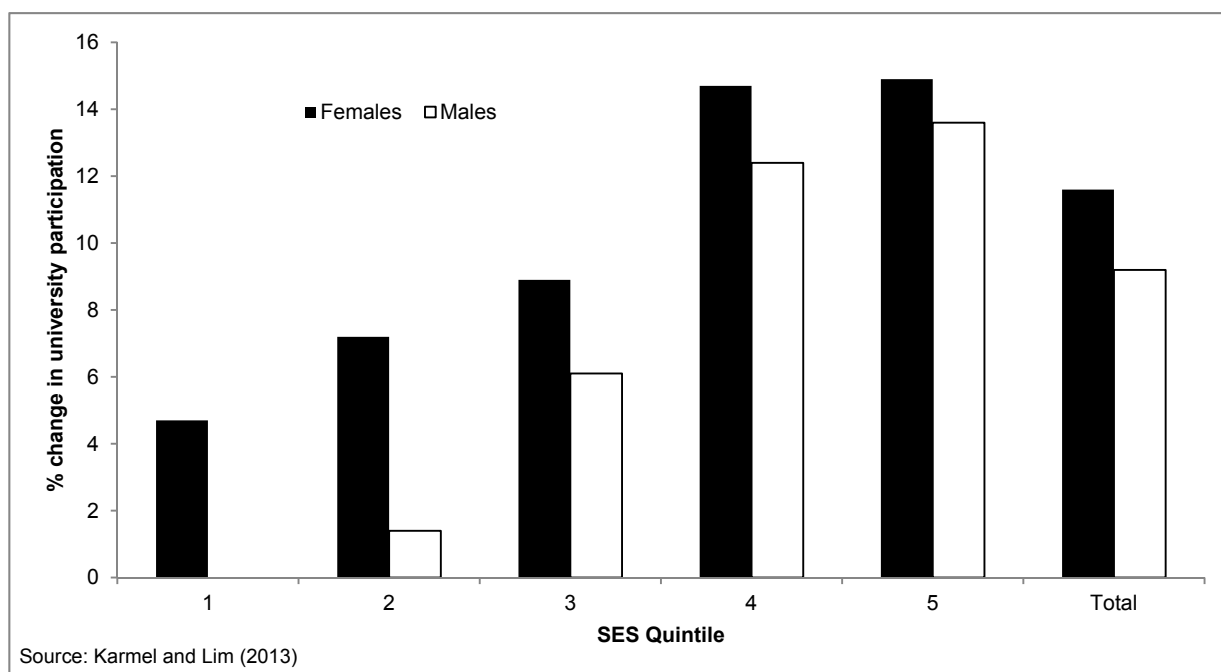
In the United Kingdom, wider participation has resulted in greater inequality, with students from low SES backgrounds concentrated in institutions and subjects considered to be of a lower level (Machin & Vignoles 2004). Machin and Vignoles (2004) found that in 1981, wealthy children were 3.3 times more likely to get a degree than children from the bottom 20% of the income distribution. By 1999, the relative odds of rich children acquiring a degree, compared with poor children, had increased still further, to 5.1 times more likely. The period of time represented in this study has seen sharp increases in educational attainment and participation in the UK, lending weight to the proposition that educational inequality at the higher education level has tended to rise in the UK in recent years. Machin and Vignoles (2004) further show that for students of a similar ability, the gap between rich and poor students has widened. That is, it is not the case that the expansion of higher education has benefited the richer students merely because they are more inherently able. Their conclusion is that it is not the most able who have benefited the most from the expansion of the UK education system but rather those from higher-income backgrounds (Machin & Vignoles 2004).

## **Australia**

Work by Karmel and Lim (2013) and Karmel, Roberts and Lim (2014) has shown that the expansion of higher education in Australia (even when targeted at low SES individuals) is likely to see relatively greater growth in medium-to-high SES participants, rather than in low SES students. If the trends seen in the US as identified by Bailey and Dynarski (2011) are observed in the Australian context, then equality in the SES levels of Australian graduates will decrease. That is, it is likely that the expansion of Australian higher education will result in higher proportions of high SES individuals obtaining a degree, despite the participation of a larger number of low SES participants. In relation to the United States, Bailey and Dynarski (2011) argued that the level of inequality observed in post-secondary entry and completion is only half explained by inequalities in high school graduation rates. Thus, increasing school completion rates for low SES individuals may not necessarily translate into higher participation, and more importantly, higher university graduation rates for low SES students in Australia.

The Australian experience generally mirrors the overseas experiences described earlier in this section. In terms of university participation, some early modelling of the impacts of the growth of higher education by Karmel and Lim (2013) and Karmel, Roberts and Lim (2014) using the Longitudinal Surveys of Australian Youth (LSAY) indicated that an expansion by 10% in university undergraduate enrolments would be predominantly taken up by those from the higher SES quintiles (figure 2). Further, similar to the UK and EU's experience, it is likely to be females who benefit more from a general expansion in higher education (Bailey & Dynarski 2011; Machin & Vignoles 2004; Marks 2007; Paulsen & St John 2002).





**Figure 2: Change in university participation by SES quintile, assuming a 10 per cent growth in university places, %**

## Conclusion

There is a substantial amount of previous research and data on university participation and completion by socio-economic status and other disadvantages. It is clear that low SES individuals have markedly different participation patterns in post-school education and are likely to enrol in lower-quality courses and institutions. As shown, in the US, low SES individuals are more likely to enrol in two-year and vocational educational institutes, sometimes in courses that lead to no better economic outcomes.

The follow-up research investigating completions is much less complete: in particular, if course and institution effects are removed, do completion rates differ by socio-economic background? The existing research provides some insight. Individuals with low SES backgrounds are likely to have lower completion rates than their high SES peers, although an Australian study by Dobson and Skuja (2002) suggests that individuals who enter a particular Australian university from government schools out-perform those from independent schools in their first year of university. (However, the implicit assumption in this is that school type accurately identifies socio-economic status, which is unlikely to be true). Li and Dockery (2014) found that that school type does matter and showed that Catholic and independent schools do provide an advantage in terms of achievement in first year of university. However, this advantage disappeared when school resourcing was included in the model.

There is also a question regarding the measurement of completions and the availability of suitable data. In the Australian context, McMillan (2005) claimed that, when investigating completions, administrative datasets often only track students within institutions. Thus, completion rates could be understated in instances where individuals move into different courses in different institutions. In Europe, the United Kingdom, the United States and Australia, there is a general commitment to increasing the participation and attainment of people to bachelor-level qualifications. The UK, US and Australia have been successful in increasing the number of individuals participating in higher education, although the success of widening participation in terms of equity is questionable, with increasing participation potentially resulting in less equity in education systems.

Do individual background characteristics influence tertiary completion rates?

To understand the completion rates and pathways of individuals, it is important that longitudinal datasets or rigorous data matching is undertaken to provide robust intelligence. The next section of this report uses the Longitudinal Surveys of Australian Youth to investigate differences in completion rates for Australian young people.

## Data and Descriptive Statistics

The data used in this study are taken from the 2003 cohort of the Longitudinal Surveys of Australian Youth (also known as LSAY. Appendix A presents an analysis on cohort choice). LSAY is a nationally representative, longitudinal, stratified cluster survey that tracks young people from the age of 15 years, to 25 years as they move from school into further study, work and other destinations. The 2003 base year of LSAY is linked to the 2003 Programme of International Student Assessment (or PISA, Organisation for Economic Co-Operation and Development 2005). PISA provides a rich set of individual background variables, together with academic testing in a range of domains such as mathematics, reading and problem-solving.

### Variables

A brief summary of the variables used is presented below, beginning with the key outcome variables and followed by the explanatory variables.

#### Outcome Variables

One primary outcome variable is used in this report, that of university completion. A secondary variable, course commencement, is used to provide some background information about those individuals who do and do not commence university. The variables of commencement and completion can be obtained from the derived variable, “XBAC”, provided with the LSAY dataset. The levels of this variable are mutually exclusive, and the derivation methodology is available from NCVER (2014). The levels of the variable, XBAC are:

**Table 1: University status of individuals, 2006 LSAY (XBAC derived field)**

Level	Label
1	Currently undertaking study at bachelor level or higher
2	Completed study at bachelor level or higher
3	Completed, and undertaking further study at bachelor level or higher
4	Commenced, but did not complete
5	Never commenced study at bachelor level or higher

In order to gain an understanding of the sample sizes, the unweighted number of individuals in each university category for the 2003 (wave 1) and 2013 (wave 11) waves of the 2003 LSAY cohort are presented in Table 2.

**Table 2: Number of individuals in each category of XBAC by wave, LSAY 2003 cohort (unweighted)**

Status	2003 (wave 1)		2013 (wave 11)	
	n	%	n	%
Currently undertaking study at bachelor level or higher	0	0.0	255	6.8
Completed study at bachelor level or higher	0	0.0	1,562	41.8
Completed, and undertaking further study at bachelor level or higher	0	0.0	368	9.8
Commenced, but did not complete	0	0.0	294	7.9
Never commenced study at bachelor level or higher	10,370	100.0	1,262	33.7
Total	10,370	100.0	3,741	100.0

From Table 2, we can see that the LSAY sample has dropped from 10,370 individuals to 3,741 in 2013. Of these 3,741, 34% have never commenced university and around 50% have completed university.

### Commenced University

The commencing university statistics are presented to provide some context for the characteristics of the individuals in the sample. Table 3 shows that around 56% of the remaining LSAY cohort had commenced university by age 25 years.

**Table 3: University commencements by age 25, LSAY Y03 in 2013**

University commencement status	Frequency (n)	Weighted frequency (N)	Per cent (%)
Did not commence	1,262	104,904	44.5
Commenced	2,479	130,687	55.5
Total	3,741	235,591	100.0

### Completed University

The focus of this study is on the bachelor degree completion rate by age 25 years. The sample of individuals used is those who are in the first four categories presented in Table 2. These four categories have been collapsed into completed bachelor degree, or not completed. These two groups form the group of students who ever commenced university. Thus, of the 3,741 individuals who remained in LSAY by age 25 years, 2,479 had commenced university at some time (Table 3).

The primary outcome variable of interest is that of completed university by the age of 25 years. Our focus in this project is restricted to those who ever commenced university ( $n = 2,479$ ).

Table 4 presents the university completion rate for those individuals who had ever commenced higher education by age 25 years, noting that those who were still undertaking their first bachelor-level qualification are included in the 'did not complete' category. We can see from this table that around 24% of those who had ever commenced had not completed university by the age of 25 years. This binary variable will provide the main response of interest in the modelling.

**Table 4: University completions rates by age 25 years, LSAY Y03 in 2013**

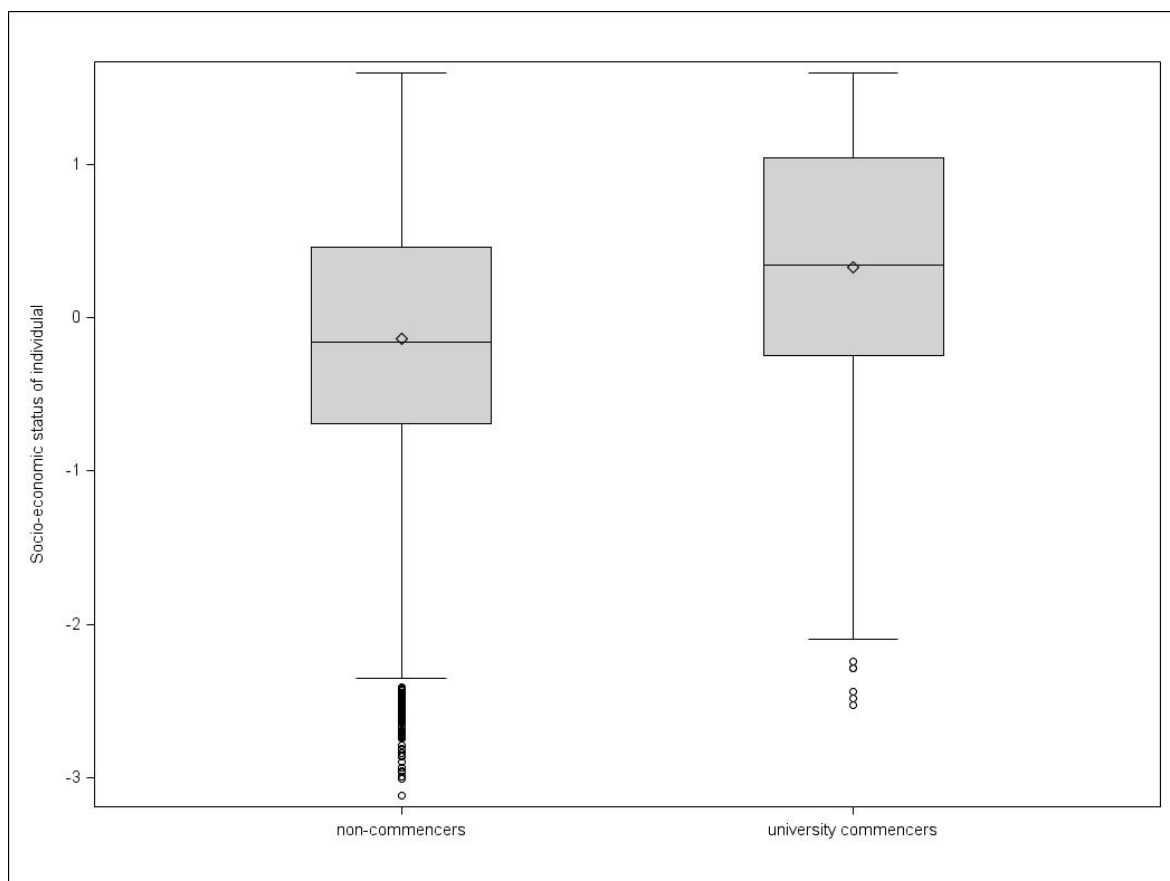
XBACH2	Frequency (n)	Weighted frequency (N)	Per cent (%)
Completed	1,930	98,954	75.7
Did not complete	549	31,733	24.3
Total	2,479	130,687	100.0

## Explanatory variables

### Socio-economic Status

Due to their ease of collection, area-based measures, such as the Socio-Economic Indexes for Areas (SEIFA; ABS 2013) are widely used in social and economic research to measure socio-economic status.

However, these measures can be criticised for their imprecision in determining SES for the individual (Coelli 2010; Jones 2001; Lim & Gemici 2011). The development of an accurate (and consistent) measure of individual socio-economic status is important. The LSAY data contain a rich set of individual background variables that can be used to create an individual measure of SES. Lim and Gemici (2011) derived a measure of SES for the 2003 cohort, which is used in this report. The distribution of the SES variable for university commencers (by 2013) and non-commencers is presented in figure 3, noting that the overall SES variable is grand mean-centred.



**Figure 3: Distribution of SES for all Y03 by university commencement**

From Figure 3, it is apparent that those who commenced university have, on average, slightly higher SES than those who never commenced.

**Table 5: Distribution of SES by university commencement**

Group	Mean	Variance	Minimum	Maximum
Non-university commencers	-0.1355	0.7376	-3.1150	1.5930
University commencers	0.3310	0.6232	-2.524	1.5940

### Field of Study of Course Completed

Table 6 presents the field of study (at the 2-digit level) measured using the ABS ASCED (Australian Standard Classification of Education; ABS 2001) for the university course completed by age 25 years. The

## Do individual background characteristics influence tertiary completion rates?

interest in this variable is whether those from low SES backgrounds complete courses with fields of study different from those from higher SES backgrounds.

From this table, we note that there is a fairly even distribution of course completions in Health, Management and Commerce, Society and Culture, followed by the Creative Arts, Education and the Natural and Physical Sciences. Box 1 on page 23 presents some examples of the courses within each of these broad categories.

**Table 6: Field of study (ASCED) for university course completed, LSAY Y03 in 2013**

	Main area of study	Frequency (n)	Weighted frequency (N)	Per cent (%)	Analysis group	Average SES
01	Natural and physical sciences	189	9,644	9.7	A	-0.102
02	Information technology	60	2,951	3.0	A	-0.262
03	Engineering and related technologies	138	6,399	6.5	A	-0.123
04	Architecture and building	41	1,933	2.0	A	0.193
05	Agriculture, environmental and related studies	26	1,419	1.4	A	-0.132
06	Health	318	14,502	14.7	C	-0.231
07	Education	163	10,062	10.2	B	-0.191
08	Management and commerce	294	15,802	16.0	C	-0.130
09	Society and culture	359	17,174	17.4	B	-0.007
10	Creative arts	179	10,462	10.6	B	-0.019
11	Food, hospitality and personal services	2	278	0.3	B	1.260
99	Unclassifiable	161	8,328	8.4	D	-0.107
	Total	1,930	98,954			

Note: There is a fairly high level of missing data in the field of study variable.

**Natural and Physical Sciences:**

- Mathematical Sciences
- Physics and Astronomy
- Biological Sciences

**Society and Culture:**

- Political Science
- Sociology, Anthropology
- Social Work, Youth Work
- Psychology
- Law
- Languages
- Economics

**Creative Arts:**

- Performing, Visual Arts
- Graphic and Design Studies
- Communication and Media Studies

**Box 1: Examples of courses within the ASCED classification**

The field of study variable has further been aggregated into three categories as shown in Table 6. The first group represents a broad technical field of study area (A); the second grouping relates to the Arts and Social Sciences (B); the third group comprises Health and Business (C); and the final group represents those whose field of study is unknown (D). The field of study categories were collapsed to assist with interpretation of interaction effects and to help counteract the impact of small sample sizes within each group.

### **Average achievement scores<sup>2</sup>**

As the correlation between the three achievement variables – Mathematics, Reading and Science – is fairly high, they have been combined into a single achievement variable by averaging the first plausible values for each of them. Figure 4 shows that the average academic achievement at age 15 years follows a symmetric distribution centred around 600 (noting that the international PISA average is around 500).

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<sup>2</sup> The PISA survey undertakes a series of testing in the domains of mathematics, reading and science. The methodology to ensure consistent reporting of achievement is that test results are converted to plausible values from an achievement distribution. Each individual is assigned five plausible values for each tested domain. It is not appropriate to average the five plausible values within each domain; however, in order to create our average achievement variable, we have averaged the first plausible value from each domain. For further information on the use and creation of plausible values refer to OECD (2005).  
<<http://www.oecd.org/edu/school/programmeforinternationalstudentassessmentpisa/35188570.pdf>>, viewed 3 December 2014.

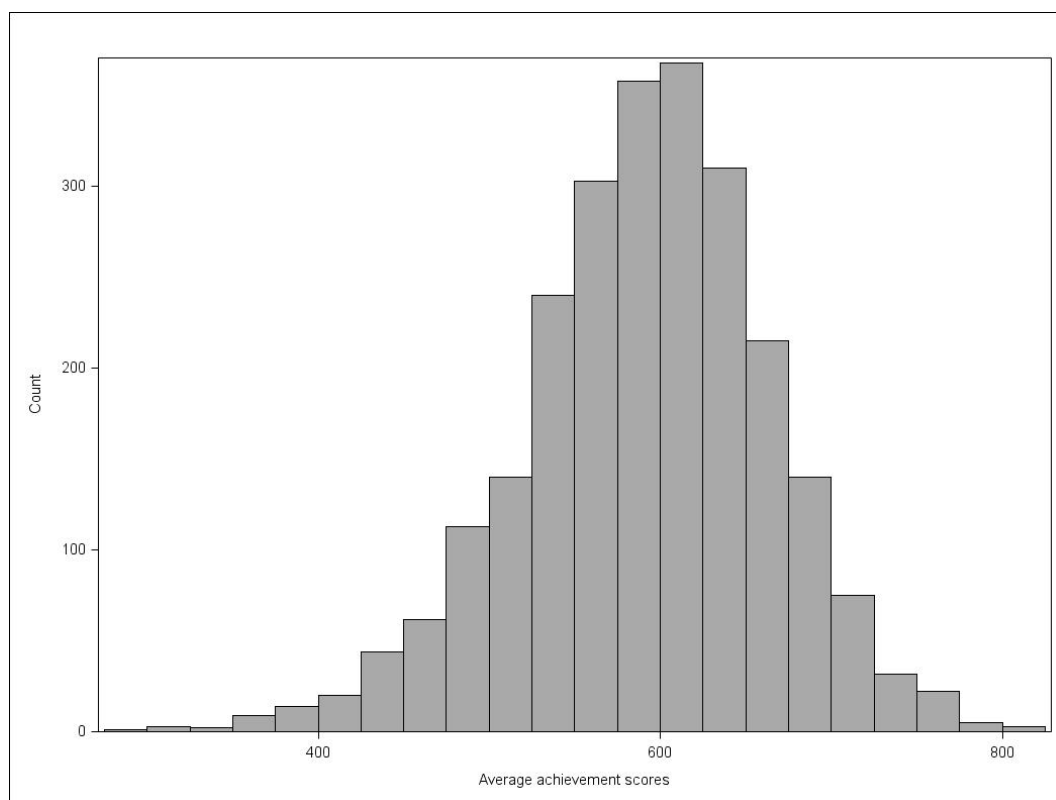


Figure 4: Distribution of average academic achievement at age 15

### Gender, Indigenous Status, Language Spoken at Home, School Sector and Regional Status

The remaining explanatory variables are presented in Table 7. This table presents the information for those who ever commenced university. Table 7 presents two percentages: the first, labelled 'per cent of commencing cohort', gives the percentage of the commencing cohort in each of the categories. For example, 30.09% of those who ever commenced university were from a low socio-economic status background. The second percentage is the percentage of each group who commenced university. For example, 42.99% of low SES individuals in the LSAY data commenced university. The results from this column are presented in the commencing university section that appears later. The final column presents the average SES for each of the factors appearing in the table (noting that the SES values are on a standardised scale).



**Table 7: Summary statistics for remaining explanatory variables**

Variable	Level	Frequency (n)	Weighted Frequency (N)	Per cent of commencing cohort (%)	Per cent of respondents in category (%)	Average SES
Indigenous status	Non-Indigenous	2,424	129,493	99.09	55.88	-0.103
	Indigenous	55	1,194	0.91	30.99	-0.500
Gender	Male	1,078	55,144	42.20	46.77	-0.125
	Female	1,401	75,543	57.80	64.19	-0.094
Language at home	English	2,237	112,969	86.44	53.64	-0.038
	Asian L	139	8,827	6.75	81.71	-0.517
	Others	103	8,891	6.80	62.75	-0.613
School sector	Government	1,293	67,107	51.35	46.01	-0.233
	Catholic	572	33,101	25.33	65.82	-0.154
	Independent	614	30,479	23.32	77.29	0.232
Regional status	Metropolitan	1,867	99,472	76.11	57.58	-0.087
	Regional/Remote	612	31,215	23.89	49.68	-0.169
Total		2,479	130,687	100.00		-0.107

For all respondents, 99% of those who commenced were from a non-Indigenous background, but 31% of Indigenous people in the LSAY dataset commenced university. This is likely to be a significant overestimate, due to the small sample size.

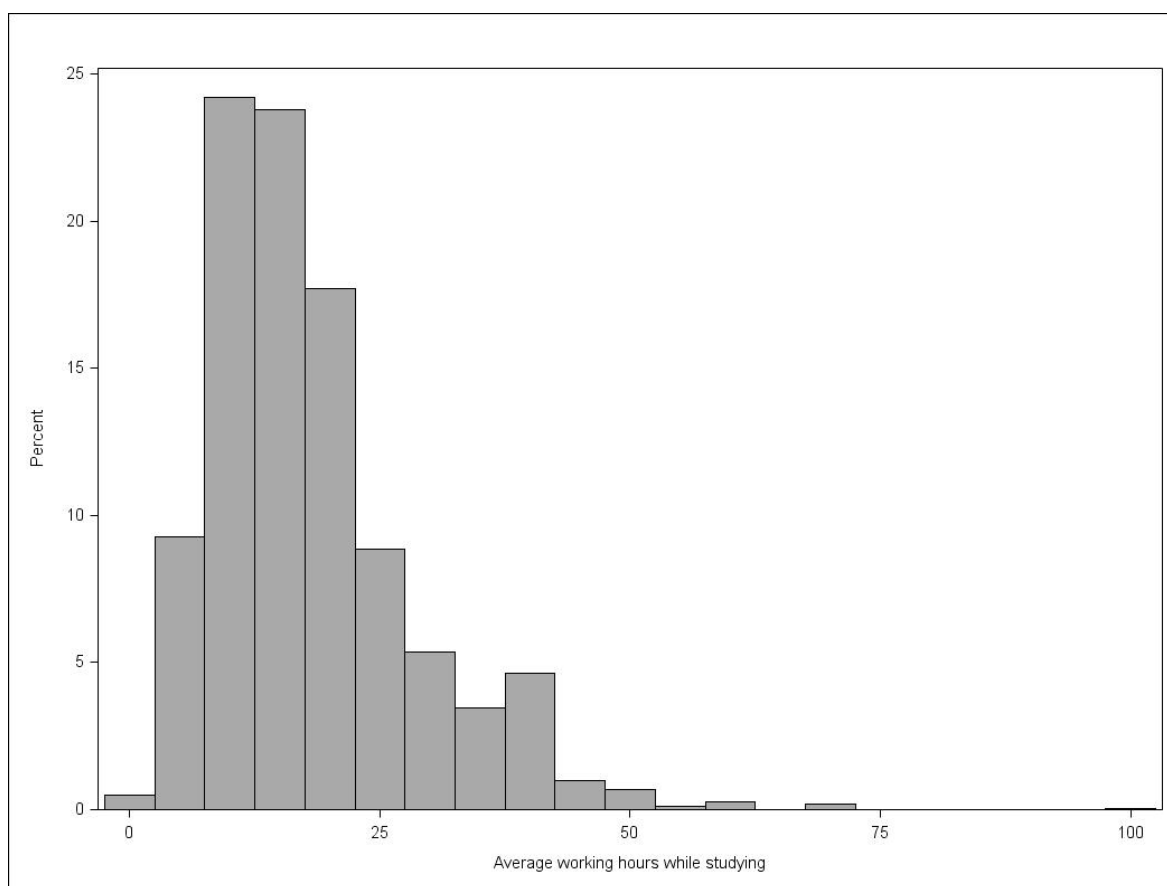
The commencing cohort sample is made up of more females than males, predominantly English-speaking and from government schools. Approximately 75% of the commencing cohort attended schools located in a metropolitan area. This analysis is expanded further in the commencing university section.

## A Note about Regional Status

LSAY collects information about regional status at age 15 years. The location variable is classified according to the MCEETYA<sup>3</sup> Geographical Location Classification (Jones 2004). The MCEETYA classifies region into eight geographical zones. These eight regions can be aggregated into three distinct zones: metropolitan zone; provincial (regional) zone; and remote zone. For this report, the provincial and remote zones have been collapsed into a single category of regional/remote location.

## Hours Worked While Studying

An area of further interest is to determine whether students who work while studying are more or less likely to complete university. LSAY enables us to determine the hours the individuals were working. However, in the case of university study, a bachelor degree is usually undertaken over several years, and students are likely to change the amount they work over each of these years. In order to create a measure of the level of work undertaken during an individual's university career, we have averaged their working hours over the number of years they report that they are studying a bachelor (or higher) degree. Figure 5 shows the distribution of the average weekly working hours while studying.



**Figure 5: Average working hours while studying**

To assist in the analysis, this continuous variable has been converted to a categorical variable with four categories: 1–10 hours, 11–20 hours, 20+ hours and not working or unknown working hours, as shown in table 8.

<sup>3</sup> Ministerial Council on Education, Employment, Training and Youth Affairs.

**Table 8: Distribution of hours worked whilst studying, categorical**

Hours worked	Frequency (n)	Weighted frequency (N)	Weighted per cent (%)	Average SES
1–10 hours	416	22,253	17.03	-0.112
11–20 hours	1,078	55,285	42.30	-0.078
20+ hours	743	38,330	29.33	-0.074
Not working	242	14,820	11.34	-0.314
Total	2,479	130,687	100.00	-0.107

Table 8 also presents the average working hours by socio-economic status. As can be seen, those who aren't working have the lowest SES, followed by those who work between one and ten hours. Those working between 11 and 20+ hours have the highest SES.

## Statistical Analysis

### Multi-level Modelling

The data used to undertake the statistical analysis is the sample of those students who ever commenced university by age 25 years. All continuous variables have been mean-centred.

The LSAY cohort is based on a sampling methodology that utilises the fact that students are grouped within schools. Given that students attending the same school may be more similar to each other than to students from a different school, the student responses and outcomes within a school may be correlated.

In order to account for this, a multi-level (or mixed) model is used in which the first level includes the measures of student characteristics, while the second level fits a random school intercept. This model introduces a variance-covariance structure that allows us to capture two levels of variation: individual variance ( $\sigma_e^2$ ) and the variation between school intercepts ( $\sigma_{sch}^2$ ).

Given that the responses of interest are binary (completed or not), a generalised logistic multi-level model is used. The implementation of this model is undertaken using the PROC GLIMMIX procedure within SAS/STAT™ (SAS Institute Inc. 2011).

The general multi-level model fitted in this analysis can be written as:

$$\text{logit}(Y) = \mathbf{X}\boldsymbol{\tau} + \mathbf{Z}\mathbf{u} + \epsilon$$

Where  $\mathbf{Y}$  is the vector of 1/0 responses, where 1 indicates course completion,  $\mathbf{X}$  is the design matrix of student-level characteristics,  $\boldsymbol{\tau}$  is the vector of student level coefficients,  $\mathbf{Z}$  is the design matrix for schools,  $\mathbf{u}$  is the vector of random school coefficients (BLUPS) and  $\epsilon$  is the random error.

We further assume that  $u \sim N(0, \sigma_{sch}^2)$  and  $\epsilon \sim N(0, \sigma_e^2)$  and in the case of the logistic model that;

$$\sigma_e^2 = \frac{\pi^2}{3} = 3.29.$$

As seen in table 2, 10,370 individuals were available in the first wave of LSAY. Individuals drop out of LSAY for a variety of reasons as outlined in Rothman (2009), and we note that the total number of individuals remaining in LSAY in wave 11 is 3,741. In order to counteract the impact of attrition, appropriate weightings are applied to summary tables and regressions. Homel et al. (2012), when comparing LSAY with the Australian Census and Youth in Focus (Breunig R. et al. 2007) datasets, showed that the use of LSAY with appropriate weights is broadly representative of young people, particularly when looking at relationships between variables.

There are two weights available for each individual in LSAY: the individual student weight and the school weight. The individual student weight is constructed to account for the survey design, the probability of an individual being selected and to take account of attrition from wave 1 (Lim 2011).

The SAS procedure requires the construction of a single weight. In the first instance, the propensity and individual student weight are multiplied to form a student-level weight.

The next step is to combine the student level and school weight into an overall weight for use in the multi-level modelling. The procedure for creating this weight is based on the methodology provided by Chantala, Blanchette and Suchindran (2011), in particular, the population-weighted iterative generalised least squares (PWIGLS) methodology, in which the individual and school weights are multiplied and then divided by the average of the individual weights within a school:

Do individual background characteristics influence tertiary completion rates?

$$mlweight_i = \frac{student\_wt_{i|j} \times school\_wt_j}{\frac{\sum_{i=1}^{n_j} student\_wt_{i|j}}{n_j}}$$

Where  $student\_wt_{i|j}$  is the individual student weight for individual  $i$  in school  $j$ ,  $school\_wt_j$  is the weight for school  $j$  and  $n_j$  is the number of individuals in school  $j$ .

This weight is then used as a survey weight in the SAS GLIMMIX procedure within SAS/STAT™ (SAS Institute Inc. 2011).

The regression models include all explanatory variables presented, as well as the interaction of the explanatory variables with socio-economic status. Interactions are removed from the model if they are substantially not statistically significant. Each interaction was removed in turn, beginning with the most insignificant. However, a conservative approach to dropping terms was used. The results of the final model are used for prediction. In deriving the predicted probabilities of completion, the explanatory variables that aren't of interest are included at an even proportion. For example, where gender is not of interest, it is assumed that 50% of the individuals are male and 50% are female. Hence, predicted probabilities are derived for a hypothetical average individual.

### Intra-class Correlation

The intra-class correlation (ICC) is a measure of the variation attributable to differences between schools compared with the variance within schools. To calculate a measure of intra-class correlation for the logistic model ( $\rho_{school}$ ), we use:

$$\rho_{sch} = \frac{\sigma_{sch}^2}{\sigma_{sch}^2 + \sigma_e^2}$$

In the case of the logistic model,  $\sigma_e^2 = \frac{\pi^2}{3} = 3.29$ , and so the ICC can be derived from the single variance component for schools as:

$$\rho_{sch} = \frac{\sigma_{sch}^2}{\sigma_{sch}^2 + 3.29}$$

As we are using a logistic model, the interpretability of the ICC is not straightforward, as it is calculated on the logistic scale. Eldridge, Ukoumunne and Carlin (2009) provide a table that enables the conversion of the ICC from the logistic scale to a proportions scale.<sup>4</sup> The proportion scale ICC is interpreted as the amount of variation explained by schools (see appendix C for the table and details).

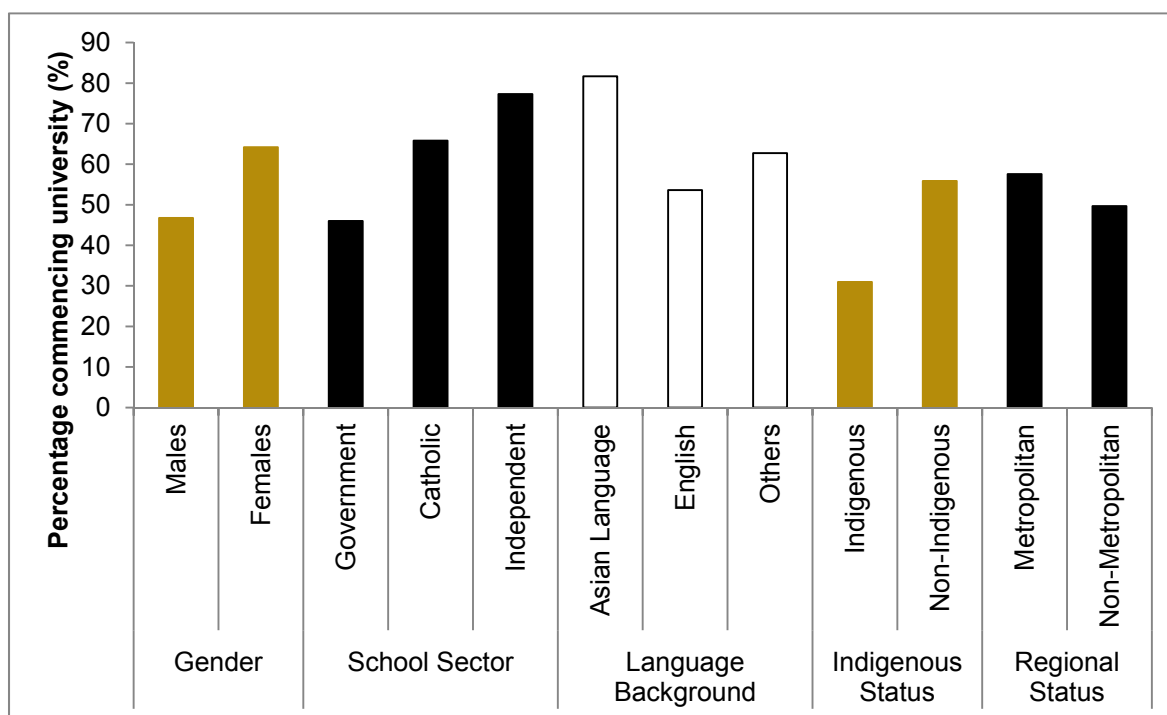
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<sup>4</sup> Table 1 of Eldridge, Ukoumunne & Carlin (2009) is reproduced in the appendix.

## Results

### Commencing University

This section presents summary statistics (and graphs) of the key background characteristics of those commencing university compared to those who don't. The group of interest is the 2003 LSAY cohort for those who remained in the cohort by age 25 years (2013). This comprised 3741 individuals, of whom 2479 (from table 3) had commenced a bachelor degree or higher. The figures below represent the weighted percentage of commencements.



**Figure 6: Commencing university by explanatory variables**

Figure 6 shows the percentage of commencing students for each group. From this Figure, it is evident that females are more likely than males to commence university (65% versus 45%, respectively). This result is not surprising, as Karmel and Liu (2011) showed that apprenticeships are an important post-school pathway for young males. Females are much less likely to undertake an apprenticeship, and females have more successful labour market outcomes (such as income) when they commence higher education.

In terms of school sector, we note that those who attended independent and Catholic schools are more likely to commence study in higher education. Around 75% of LSAY respondents who attended either a Catholic or independent school commenced study at bachelor or higher level. Fewer than 50% of those who attended a government school had enrolled in higher education by the age of 25 years.

Those who come from a household where an Asian language is primarily spoken are more likely to commence university study. Around 85% of these individuals commenced university compared with 55% and 60% of those who have English or another language background.

Overall, around 55% of the non-Indigenous population of LSAY commence university study. This compares with around 30% of the Indigenous population in LSAY.

A higher proportion of those from metropolitan areas attend university, with around 55% enrolling in a bachelor degree course. However, the difference between regional/remote and metropolitan students is small, with around 50% of regional individuals commencing study at bachelor degree or higher level.

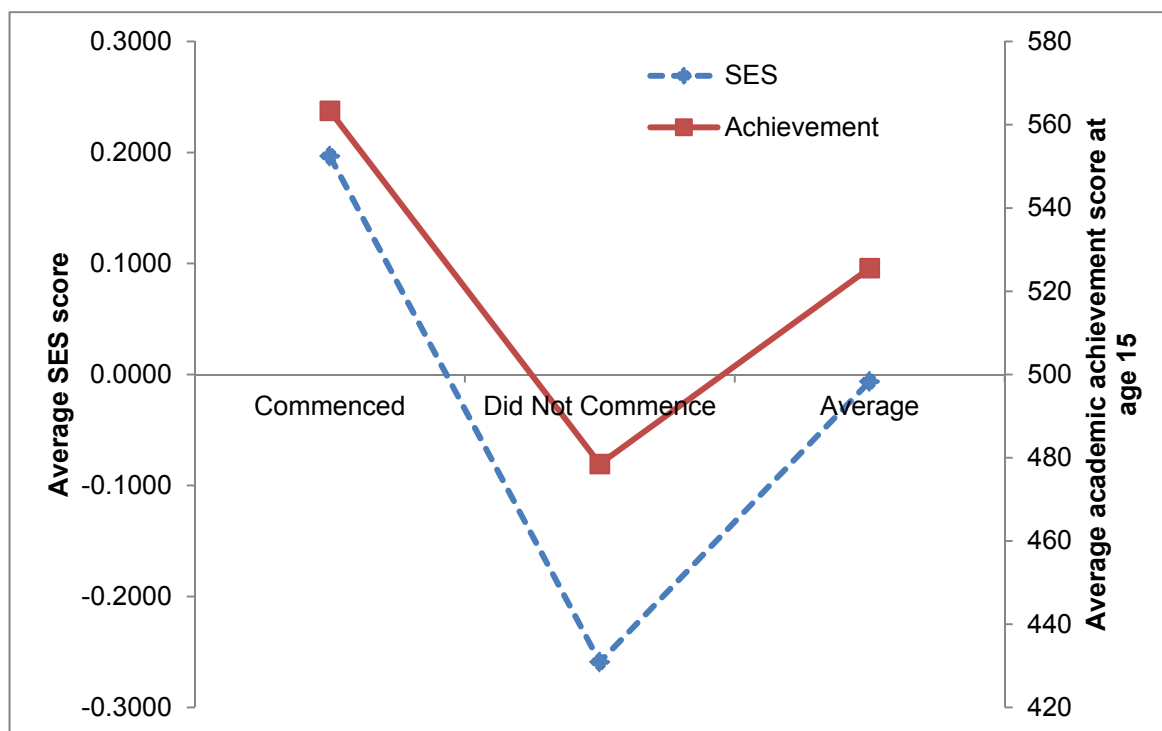
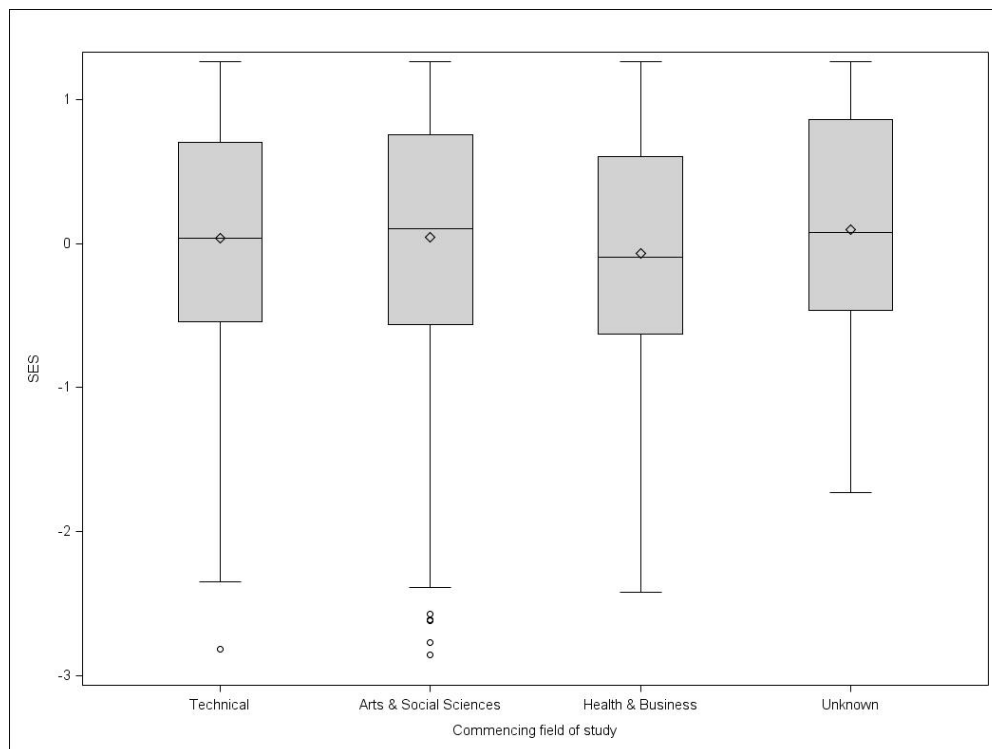


Figure 7: SES and achievement scores by university commencement status

In terms of SES and academic achievement (as represented by the red line in Figure 7), those who did not commence university have substantially lower achievement scores than those who did. In relation to socio-economic status, it is clear that those who commenced university also have higher SES, on average, than both the overall average and those who did not commence university.



**Figure 8: Commencing field of study by SES status**

Figure 8 shows the distribution of SES for each of the commencing fields of study. As can be seen, each of the fields of study has similar distributions of socio-economic status, although health and business may have a slightly lower average SES than the fields of study.

## Conclusion

This section presented a simple exploratory analysis of the characteristics of those who commenced university by age 25 years in this LSAY sample. The results have shown that the characteristics of those who commence university in LSAY match the trends observed in much of the literature. In particular, they are more likely to be individuals who come from a high SES background, attend independent or Catholic schools, are female, are from metropolitan areas and have higher academic achievement at age 15 years.

The focus of this report is on university completion and course changing, given that an individual has commenced university. The cohort of interest (that is, those who commenced higher education by age 15 years) is described in table 3 and the next sections present the results from the regression modelling of university completion.



## University Completion

In this section, the results from the modelling of university completion are presented. Rather than providing tables of regression output, the results are presented using a series of figures. These figures represent the size of the effects obtained from the regression models, presented as predicted probabilities. Full regression results can be found in appendix C.

The analysis of university completion begins by looking at the intra-class correlation. As described in the methodology, the intra-class correlation attempts to measure the level of influence that schools have on an individual's probability of completing university. From the model-fit statistics presented in table B1, the intra-class correlation of the null model on the logistic scale is 0.58. Table 1 in Eldridge, Ukoumunne and Carlin (2009) indicates that the calculated ICC of 0.58 and an overall university completion rate of 0.75 ( $p = 0.25$ ) leads to an ICC on the proportion scale of around 0.30 (noting that this value needs to be extrapolated from the information in Table B1).

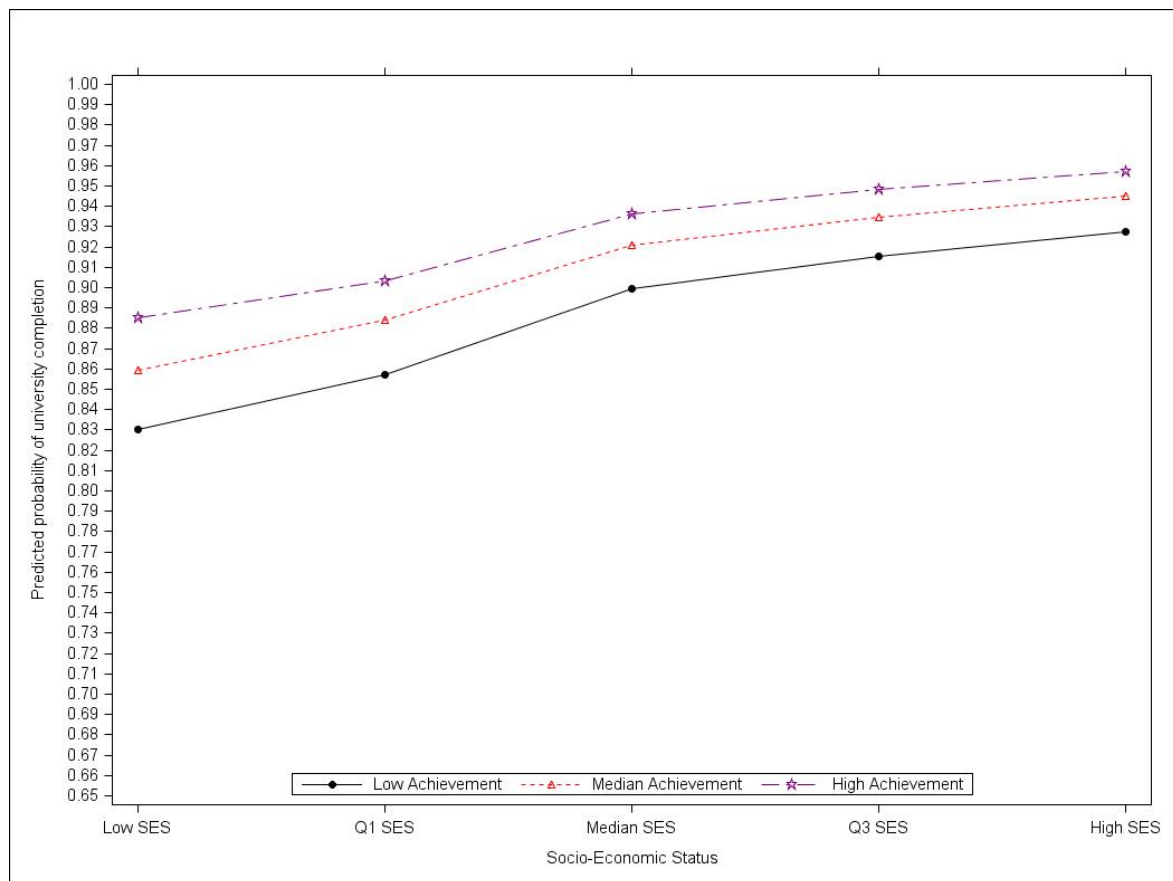
This implies that schools have some impact on university completion (around 30% of the variance in university completion is driven by school factors). However, 70% is driven by the characteristics of the individuals.

In the final model, of particular interest are the interaction terms between socio-economic status and the other background variables. A significant interaction implies that the impact of SES differs according to the level of the other variables. For example, it might be the case that being from a low SES background has a different influence on completion if growing up in a regional area compared with the effect of being low SES in a metropolitan area.

From the regression results (appendix C), we note that for all included variables there is a statistically significant relationship between SES background and the variable of interest. The results presented below include the relationship of the variables of interest, SES and academic achievement at age 15 years. Academic achievement is included in the figures, due to the importance that academic ability has in relation to the probability of completing university.

## Academic Achievement

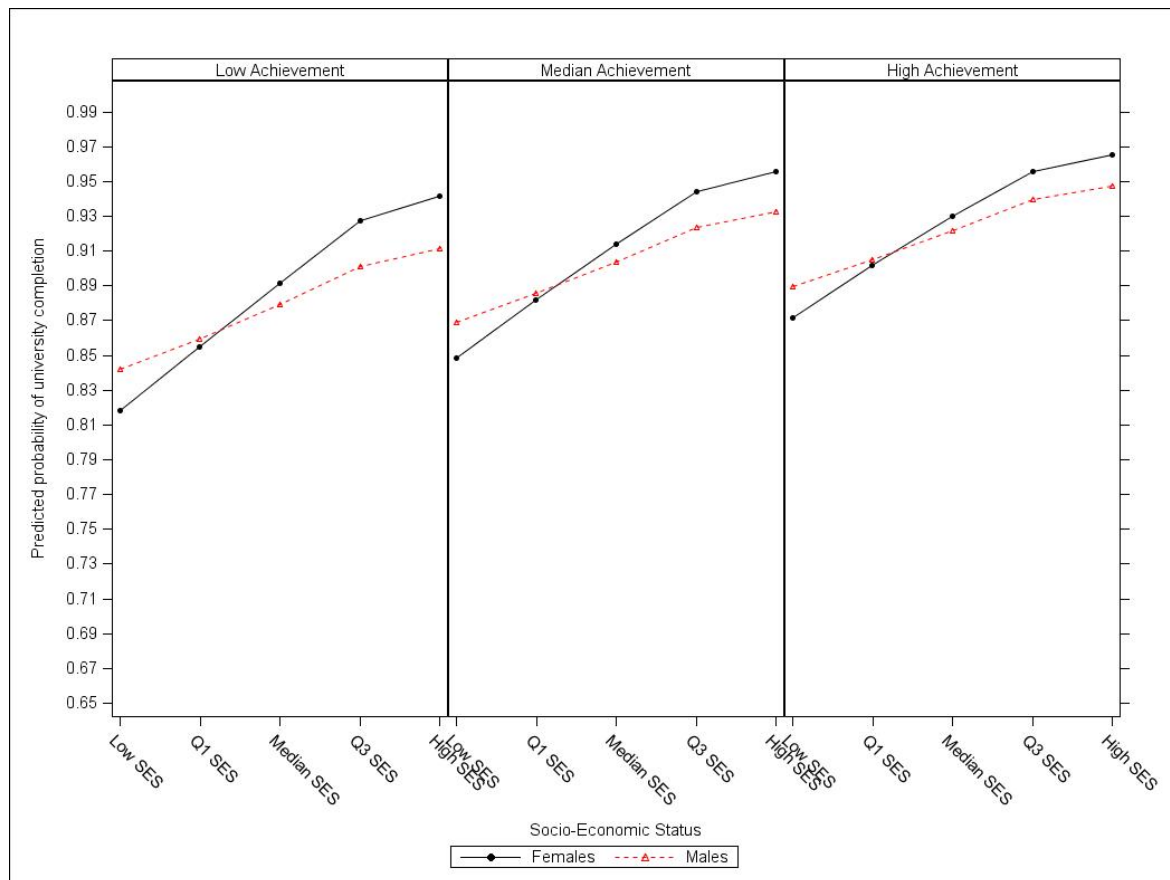
An important factor in determining whether a student will complete university is their academic achievement. Figure 9 presents the probability of completing university by different levels SES (low = 10th percentile, Q1, Median, Q3 and high = 90th percentile) for three different levels of academic ability at age 15 years (quartile 1, median, and quartile 3).



**Figure 9: Predicted probability of completion by SES and academic achievement**

From Figure 9, it can be seen that the differences between high and low academic achievement lie in the order of five percentage points. It can be further seen that, as an individual's socio-economic status increases, then so does the probability of completing university. As SES increases, the gap between high and low achievers decreases. Thus, being from a high SES background seems to reduce the impact of having lower academic achievement at age 15 years.

## Gender

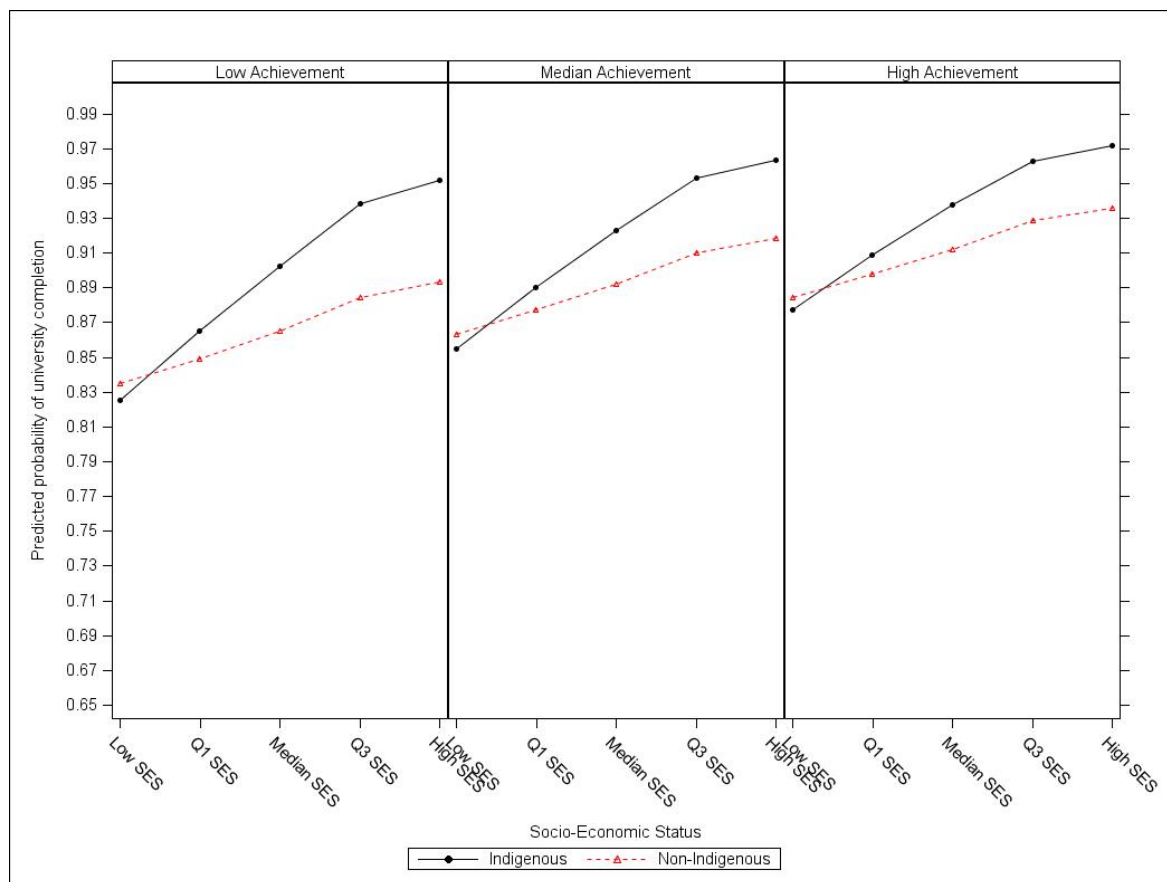


**Figure 10: Predicted probability of university completion by SES, gender and academic achievement**

Previously, it was noted that females are more likely than males to commence university. Figure 10, which presents the predicted probability of university completion by gender, SES and academic achievement at age 15 years shows that there are some differences between male and female completion rates.

Low SES males have higher completion probabilities than low SES females; however, as the SES levels increase, females overtake males and have higher completion probabilities. The gap between males and females increases as individual socio-economic status increases. Further, the impact of SES is slightly lower for males than for females, with males having around a six-percentage-point difference in completion probabilities between high and low. Females, on the other hand have around a ten-percentage-point difference in completion probability between high and low SES for low-achieving individuals.

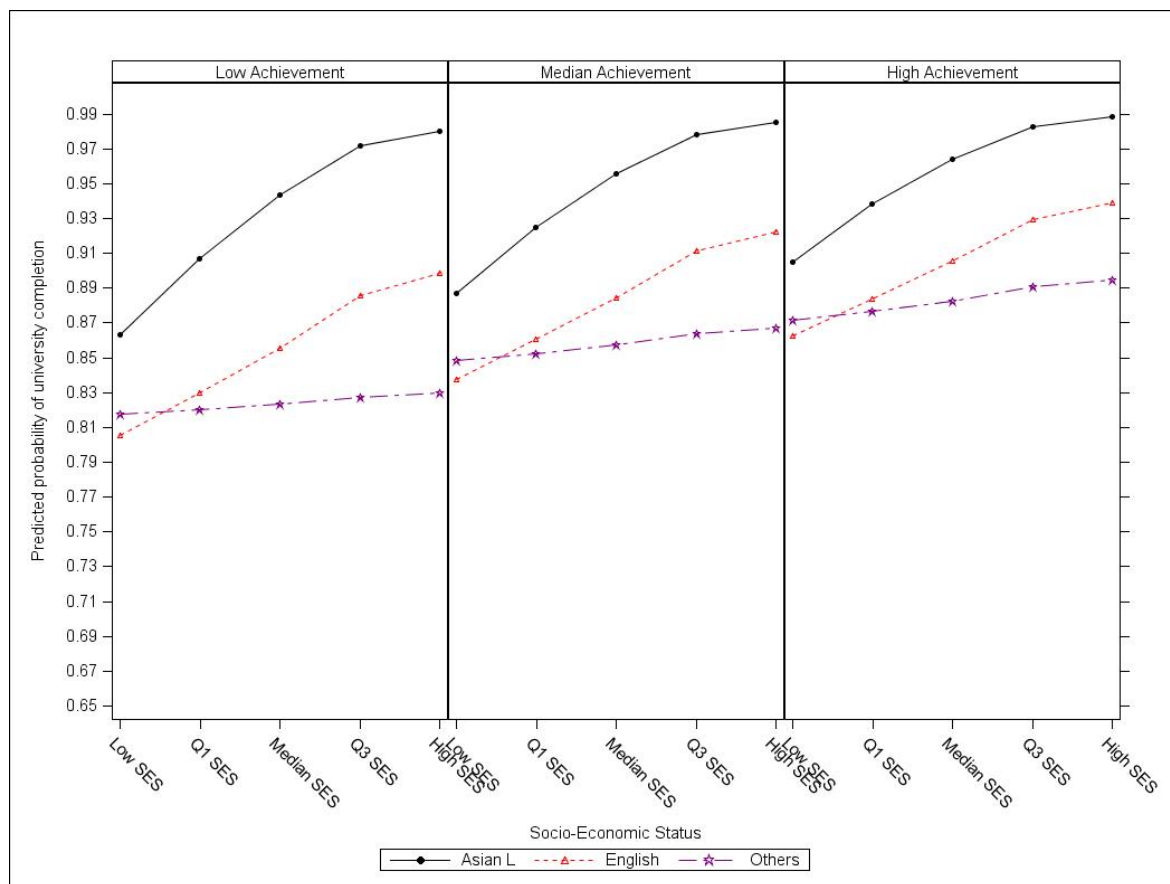
## Indigenous Status



**Figure 11: Predicted probability of university completion by SES, Indigenous status and TER score**

As can be seen from Figure 11, socio-economic status impacts on Indigenous people more strongly than on non-Indigenous individuals. For those with relatively low achievement, the difference between high and low socio-economic status for Indigenous individuals is of the order of 12 percentage points, with high SES Indigenous individuals having very high probabilities of completing. Low SES Indigenous individuals are less likely to complete university than their non-Indigenous peers. It must be noted that the Indigenous sample of commencing students is small and so these results should be interpreted with caution. From these results, it appears that, for this small sample of Indigenous students, once they commence higher education, they are more likely to go on to complete.

## Language Background



**Figure 12: Predicted probability of university completion by SES, language background and academic achievement**

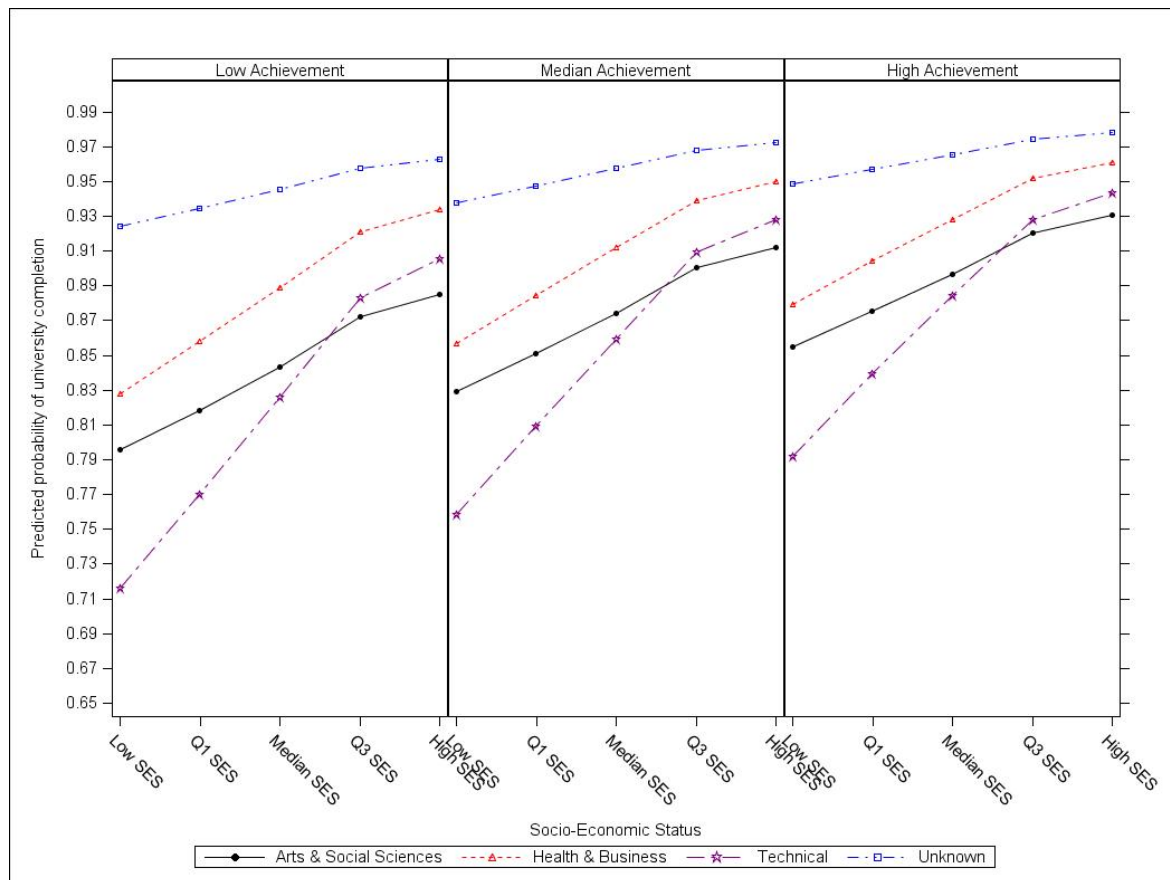
An individual's language background influences their likely course completion. Overall, those with an Asian language background have a statistically higher probability of completing university than those from English or other language background (Figure 12).

For those with an Asian or English language background, socio-economic status influences the probability of completion. However, for those who speak other languages, SES has relatively no impact, with the probability of completion remaining static as SES increases.

As can be seen, the probability of completing increases at a higher rate as SES increases. SES has minimal impact on those individuals who have an 'other' language background. For those from English-speaking backgrounds, SES can increase the probability of completion by around ten percentage points and for those from an Asian language background the increase is around 12 percentage points.

Thus, in this case, those who already have a completion advantage (Asian languages) are further boosted by their SES background. Of concern, however, are those with 'other' language backgrounds, whose completion rates are lower than the other groups and for whom their SES background makes little difference.

## Commencing Field of Study



**Figure 13: Predicted probability of university completion by SES, commencing field of study and academic achievement**

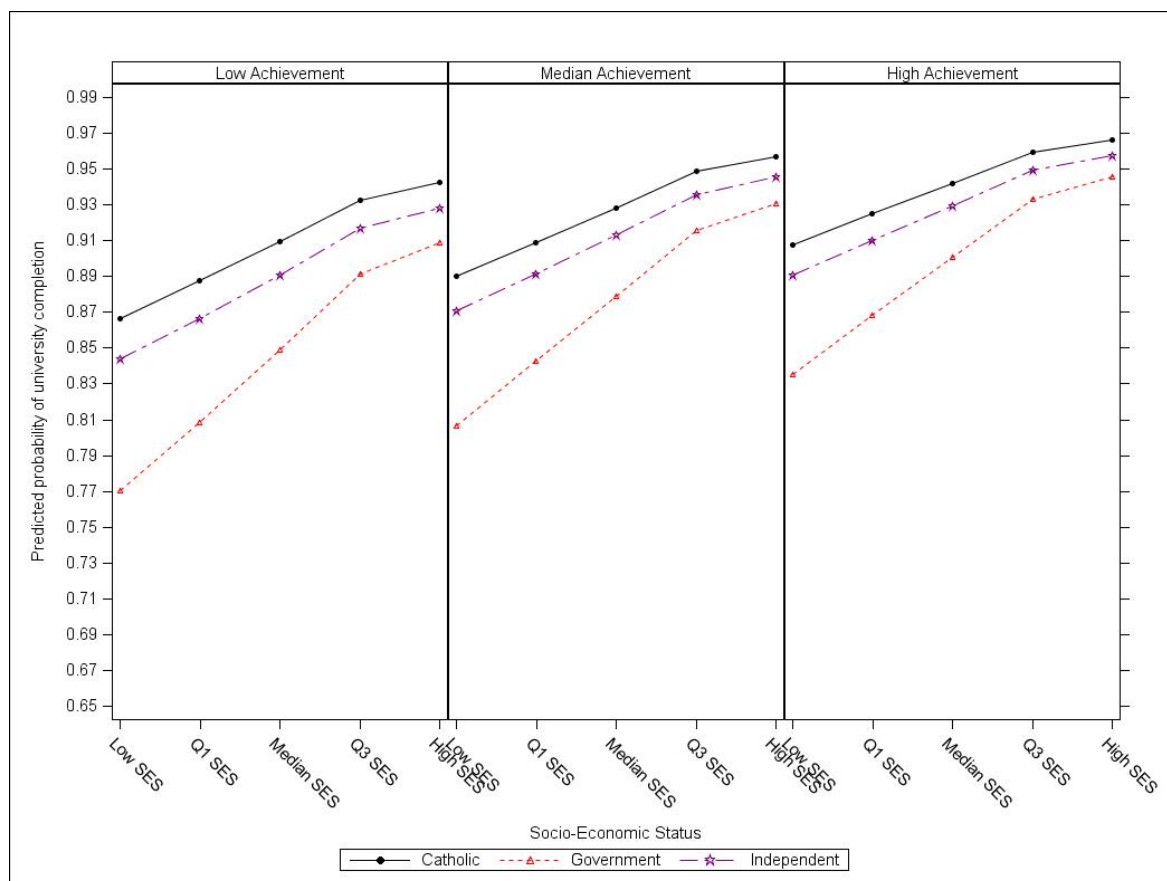
A student's commencing field of study is one of the most important predictors of course completion identified from the model (appendix C). Overall, those who commence in a technical (Engineering, Science and IT, for example) field of study have the lowest probabilities of course completion.

The impact of SES is also significant, again, primarily for those who commence in the technical fields, but across all fields of education. From Figure 13, it can be observed that there is relatively no difference in completion probabilities for all fields of study for those individuals with moderate to high SES backgrounds. For those with low SES, the gap between the technical fields and the other three fields of education is substantial (around ten to 20 percentage points for students with low TER scores, compared with around five percentage points for high SES individuals). Thus, as for the previous variables, SES may be able to mitigate some of the impacts of undertaking different fields of study. For high SES individuals, while there are some differences between the fields of study, the differences aren't as pronounced as for those from low SES backgrounds. In particular, there may be something about commencing university in a technical field that makes it more difficult for low SES students to complete (regardless of their academic achievement at age 15 years).

These findings are similar to those observed by Quinn (2013), who showed that the Science and Engineering disciplines have the highest drop-out rate and that men from a working class background are particularly vulnerable. Aird et al. (2010) argued that low SES students tended to focus on studying for a

particular job and know the type of occupation they want and thus Science and Engineering fields of study may not provide the stability required by these individuals. Specific policy or actions by universities that target low SES individuals who commence in technical fields of study may help to lift the completion rates for these particular students.

## School Sector

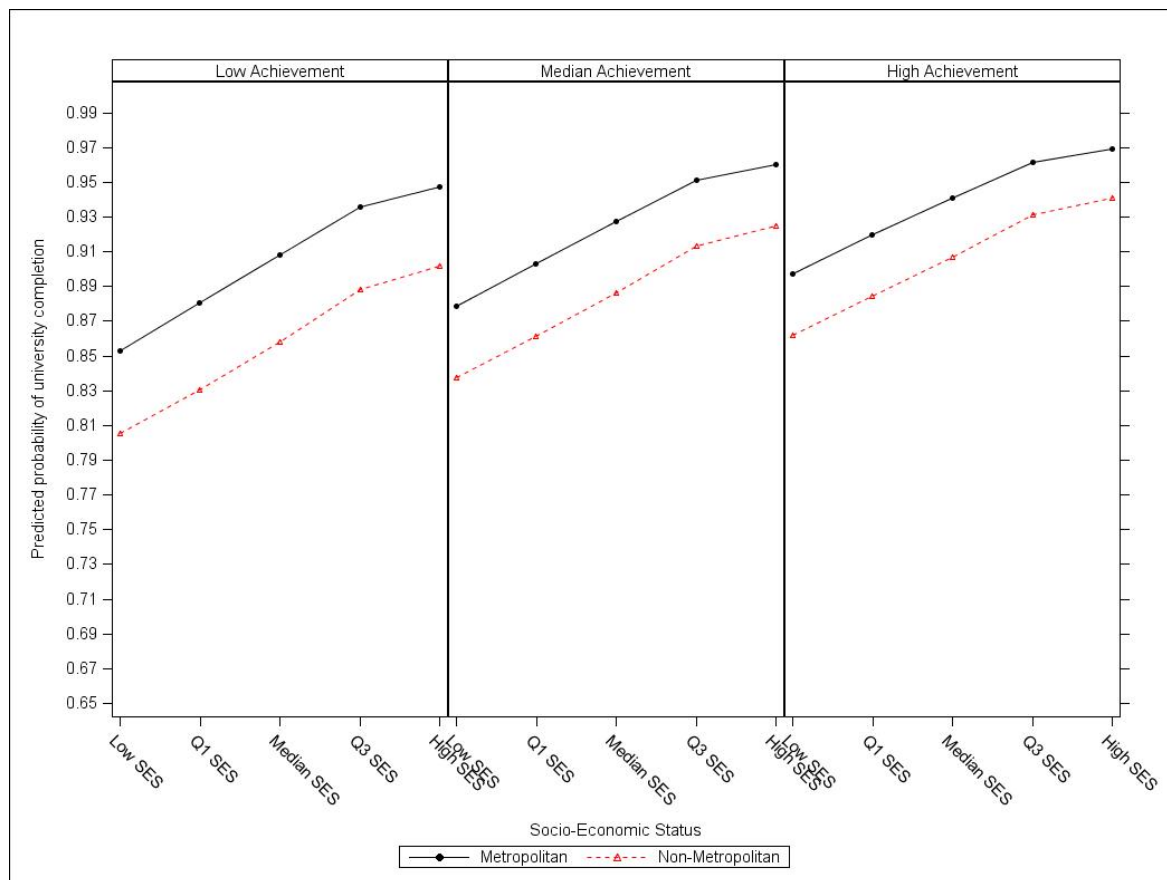


**Figure 14: Predicted probability of university completion by SES, school sector and academic achievement**

Catholic and independent schools have a high proportion of their students commencing university (Figure 14). Those from government schools have around an eight-to-ten percentage point lower probability of completion than those who attended Catholic or independent schools. Catholic schools have, on average, students with the highest probability of completion.

When student socio-economic status is considered, we see that low SES students from government schools have the lowest probability of completion. For high SES students, the sector of the school attended makes no difference to the probability of completing. As seen by the slope of the curves, whilst low SES individuals in all school sectors have lower completion rates than their high SES counterparts, attending a Catholic or Independent school can somewhat cushion the impact of having a low SES background. That is, the impact of being from a low SES background and attending a government school is much greater than the impact of being from a low SES background and attending the other school types (when compared to being from a high SES background).

## Regional Status



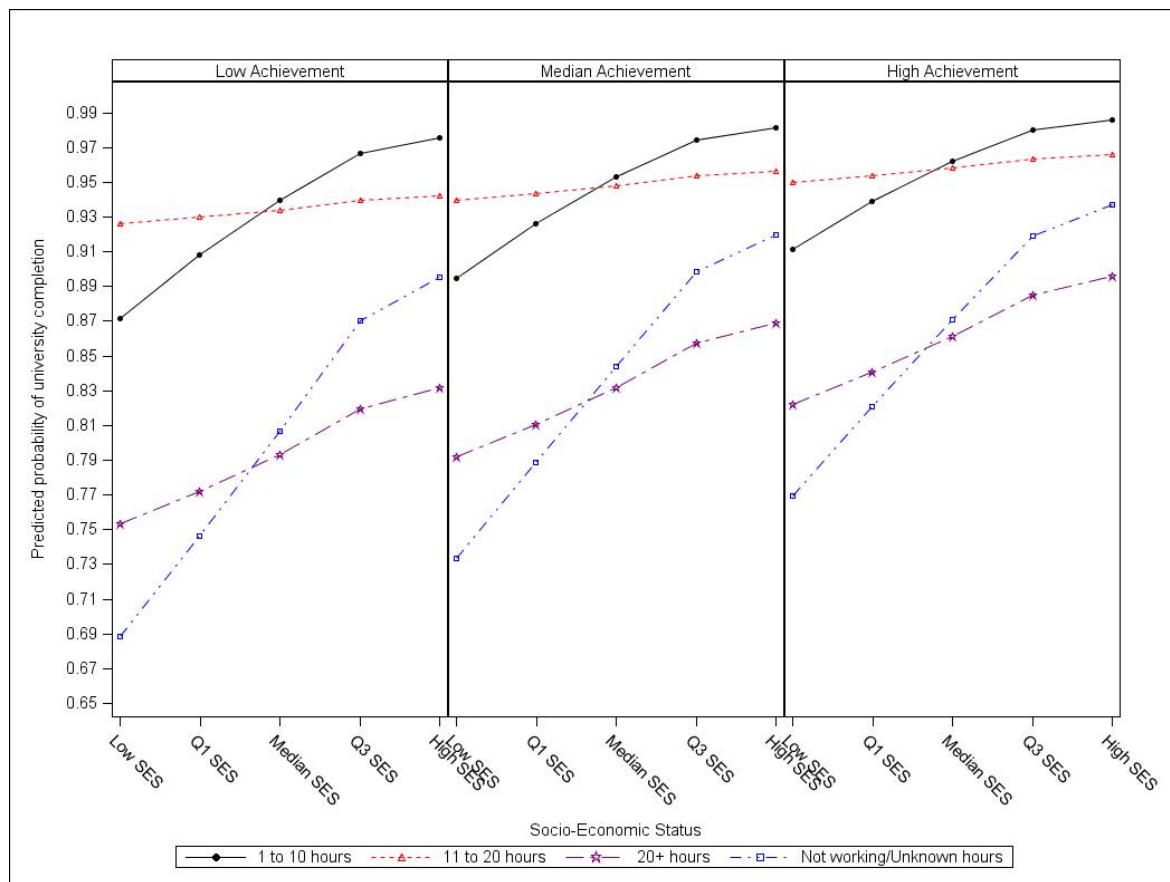
**Figure 15: Predicted probability of university completion by SES, regional status and academic achievement**

Figure 15 demonstrates that, on average, students from metropolitan regions have higher probabilities of completing university. The impact of SES is again important for those with low PISA scores, with low SES individuals having around an eight percentage point difference in completion probabilities. While there is a statistically significant interaction between SES and regional status, there appears to be no practical difference in the response profile of regional and metropolitan students with regards to SES. That is, the gap between metropolitan and regional students remains fairly constant across all levels of SES.

The impact of being from a regional location occurs fairly evenly across all SES levels. Any intervention that focuses on regional completions will have a positive effect for all regional students, regardless of their SES status.



## Working While Studying



**Figure 16: Predicted probability of university completion by SES, working hours and academic achievement.**

Figure 16 shows that, on average, those students who have moderate working hours (between one and 20 hours per week) are more likely to complete their university studies. Those students who work more than 20 hours per week are the least likely to complete. However, when the interaction with SES is considered, the probability of completing university becomes more complex. Firstly, the impact of socio-economic status is minimal for those who work between 11 and 20 hours per week. Socio-economic status has the most influence over university completion for those who weren't working while studying. For low SES individuals, those who work more than 20 hours per week have a higher completion probability than those who aren't working. However, the relationship between those who aren't working and those working more than 20 hours, reverses as SES increases; that is, high SES students who aren't working are more likely to complete their studies than high SES students who work more than 20 hours per week.

Students who work for more than 20 hours per week have the lowest probability of course completion, except for low SES students, where there is no difference. It may be that those who are working longer hours are more disengaged from their education and hence are more likely to drop out. Further, it is clear from this that students who do some work while studying are more likely to complete than those who don't work. Long working hours are a detriment to high SES students, but may be necessary for low SES students.

Polidano and Zakirova (2011) had similar findings, with those who worked more than 16 hours per week while studying being less likely to complete their course. James, Krause and Jennings (2010) showed that

the proportion of students working during semester continues to increase, particularly for full-time students who are working, on average, close to 13 hours per week. Students' main motivations for work are to afford extras and become financially independent. Nearly two-thirds of students work to afford basic needs. Longer hours of work are associated with lower grades. Paulsen and St John (2002) found that students who were employed while studying and those classified as financially independent were more likely to persist in college.

## Summary of Results

The impact of socio-economic status on university participation and completion is not straightforward. In terms of participation, low SES students in the LSAY Y03 cohort continue to participate in higher education at lower rates than their high SES counterparts. However, that may be due to the fact that low SES students have lower academic achievement scores at age 15 years (noting that this may be due to the fact that they are in fact low SES - a somewhat circular argument). For university completion, there is an important positive relationship between socio-economic status and the probability of university completion, with low SES students less likely to complete their course than high SES students. Socio-economic status also has important relationships with other background variables. Further, the impact of SES background is different depending on the level of other background characteristics, meaning that being from high SES background may in fact cushion or counteract the impact of other variables.

One variable in particular over which the individual has control is working while studying. We have seen that working moderate hours – between one and 20 hours per week – over the length of their course increases the chance of completion, regardless of SES background. This may be related to the fact that the income earned may help all students to meet their living expenses. However, the results also show that working more than 20 hours per week, and not working at all, substantially decreases the probability of completion for all SES students.

Further, there is some indication that low SES students who commence in the Arts and Social Sciences are more successful in their course, whereas low SES students who undertake technical courses have the lowest chance of completing. However, socio-economic status appears to negate the impact of course choice, with high SES students having much smaller differences in completion probabilities across the four fields of study.

In summary:

- Low SES individuals complete university courses at lower rates than high SES individuals.
- Being from a high SES background may somewhat overcome the impact of having low academic achievement at age 15 years. That is, high SES individuals with lower academic achievement have higher predicted probabilities than some low SES students with higher academic achievement.
- Low SES males are more likely to complete than low SES females; however, females overtake males as SES increases.
- Asian language background students have the highest probability of completion. Being from a high SES background further advantages students from an Asian language background. The completion rate of students who come from 'other' backgrounds is not greatly influenced by their socio-economic status.
- Low SES students who commence in a technical field of study have the lowest probability of completing relative to the other fields of education. The gap between the fields of education narrows significantly as SES increases.

## Do individual background characteristics influence tertiary completion rates?

- Students attending Catholic and independent schools have a higher probability of completion than those from government schools. High socio-economic status removes the impact that school sector has on completion. Attending a Catholic or Independent school may somewhat cushion the impact of being from a low SES background.
- SES has a minimal impact on regional status, with students from regional locations having lower completion probabilities across the full range of SES.

Marks (2007) and the (Melbourne) Centre for the Study of Higher Education (2008) found that, once students from low socio-economic status backgrounds enter university, their background does not negatively affect their chances of completing their course. This report has found that the impact of SES on those who commence university is significant for course completion. However, it is not socio-economic status alone that impacts on completion, but rather the combination of background characteristics that influences an individual's chance of completing. Nevertheless, the impact of socio-economic status remains important even after considering the influence of the individual's academic ability (as measured at age 15 years).

## Discussion and Conclusion

The Longitudinal Surveys of Australian Youth (LSAY) was used to investigate whether key background characteristics impact on individuals completing university. The variables investigated include socio-economic status, language background, Indigenous status, regional status and the level of working while studying. The population of individuals is those who had ever commenced university. Thus, the results represent the impact of these background factors on university completion after considering the impact they have on university enrolment. Further, a brief investigation showed that schools continue to have an impact on university completion.

In terms of university completion, the analysis found that the impact of schools is not insubstantial. For completion, schools account for around 30% of the variation. This figure is slightly higher than the 20% found in tertiary entrance rank score (TER/ATAR) by Gemici, Lim and Karmel (2013), and the 10% the researchers found for university entrance. However, it is important to point out that Gemici, Lim and Karmel (2013) measured the impact of schools on university entrance after accounting for tertiary entrance rank. These results may suggest that schools have a larger impact on student resilience at university than on helping individuals to gain entrance to university. The results showed that once an individual commences university, school sector continues to influence course completion, with significant differences observed for low SES students. Low SES students attending government schools had lower completion rates than high SES students attending Catholic and independent schools. However, being from a high socio-economic status background removed the impact that school sector had on course completion.

Students with an Asian language background were shown to have the highest chance of completing university.

Regionality is directly related to non-completion, with those from regional areas having the lowest probabilities of completion.

The aim of this report was to investigate whether the SES status of students impacts on the probability of completing university. The results showed that SES is important, with low SES students having lower completion probabilities. The impact of SES on completion is not straight-forward and the relationships between SES and the other characteristics showed that in some instances being from high SES removed differences resulting from other background characteristics, for example, school sector.

There are some natural extensions to this report. The first is to expand the investigation into the impact that schools may have on university completion. The inclusion of more in-depth school level information, available from a range of sources, including LSAY, would extend the work of Li and Dockery (2014) and attempt to determine which aspects of schools matter to completion. A second extension is to look at the pathways of individuals through university. That is, does SES (and other measures of disadvantage) influence course changing or the length of time that individuals take to complete their courses? Finally, investigations into post-university employment outcomes, and whether students are working in occupations or industries aligned with the field of study commenced, would also be policy relevant given the assumption that increasing participation of low SES students will generate positive returns in employment and earnings.

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## Appendix A: Cohort Choice?

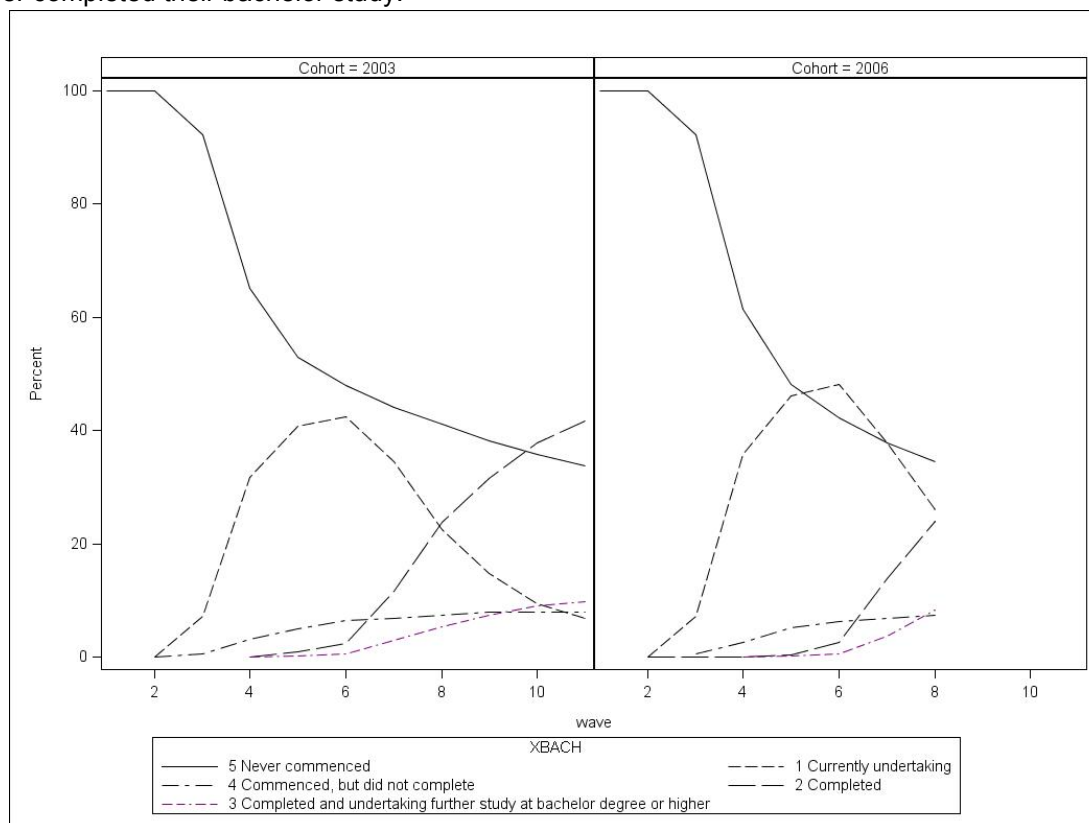
The first step is to determine which of the 2003 and 2006 cohorts is the most appropriate to use in this study. While the 2006 cohort could potentially highlight the impact of government policy on increasing university participation, this cohort may not have been in the field long enough for outcomes to have been observed.

For this exploratory analysis, a preliminary outcome variable has been created, comprising a five-level variable indicating an individual's status in undertaking a bachelor degree. The levels of this variable are mutually exclusive and the derivation methodology is available from NCVER (2013). The levels of the variable, XBAC, are:

**Table A1: Levels of 2003 and 2006 LSAY XBAC derived field**

Level	Label
1	Currently undertaking study at bachelor level or higher
2	Completed study at bachelor level or higher
3	Completed, and undertaking further study at bachelor level or higher
4	Commenced, but did not complete
5	Never commenced study at bachelor level or higher

Figure A1 shows the percentage of the 2003 and 2006 cohorts by bachelor-degree status. From this figure, it is apparent that the members of the 2003 cohort have transitioned through higher education; either having completed, not completed, or never undertaken study at the bachelor or higher level. By the final wave, we see that around 40% have never undertaken study at bachelor or higher level, around 50% have completed bachelor study and then undertaken further study at bachelor or higher level, and around 10% commenced but never completed their bachelor study.



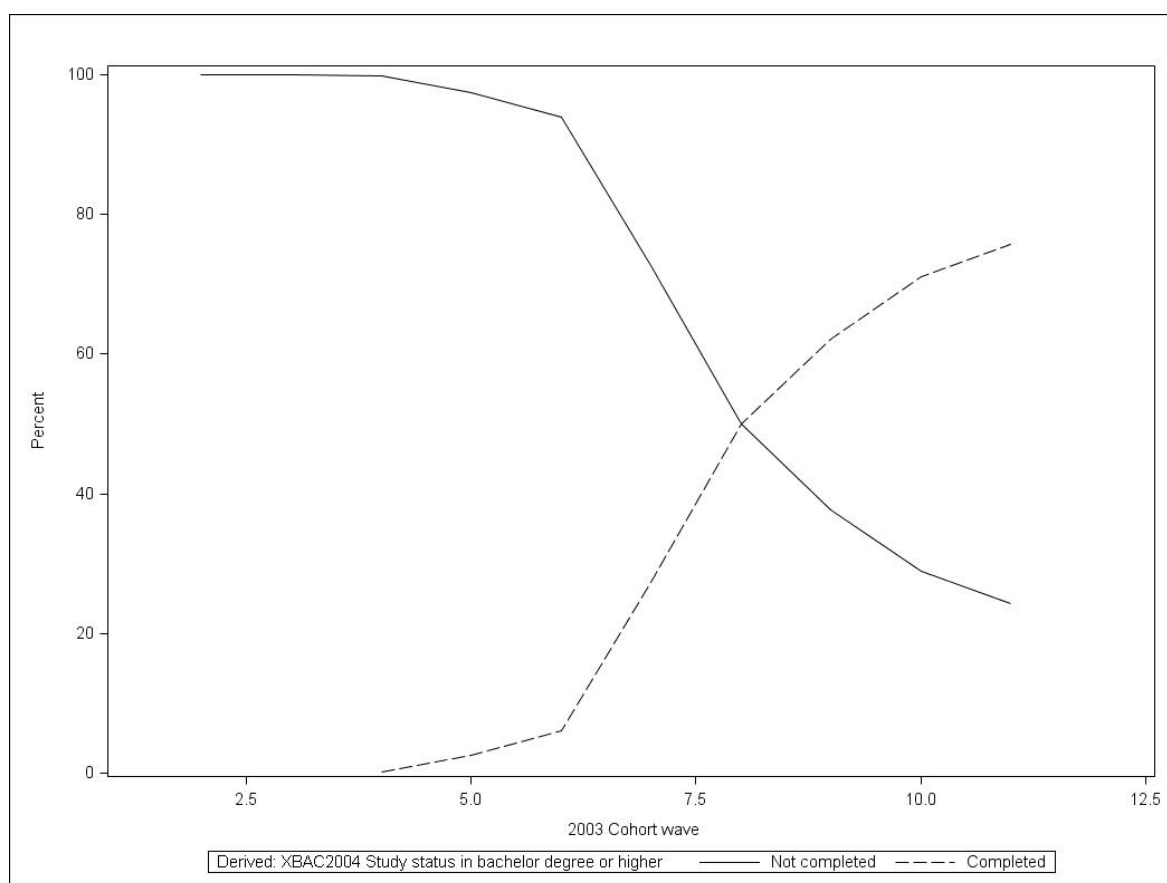
**Figure A1: Per cent of cohort by study in bachelor degree status**



From Figure A1, we see that for the 2006 cohort, about 25% of young people are still undertaking their bachelor-level courses; 25% reported that they completed and around 10% have indicated that they commenced but never completed their bachelor course. This figure suggests that the 2003 LSAY cohort is the most appropriate to use in terms of investigating the completion of tertiary study for young people. This cohort has recently completed all fieldwork and it is possible to gain a good understanding of the transitions for the majority of young people from this cohort. The 2006 cohort would be suitable to use with another one or two years of data collection.

Given this, the XBAC variable was converted to a binary variable indicating whether an individual had completed a bachelor degree or not. Figure A2 presents the proportion reporting completing a bachelor degree over the life of the 2003 cohort for all those individuals who reported ever commencing a bachelor degree.

We can see that by the final wave of the 2003 cohort around 25% of young people who commenced had not yet completed their study. Note that this group includes those who were still studying for their degrees in the final wave, along with those who had indicated that they had dropped-out.<sup>5</sup>



**Figure A2: Non-completion rate of bachelor or higher study, Y03 cohort by wave**

It is therefore clear that the 2003 cohort of the Longitudinal Surveys of Australian Youth (LSAY) is the most appropriate one to use.

<sup>5</sup> Noting that this includes those who reported that they were still studying in the final wave. It might be possible to reassign these individuals to completed or not completed using the probability of completion. However, the model to do this would be similar to the model used in this investigation and so may distort the results.



## Appendix B: Intra-class Correlations

Eldridge, Ukoumunne and Carlin (2009) highlights that there is no easy way to interpret the intra-class correlation produced on the logistic scale. However, it is possible to convert the logistic ICC to an ICC on the proportion scale. This conversion requires the use of a complex simulation procedure. Eldridge, Ukoumunne and Carlin (2009) produce a table that converts values of the intra-class correlation calculated on the logistic scale to values of the ICC on the proportion scale using the simulation approach. This table is reproduced below for reference.

**Table B1: Values of ICC on the logistic scale ( $\rho_{h(l)}$ ) given the ICC on the proportion scale ( $\rho_h$ ) and overall prevalence ( $\pi$ )**

ICC on Proportions Scale ( $\rho_h$ )	Overall prevalence ( $\pi$ )				
	0.1	0.2	0.3	0.4	0.5
0.01	0.03	0.02	0.01	0.01	0.01
0.05	0.18	0.10	0.08	0.07	0.06
0.1	0.38	0.21	0.16	0.14	0.13
0.15	0.56	0.33	0.25	0.21	0.21
0.30	*	0.65	0.53	0.46	0.44
* Impossible to obtain result via straightforward simulation because in the Markov chain Monte Carlo simulation cluster proportions inevitably reach the value 0, giving an undefined value for log odds. Reproduced from Eldridge, Ukoumunne & Carlin. (2009).					

## Appendix C: Regression Results for University Completion

**Table C1: Model fit statistics for all models**

Statistic	Null model (0)	Final model (full model (2))
-2LogL	122,206.0	124,716.4
Sigma^2_School	4.605	4.480
Sigma^2_error	3.29	3.29
Total error variance	7.89	7.77
ICC	0.58	0.58

**Table C2: Fixed effect significance test**

Effect	Full Model P-value (2)
Achievement	<.0001
Hours worked	<.0001
SES status	<.0001
Sex	<.0001
Indigenous status	<.0001
Language background	<.0001
Commencing field of study	<.0001
School sector	0.1696
Regional Status	0.0588
SES*Sex	<.0001
Achievement*SES	<.0001
SES*Language background	<.0001
SES*Indigenous status	<.0001
SES*Hours worked	<.0001
SES*School sector	0.0004
SES*Commencing field of study	<.0001
SES*Regional status	<.0001

# Do individual background characteristics influence tertiary completion rates?

**Table C3: Regression coefficients, final model, completion**

Variable	Estimate	Standard error	DF	t-Value	Pr >  t
Intercept	2.041	0.400	303	5.11	<.0001
Achievement	0.005	0.0001	2 146	38.14	<.0001
SES	0.125	0.134	2 146	0.93	0.350
Hours worked while studying (Average):					
less than 11 hours	1.351	0.0360	2 146	37.51	<.0001
11 to less than 20 hours	1.137	0.0290	2 146	39.17	<.0001
20 or more hours	-0.153	0.0280	2 146	-5.44	<.0001
Hours unknown	Reference group				
Gender:					
Females	0.168	0.0199	2 146	8.44	<.0001
Males	Reference group				
Indigenous status:					
Indigenous	-0.438	0.08476	2 146	-5.17	<.0001
Non Indigenous	Reference group				
Language spoken at home:					
Asian languages	1.421	0.075	2 146	18.95	<.0001
English	0.293	0.045	2 146	6.46	<.0001
Other languages	Reference group				
Commencing field of study:					
Arts & social sciences	-1.177	0.087	2 146	-13.54	<.0001
Health & business	-0.751	0.087	2 146	-8.59	<.0001
Technical	-1.253	0.088	2 146	-14.18	<.0001
Unknown	Reference group				
School Sector:					
Catholic	0.216	0.420	2 146	0.51	0.608
Government	-0.356	0.348	2 146	-1.02	0.307
Independent	Reference group				
Regional Status:					
Metropolitan	0.517	0.274	2 146	1.89	0.059
Regional/rural or remote	Reference group				
SES by achievement	0.001	0.0001	2 146	4.51	<.0001
SES by sex:					
SES * Female	0.290	0.02	2 146	13.1	<.0001
SES * Male	Reference group				

## Do individual background characteristics influence tertiary completion rates?

SES by Language background					
SES * Asian L	0.931	0.078	2 146	12	<.0001
SES * English	0.320	0.046	2 146	6.91	<.0001
SES * Others		Reference group			
SES by average working hours while studying:					
SES * worked less than 11 hours	0.196	0.042	2 146	4.68	<.0001
SES * worked between 11 and 20 hours	-0.517	0.035	2 146	-14.67	<.0001
SES * worked more than 20 hours	-0.412	0.034	2 146	-12.03	<.0001
SES * working hours unknown		Reference group			
SES by school sector:					
SES * Catholic	0.027	0.035	2 146	0.76	0.4468
SES * Government	0.105	0.030	2 146	3.47	0.0005
SES * Independent		Reference group			
SES by commencing field of study:					
SES * Arts & social sciences	-0.035	0.088	2 146	-0.4	0.6887
SES * Health & business	0.150	0.089	2 146	1.69	0.0903
SES * Technical	0.275	0.090	2 146	3.06	0.0022
SES * Unknown		Reference group			
SES by regional status:					
SES * Metropolitan	0.156	0.026	2 146	6.09	<.0001
SES * Non-metropolitan		Reference group			