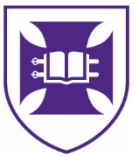

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Beyond graduation: Long-term socioeconomic outcomes amongst equity students

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Table of Contents

List of Tables

List of Figures

Executive Summary

This report aimed to address significant gaps in scientific knowledge about the trajectories of post-graduation outcomes of students from equity groups by examining the following research questions:

- Do equity graduates reap the benefits of university education to the same extent as non-equity graduates over the short and long run?
- What are the differences in outcomes between graduates from different equity groups?
- What are the specific outcome domains (e.g. labour market, social capital, wellbeing) where equity group graduates perform particularly well or particularly poorly?

To answer these research questions, the study utilised robust statistical methodologies to analyse high-quality, nationally representative longitudinal data from the ABS Census of Population and Housing (the Census) and the Household, Income and Labour Dynamics in Australia (HILDA) Survey. Both sets of analyses covered five population-based equity groups:

- low socioeconomic status (low SES)
- non-English-speaking background (NESB)
- residents in regional/remote areas
- Aboriginal and Torres Strait Islanders (Indigenous)
- students with disability.

Analysis of the Census data focused on the labour market outcomes and provided robust evidence over a short to medium time period. The Census analyses were complemented by innovative analysis of the HILDA Survey, which enabled us to document long-term trajectories across a broader set of socioeconomic outcomes (for example, health, subjective wellbeing and social capital) that go beyond the standard labour market indicators investigated by previous studies in this area.

The analysis of the longitudinal Census data suggested that there exist relatively small but significant differences between graduates from some of the equity groups and their non-equity counterparts in relation to certain labour market outcomes. Key findings from these analyses included:

- a lower likelihood of low SES and NESB graduates to be in employment, to be employed in a managerial or professional occupation, and to have a high personal income if in full-time employment
- a lower likelihood of graduates with disability to be employed.

These findings are consistent with the previous evidence from the limited body of other Australian studies in this area, while arguably offering more robust evidence being based on a high-quality and authoritative data source. Furthermore, while the Census analyses have a relatively short time horizon, covering up to five years post-graduation, this analysis went considerably beyond the four- to six-month after graduation horizon of the Graduate Outcomes Survey (GOS), which has been typically used to report employment outcomes for university graduates in Australia.

The HILDA analyses further extended the time horizon covered, capturing outcomes up to 15 years post-graduation. They also focused on a different set of outcomes, covering health and wellbeing indicators, as well as a set of subjective measures related to employment and financial circumstances. This makes it the first study in Australia to investigate such outcomes in relation to post-university outcomes of equity graduates.

Overall, the HILDA analyses suggested that for most of the outcomes investigated in this report, the trajectories of equity and non-equity graduates moved in similar directions, and at a comparable pace, after the attainment of undergraduate university qualifications. This resulted in lack of differences or a convergence in outcomes over a longer time horizon. However, while rarely statistically significant, there appeared to be some evidence that equity graduates generally reported inferior outcomes compared with non-equity graduates, at least in the first few years after graduation. This pattern appeared to be most pronounced for indicators related to subjective assessment of financial prosperity and job security but also social support.

Although the differences between equity and non-equity graduates were often not statistically significant, or converged over time, there were two notable exceptions to this pattern: students of an Indigenous background, and students with disability, both of which reported significantly inferior outcomes compared with their non-equity counterparts, particularly in terms of physical and mental health, and subjective wellbeing as captured by life satisfaction. While based on small samples, and arguably reflecting a broader underlying disadvantage for these two equity groups, these findings highlight that this kind of disadvantage is not easily alleviated through the completion of a university degree alone, but also requires a concerted policy effort within and beyond the higher education sector. For the other equity groups, the trajectories of equity and non-equity graduates appeared to converge over a longer-run so that any initial differences disappear after seven to eight years post-graduation. However, arguably more could be done to prevent this seven- or eight-year-long catch up and give an equal start to all university graduates, regardless of their background.

Introduction

The benefits of attaining tertiary-level educational qualifications are well documented. Individuals who have completed tertiary education generally enjoy better labour market prospects. For example, across OECD countries, seven per cent of tertiary-educated adults aged 25-34 year-olds are unemployed, compared to nine per cent for those with upper-secondary and post-secondary qualifications, and 17 per cent of those who have not completed upper secondary education (OECD, 2017). In Australia, employment rates are substantially higher for individuals holding postgraduate (82 per cent) and bachelor (80 per cent) degrees than individuals without post-school qualifications (54 per cent) (ABS, 2017), and this gap has been forecasted to grow over the next five years (Department of Jobs and Small Business, 2018).

When employed, tertiary education graduates are also more likely to receive higher earnings and work in more prestigious occupations, a pattern that has been documented for OECD countries as a whole (Desjardins & Lee, 2016), as well as for specific countries; for example, the US (Card, 1999; Hauser, Warren, Huang, & Carter, 2000; Heckman, Humphries, & Veramendi, 2016), the Netherlands (Van der Velden & Wolbers, 2006) and Australia (Cassells, Duncan, Abello, D'Souza, & Nepal, 2012; Daly, Lewis, Corliss, & Heaslip, 2015; Norton, 2012). In Australia, the estimated lifetime earnings of an individual with a postgraduate degree are A$3.17 million, compared to A$1.74 million for an otherwise equal individual who had not completed secondary education (Cassells et al., 2012)[1].

The positive outcomes associated with tertiary education attainment are not confined to the labour market, with substantial research documenting positive influences on a range of non-market outcomes (Oreopoulos & Salvanes, 2011), including mental health (Heckman, Humphries, & Veramendi, 2017), general health (Cutler & Lleras-Muney, 2008; Duke & Macmillan, 2016) and subjective wellbeing (Albert & Davia, 2005; Castriota, 2006; Cuñado & de Gracia, 2012; Easterbrook, Kuppens, & Manstead, 2016; Hayo & Seifert, 2003; Layard, 2005; Oreopoulos & Salvanes, 2011; Striessnig, 2015).

Because of these well-known benefits of higher education, social scientists have long been interested in the social and demographic patterning of access to, and completion of, higher education, as well as how the benefits of higher education participation differ across social groups (see e.g., Hout, 1984, 1988; Torche, 2011). However, there is a dearth of research in Australia that specifically considers differences in long-term outcomes of graduates from a variety of disadvantaged backgrounds (Harvey, Andrewartha, Edwards, Clarke, & Reyes, 2017; Whitney & Purchase, 2018). In addition, limited by availability of data, there is also a lack of research on subjective wellbeing of graduates from disadvantaged backgrounds in Australia.

This report contributes to the Australian and international literature in two key ways. First, it expanded the focus from employment outcomes to broader measures of health and wellbeing — hence providing a rounder picture of the benefits of education participation. Second, it examined post-graduation trajectories in outcomes over time using longitudinal data and methods — thereby offering a better window into the short- and long-term outcomes of different groups of graduates.

Research questions, aims and scope of this report

This report addressed significant gaps in scientific knowledge about the post-university trajectories of graduates from equity groups, and aimed to offer new policy insights by examining the following research questions:

[1] Similarly, Norton (2012) estimates the difference in median lifetime income between individuals with secondary education qualifications and those with a bachelor degree to be A$800,000 for women and A$1,116,000 for men.

1. Do equity graduates reap the benefits of university education to the same extent as non-equity graduates over the short and long run?
2. What are the differences in outcomes between graduates from different equity groups?
3. What are the specific outcome domains (e.g. labour market, social capital, wellbeing) where equity group graduates perform particularly well or particularly poorly?

To answer these research questions, we utilised robust statistical methodologies to analyse high-quality, nationally representative longitudinal data from the ABS Census of Population and Housing (the Census) and the Household, Income and Labour Dynamics in Australia (HILDA) Survey. Analysis of the Census data provided robust evidence on post-graduate labour market outcomes over a medium time period, covering five population-based equity groups: low SES; NESB; residents in regional/remote areas; Indigenous; and students with disability. The Census analyses sought to establish benchmark comparisons with individuals who are not identified as a member of a given equity group. The Census analyses were complemented by innovative analysis of the HILDA Survey: the largest and most rigorous household panel survey in Australia. Analyses of this rich dataset enabled us to document long-term trajectories across a broader set of socioeconomic outcomes (for example, subjective wellbeing and social capital). The HILDA analysis focused on the same five groups as the Census analyses, albeit using somewhat different operational definitions, as well as considering an overall indicator of disadvantage, capturing the membership in any of the equity groups.

Background

This chapter begins with a brief summary of theories that explain and predict whether graduates from disadvantaged and non-disadvantaged backgrounds would benefit from higher education to a similar extent. This is then followed by a review of international and Australian empirical evidence in this area.

Theoretical mechanisms

A number of theories have been postulated in the social sciences to explain the mechanisms by which individuals may benefit from educational attainment, including higher education. Some of these theories predict equal benefits of higher education attainment for students from different social backgrounds, while other postulate lower returns to higher education amongst disadvantaged graduates.

Two broad theories lead to the prediction that disadvantaged graduates, such as those from identified equity groups, will benefit from degree attainment to a similar extent as their advantaged peers: human capital and signalling theory. In Becker's seminal work on human capital, investments "improve the physical and mental abilities of people [that] raise real income prospects" (Becker, 1962, p.9). University participation is a key mechanism whereby people learn new knowledge and skills and, in turn, increase their labour market productivity. Within this framework, the returns to higher education participation stem from the increased labour market productivity of university graduates. Consistent with this, studies have documented causal effects of tertiary education participation and attainment on a range of outcomes, with the effects of university education on earnings being driven by cognitive and non-cognitive skills (e.g., Heckman et al., 2016).

Another theory predicting similar benefits for disadvantaged graduates is signalling or screening theory, which posits that employers deal with imperfect information on the productivity of prospective employees by taking their years of schooling as a "signal" of productivity and use this information in the employee screening process (Spence, 1973; Stiglitz, 1975). The literature on "sheepskin effects" points more specifically to educational credentials (for example, a university degree) instead of years of schooling as the key markers of productivity (Hungerford & Solon, 1987). As a result, educational credentials are of critical importance in structuring access to high-status, high-wage jobs (Gibson, 2000; Jaeger & Page, 1996). From this point of view, employers should not differentiate between disadvantaged and advantaged applicants in their hiring practices, so long as they have attained commensurate levels of education, as evidenced by comparable qualifications.

The arguments discussed so far can also be extended to personal outcomes beyond the labour market (for example, health and wellbeing). Possible mechanisms driving the well-documented associations between better education and health outcomes include improved healthcare access and treatment due to increased income, better processing of health-related information and better lifestyle choices due to enhanced cognitive capacities, and stronger social networks with other university graduates (Hartog and Oosterbeek, 1998; Cutler & Lleras-Muney, 2008; Desjardins, 2008; Oreopoulos & Salvanes, 2011; Heckman et al., 2016). For instance, Duke and Macmillan (2016), drawing on the National Longitudinal Survey of Youth-1997 in America, found that positive effects of high educational attainment on health are largely accounted by improved cognitive and non-cognitive skills. In a similar vein, Heckman et al. (2016) found that education improves people's health through increased cognitive and non-cognitive endowments. In particular, increasing socio-emotional endowments has significant effects on health despite a smaller effect on labour market outcomes (Heckman et al., 2016). Based on this reasoning, the health returns to tertiary education are expected to be similar for graduates from both advantaged and disadvantaged backgrounds.

Furthermore, selection arguments based on rational action theory point to a similar set of theoretical predictions. For instance, Goldthorpe (1996, 2014) noted that the relative costs of attending university are higher for disadvantaged than advantaged individuals. Therefore, disadvantaged individuals, constrained by their socioeconomic resources, tend to weigh the potential costs and benefits of higher education participation more carefully than their more advantaged counterparts. Only those who perceive low risks of failure, most notably when the prospective student has demonstrated excellent academic aptitudes, choose to pursue higher education. These positively-selected disadvantaged individuals are likely to accrue cognitive and non-cognitive skills from university participation at similar rates as their less disadvantaged peers.

By contrast, several theories predict unequal socioeconomic trajectories of graduates from disadvantaged background — these include social capital theory (Coleman, 1988), cultural capital theory (Bourdieu, 1984) and the life-course approach (Elder, Johnson, & Crosnoe, 2003).

Social capital theory draws attention to the importance of individuals being able to access information channels to optimally navigate social structures (Coleman, 1988). In the context of post-graduate outcomes, disadvantaged graduates may have less-developed social networks, and their networks may disproportionally comprise members of other relatively under-resourced groups (e.g., Lin, 1999). When applied to the Australia higher education context, graduates from equity groups may be less able to rely on social networks to access information on the availability of suitable jobs, or to leverage such networks when navigating selection process, for example, via recommendations or direct referrals to prospective employers (Coleman, 1988; Lin, 2001; Franzen & Hangartner, 2006).

Similarly, the principle of social reproduction within Bourdieu's (1984) cultural capital theory posits that employers are biased towards hiring individuals who are similar to them. This demand-side social-closure process acts to restrict disadvantaged graduates' ability to access high-status, high-paying occupations (e.g., legal or medical professions).

The life-course perspective offers an additional lens with which to examine the intersections between social status and socioeconomic inequalities (Elder et al., 2003). Two elements of this approach are helpful in theorising post-graduation trajectories of graduates from disadvantaged backgrounds. First, inter-relationships between life domains are important in structuring individual outcomes (Elder et al., 2003). Second, disadvantage is best conceptualised as a cumulative process that unfolds over time; compared to one-off experiences of disadvantage, repeated or chronic exposure to barriers and stressors can be more harmful to individuals' chances to succeed in different aspects of their lives (Elder et al., 2003). In our context, graduates from disadvantaged backgrounds may be more likely to experience negative life events in domains other than employment or education (such as personal or parental health problems, family breakdown and financial difficulties) and to experience these circumstances for longer periods of time than their advantaged counterparts (e.g., Umberson, Williams, Thomas, Liu, & Thomeer, 2014). Chronic and/or repeated exposure to these stressors may restrict the ability of graduates from disadvantaged backgrounds to pursue, focus on and develop their work careers, and enjoy the benefits associated with doing so, to the same extent as their more advantaged peers.

As described above, some theories predict similar outcomes for university graduates from different backgrounds, while others predict inferior outcomes for graduates from disadvantaged backgrounds. Far from being mutually exclusive, a number of these mechanisms are likely to operate simultaneously, shaping the post-university outcomes of advantaged and disadvantaged graduates. Furthermore, different mechanisms may be relatively more pronounced at different time points after graduation. For example, social and cultural capital may play a more important role immediately after graduation, enabling advantaged graduates to obtain better jobs more quickly compared with their peers from disadvantaged backgrounds. However, the role of human capital may gradually increase in

the longer term, with graduates from disadvantaged backgrounds utilising their cognitive and non-cognitive skills as well as their non-disadvantaged peers, and employers judging them based on their performance rather than on their socioeconomic background.

Empirical evidence

International studies

Over two decades ago, Hout (1984, 1988) reported virtually no association between socioeconomic background and occupational status among higher education graduates in the United States, a finding which was initially interpreted as a sign of the meritocratic function of university (e.g., Breen and Jonsson 2007). That is, the higher education system was seen as producing successful graduates, regardless of their socioeconomic background. Subsequent US studies however, have painted a more complex picture, suggesting that the relative returns of university participation by socioeconomic background depend on factors such as the qualification level, fields of study and institutional context. For instance, Torche (2011) demonstrated that, in the US, the economic returns to a bachelor degree did not differ by graduates' socioeconomic background, but the returns to post-graduate degrees (such as PhD and professional post-graduates degrees in medicine, law and MBAs) did.

Evidence on differences in the benefits of a university degree by socioeconomic background has also been gathered in countries other than the US. In Norway, Hansen (2001) showed that individuals from high socioeconomic status backgrounds received higher economic returns to university participation, compared with their disadvantaged peers, net of qualification level and fields of study. Similarly, Triventi (2013) found that European graduates in Norway, Italy and Spain whose parents also had university qualifications were more likely to have attained a high-status occupation five years post-graduation than similar graduates whose parents did not hold university qualifications. However, the same pattern of results was not observed amongst German graduates. In a similar fashion, Jacob et al. (2015) examined the effect of parental education on tertiary graduates' occupational outcomes at labour market entry and five years post-graduation in Germany and the UK, finding a comparative advantage for graduates with highly educated parents (with tertiary qualification) in entering higher-status occupations. Importantly, this effect was stronger at labour market entry than five years after graduation, suggesting the importance of considering longitudinal associations.

In summary, international evidence suggests that the effect of disadvantaged background on the post-graduation outcomes of university graduates depends on a range of factors, including the institutional and country context, the level of the attained qualification, the specific outcomes considered, and the time after graduation at which the outcomes are captured.

Australian context

The last several decades have witnessed remarkable growth in the Australian higher education sector and worldwide (Schofer & Meyer, 2005). Between 1989 and 2014, the rate of higher education attainment in the Australian population aged 25–34 increased from 12 per cent to 37 per cent (Department of Education and Training, 2015, p.29). The expansion of the higher education reflected the Australian Government's policy focus on increasing higher education participation to shape a competitive workforce in the global economy (National Board of Employment Education and Training (NBEET), 1996; Schofer & Meyer, 2005). Furthermore, the more recent Bradley Review of Australian higher education recommended an increase in the attainment of bachelor or higher degrees in the population aged 25–34 from 29 per cent in 2008 to 40 per cent by 2020 (Bradley, Noonan, Nugent, & Scales, 2008).

In parallel with the expansion of the higher education sector, since the 1960s successive Australian governments began to develop an interest in equity in higher education. Their focus was based on the premise that the underrepresentation of certain groups in higher education indicated underutilised talent, and on an understanding of education as a vehicle to improve not only the lives of individuals, but also socioeconomic circumstances in their communities (National Board of Employment Education and Training (NBEET), 1996).

In 1988, the Federal Government signalled a commitment to improving equity in higher education in the Dawkins "White Paper" on higher education Policy (Dawkins, 1988). The White Paper outlined barriers and associated inequalities in access to and success in higher education for disadvantaged groups, and as such provided the foundations for the pivotal discussion paper, *A Fair Chance for All: National and Institutional Planning for Equity in Higher Education* (DEET, 1990), which outlined five population-based equity groups:

- low socioeconomic status (low SES)
- non-English speaking background (NESB)
- residents in regional/remote areas
- Aboriginal and Torres Strait Islanders (Indigenous)
- students with disability.

In addition, women—with a particular emphasis on those participating in non-traditional courses, and in research and higher degrees—were also designated as a group of focus for equity policies.

This report focused on the five population-based equity groups, (low SES, NESB, Indigenous, regional/remote and people with disability), and this section reviews the empirical evidence on the post-university outcomes of the members of these five groups.[2]

Despite equity in higher education being a salient issue in the Australian policy arena (see e.g. Harvey, Burnheim, & Brett, 2016; National Board of Employment Education and Training, NBEET, 1996), there is surprisingly little research specifically investigating whether graduates from equity groups can benefit from university participation to the same extent as non-equity graduates (Harvey et al., 2017; Whitney & Purchase, 2018). In their review of research specifically looking at post-graduate outcomes of equity students, Whitney and Purchase (2018) only found 10 studies, which are presented in Table 1 alongside the datasets on which they drew. This section summarises findings from these studies, and reviews evidence available to date for the five officially identified equity groups that are of focus for this report.

Table 1: Summary of data sources on which previous Australian studies drew

Surveys	Year	Time after graduation	Administrating institution	Studies
Graduate Pathways Survey (GPS)	2008	1 (2003), 3 (2005) and 5 (2008) years	Australian Council for Educational Research (ACER)	Coates & Edwards (2009) Edwards & Coates (2011)
Australian Graduate Survey (AGS) including: - GDS: the Graduate Destination Survey, CEQ	1972–2015	4–6 months	Graduate Careers Australia (GCA)	2014 data: Richardson, Bennett, & Roberts (2016, report); Pitman, Roberts, Bennett, & Richardson, (2017, journal article) 2015 data: GCA (2016)

[2] The WINTA group is not covered in this report, partially due to the characteristics of the datasets used, which prevent a detailed investigation of this group but also because the post-university outcomes for men and women are likely to be shaped by a range of broader social processes which would require a separate stand-alone study to be properly addressed.

Surveys	Year	Time after graduation	Administrating institution	Studies
PREQ				2010–14 data: Li et al. (2016; 2017, note: only include four universities in one state)
Graduate Outcomes Survey (GOS)	2016–	4–6 months	Quality Indicators for Learning and Teaching (QILT)	QILT (2018)
2017 Graduate Outcomes Survey–Longitudinal (GOS-L)	2017 surveyed AGS 2014 participants	3 years	QILT	QILT (2017)

Low SES group

In most of the studies, the low SES population was defined as those in the bottom quartile in a ranking using ABS census educational and socioeconomic data in an index constructed at the area (e.g., postcode) level, known as the Socio-Economic Indexes for Areas or SEIFA, (Li et al., 2017; QILT, 2018; Richardson et al., 2016). An exception is the research conducted by Edwards and Coates (2011), who defined low SES in terms of paternal occupation level.

Findings from different surveys are largely inconclusive. Whilst some of the studies suggest that graduates from low SES backgrounds were slightly worse off in terms of the labour market outcomes than their high SES peers, others find no significant difference among them. Specifically, an analysis of GOS 2017 data (QILT, 2018) shows that the full-time employment rate for low SES graduates is 70 per cent comparing to 74 per cent for their high SES peers, with the same median salary for full-time work (A$60,000) (QILT, 2018). Drawing on AGS 2014, Pitman et al. (2017) found that graduates from the top three SES quartiles (based on SEIFA) were 1.2 times more likely than those from the bottom quartile to be working within four to six months after graduation. In addition, the low SES graduates also earned A$6,999 less than their peers from the top SES quartile.

In contrast, Li et al. (2017) linked 2010–14 AGS data with administrative data from four anonymous universities in one of the Australian states and found no significant differences in the labour market outcomes between low and high SES graduates. Furthermore, when looking at labour market outcomes at fifth year after graduation, Coates and Edwards (2009) found that graduates with fathers in non-managerial/professional occupations were on par, or possibly even slightly better off, than their peers with fathers in managerial or professional occupations in terms of the full-time employment rate (75 per cent versus 74 per cent) and median salary (A$40,000 versus A$38,000)

Regional/remote group

The definition of students from regional/remote areas varies across the surveys reviewed here. Specifically, GOS 2017 uses a location measure based on the ABS 2011 Australian Statistical Geography Standard (ASGS) classification of remoteness. AGS 2014 defines regional/remote students as those who reported living outside the capital cities, whilst Coates and Edwards (2009) utilised data available in GPS 2008 to categorise participants into remote, provincial and metropolitan groups, according to their primary school location.

Again, the findings of these analyses are largely inconclusive, which is likely to be partially due to different ways of defining the regional/remote students across the datasets. For example, GOS 2017 data (QILT, 2018) shows that the full-time employment rate for graduates from regional/remote areas is 76 per cent, compared with 71 per cent for their peers from metropolitan areas, with a slightly higher median salary for full-time work

(A$60,000 versus A$59,000). However, drawing on the AGS 2014, Pitman et al. (2017) found that graduates from regional/remote areas earned A$1,453 less than their peers from metropolitan areas.

By contrast, Li et al. (2017) found no significant differences in the probability of employment between regional and metropolitan areas graduates. Furthermore, regional/remote graduates were more likely to be in jobs of good quality, and jobs that matched their university degree, compared with their peers from metropolitan areas. In addition, male regional/remote graduates were found to earn more than their metropolitan counterparts, but there was no significant difference between female regional and metropolitan areas graduates.

When considering longer-term outcomes, Coates and Edwards (2009) found a small gap in the labour force participation rate between regional/remote and metropolitan areas graduates around one year after graduation (84 per cent versus 89 per cent), which decreased to zero at around five years after graduation (93 per cent for both groups). However, whilst both groups reported the same median annual salary one year after graduation, graduates from regional/remote areas earned less (A$60,000) compared to their peers from metropolitan areas (A$64,500) around five years after graduation.

Indigenous

Empirical evidence from previous studies suggests that Indigenous graduates in general reported better employment outcomes than their non-Indigenous peers after graduation. GOS 2017 data (QILT, 2018) shows that the full-time employment rate for Indigenous graduates is higher than their non-Indigenous peers (78 per cent versus 72 per cent), with a slightly higher median salary for full-time workers (A$62,600 versus A$60,000). A similar pattern emerged from 2017 GOS-L data set (QILT, 2017). Indigenous graduates' full-time employment rate increased from 76 per cent around one year after graduation to 89 per cent around three years after graduation, which is the same as that of non-Indigenous (67 per cent at one year, increasing to 89 per cent at three years after graduation). In addition, Indigenous graduates who worked full-time also enjoyed higher median salary (A$70,000) than their non-Indigenous counterparts (A$68,500) around three years after graduation.

Furthermore, drawing on AGS 2014 data, Pitman et al. (2017) also concluded that Indigenous graduates earned more than any other group of graduates analysed in their study, both in full-time and part-time employment. Coates and Edwards (2009) found that a small gap in full-time employment rate between Indigenous and non-Indigenous graduates around one year after graduation (58 per cent versus 60 per cent), which reversed around five years after graduation (78 per cent versus 75 per cent). Li et al. (2017) were not able to look into this group due to small sample size.

Disability

The definition of this equity group also varies across the reviewed studies. Disability is typically self-reported in Australia, including in higher education enrolment collections through the Higher Education Information Management System (HEIMS). GOS 2017 defines this group as those who self-report having to work limited number of hours due to a long-term health condition or disability (QILT, 2018). AGS and GPS defined this group as those who self-identify as having a disability with the nature or severity of the disability not being further defined.

In general, findings from the previous studies suggest that graduates with disability are worse off than their peers without disability in terms of labour market outcomes. Specifically, GOS 2017 data (QILT, 2018) shows that the full-time employment rate for graduates with disability was 62 per cent, which is markedly lower than that of their peers without disability (72 per cent). However, those who work full-time reported the same median salary as the latter at A$60,000. GOS-L 2017 data set (QILT, 2017) shows that the gap remains stable

around three years after graduation. The full-time employment rate among people with disability increased from 58 per cent around one year to 81 per cent around three years after graduation, which is still lower than their peers without disability (68 per cent increased to 90 per cent). However, graduates with disability reported similar increase in their median salary for full-time work (from A$56,300 to A$68,000) as their counterparts without disability (from A$56,000 to A$68,900).

AGS 2014 data (Richardson et al., 2016) shows that graduates with disability were 0.6 times less likely than their peers without disability to be working around four to six months after graduation, and earned A$6,279 less as well. In addition, Coates and Edwards (2009) found that the gap in full-time employment rate between graduates with and without disability increased a bit from 14 per cent (46 per cent versus 60 per cent) around one year after graduation to 19 per cent around five years after graduation (57 per cent versus 76 per cent).

NESB

The NESB group was also defined differently across surveys reviewed. In GOS 2017 and GPS 2008, the group was defined as those who speak a language other than English at home. AGS 2014 defines NESB students as self-identifying as speaking a language other than English as their first language.[3]

As with other groups, a mixed picture emerges from the empirical findings. Specifically, GOS 2017 data (QILT, 2018) shows that the full-time employment rate for NESB graduates was much lower than for their English Speaking Background (ESB) peers (54 per cent versus 72 per cent around four to six months after graduation), with lower median salary from full-time job (A$56,400 versus A$60,000). Similarly, drawing on AGS 2014 data, Pitman et al. (2017) found that ESB graduates were 1.6 times more likely than NESB graduates to be working around four to six months after graduation and also earned more than the latter. In addition, although Li et al. (2017) found no significant difference in the employment probability between NESB and ESB graduates, they found that the former were less likely than the latter to be in a job matched to their university degree and jobs of good quality. In addition, NESB graduates also earned around 12 per cent less than their ESB counterparts.

In contrast, Coates and Edwards (2009) found evidence of a catch-up effect for NESB graduates for their full-time employment rate, which increased from 55 per cent around one year after graduation to 77 per cent around three years after graduation, comparing that of their ESB counterparts (increased from 60 per cent to 74 per cent). Furthermore, GOS-L 2017 data set (QILT, 2017) shows that, focusing on those who work full-time, NESB graduates have similar median salary to their ESB peers three years after graduation (A$69,000 for NESB versus A$68,100 for ESB).

In summary, Australian empirical evidence shows a mixed picture for the labour market outcomes for most of the equity groups. Specifically, graduates from low SES, remote areas and NESB were reported in some studies to have poorer labour market outcomes, including lower employment rate and lower salaries, but other studies report them having similar or even better outcomes compared with their peers from non-equity group. The evidence appears to be more consistent for graduates with disability and those of Indigenous background, where evidence suggests that the former have worse labour market outcomes whilst the latter have better labour market outcomes than the rest of the graduate population.

The reasons underlying such inconclusive findings might lie in a number of issues. First, as the above short summary reveals, the operational definitions of equity groups usually vary across the studies. Second, the representativeness of the reviewed surveys may be constrained by their response rates, which are relatively low for some of them. In addition,

[3] Note that there is also a separate group “overseas-born” defined in this study: those who reported having been born in a country other than Australia.

some studies (e.g., Li et al., 2017) only include participants from one particular state. Third, the methodologies employed by these studies vary from relying on reporting percentages and means, to running logistic regression or Probit models. Finally, as the study by Coates and Edwards (2009) highlighted, much of the gap in the labour market outcomes between the equity and the non-equity graduates was evident shortly after graduation (up to one year, but typically four to six months after graduation), and subsequently decreased to non-significant differences over a longer-run (at around five years after graduation). This "catch-up" effect for disadvantaged groups in terms of their labour market outcomes also echoes findings from international studies (i.e., Jacob et al., 2015), which demonstrate the importance of examining the labour market outcomes over a longer-term.

Therefore, there are two major limitations of the previous Australian studies in the area of investigating whether graduates from equity groups can benefit from the university degree to the same extent as their non-equity groups peers. First, most of the studies have a very short time horizon, drawing on surveys on graduate outcomes captured only at around four to six months after graduation. Second, constrained by the lack of availability of broader measures in those surveys (for example, data on social networks or subjective wellbeing), the research to date was largely limited to investigating labour market outcomes. In particular, subjective wellbeing of graduates from equity groups has been rarely explored in the Australian context. To our best knowledge, the only exception is the report by Coates and Edwards (2009), which included work satisfaction. They found that graduates from disadvantaged groups reported higher work satisfaction in the first year after graduation (mean score of 61 versus 58 on a 100-point scale) than their advantaged peers, with the difference fading away over time. Whilst there are studies drawing on LSAY and HILDA to investigate subjective wellbeing of university graduates in Australia (e.g., Dockery, 2003; 2010), they usually look at the graduates as a whole rather than specifically investigate equity groups.

Employment outcomes of new graduates: findings from the Census data

This chapter explores post-university outcomes of equity and non-equity graduates drawing on the Australian Census Longitudinal Dataset (ACLD). Due to the characteristics of this data, the analyses in this chapter focus on labour market outcomes, and investigate these outcomes over a relatively short time horizon. As such, the results presented in this chapter can be seen as following a similar approach to the previous Australian studies in this area, except that they arguably use a more robust data source compared with the previous studies.

Dataset and sample

The ABS undertakes the Census every five years (ABS, 2017). The Census is a count of the population located within Australia. Census data include information on population characteristics, which can identify people with higher education qualifications as well as equity group characteristics. Census data rely on self-reported information about the highest level of education completed, which was used as proxy for indicating higher education graduates.

The ACLD 2011-2016 panel

The ACLD is a longitudinal extension of the Census (ABS 2018a). The ACLD 2011-2016 panel is a linked dataset that combines information from two consecutive censuses (2011 & 2016) for a 5.7 per cent random sample of the Australian population in 2011. Of the 1,221,057 records selected from the 2011 Census, 76 per cent were linked to 2016 records. The majority of these records (72.7 per cent) were linked using deterministic matching based on personal and demographic characteristics, with the remainder being linked by probabilistic matching (for details, see ABS, 2018b). This resulted in 927,520 linked records. The false link rate in this process was estimated at 1.4 per cent (ABS, 2018b).

The ACLD 2011-2016 panel allowed for the definition of the population along equity group lines in 2011, five years before observing employment outcomes in 2016. We made use of this capability to explore early graduate outcomes.

The advantages of ACLD are its reliability, robustness and large sample size to study small sub-populations. Further, due to the almost universal population coverage in the Census, and the large sample size, sampling error is minimal. Its disadvantages include the relatively short-term timeframe post-graduation (see below).

Selection of sub-population

To investigate employment outcomes of new graduates we selected a cohort:

- aged 15-54 years in 2011
- with no higher education qualification in 2011
- with higher education qualification in 2016.

This cohort (N=809,317, n=31,499) would be 20-59 years old in 2016 and would reflect people who had completed their first higher education qualification between the Census 2011 and the Census 2016. This subpopulation was the basis for investigating variations of labour force status. To investigate variations in employment characteristics (employee status, full-time employment, sector of employment, occupation in employment) the population was further reduced to those who were employed in 2016 (N=682,287, n=27,019) and in the case of personal income to those in full-time employment in 2016.

Data access

Data from the ACLD 2011-2016 panel was accessed through the ABS DataLab. The DataLab allows working with unit record data while adhering to strict confidentiality protocols defined and administered by the ABS. Accessing the ACLD through the DataLab allowed advanced data modelling that considered various controls.

Data analysis

As described earlier, the modelling presented in this report was based on a cohort who had obtained their first higher education qualification between 2011 and 2016. As such, the analyses concerned new graduates in Australia.

The analysis commences by tabulating employment outcomes for the five equity groups considered in this report (low SES, regional/remote, NESB, Indigenous, and people with disability). Then these employment outcomes are modelled to take account of potentially confounding factors.

The models rely on logistic regression models of the following form:

$$ln\left(\frac{p(EO)}{1-p(EO)}\right) = G\beta_1 + C\,\beta_2 + e \quad (1)$$

where *EO* is a given employment outcome measured in 2016, G is a vector of equity group binary indicators, C is a vector of control variables, the *β*s represent coefficients or vectors of coefficients to be estimated, and *e* is the usual random error in regression. To facilitate the interpretation of results, we present average marginal effects. The average marginal effect gives the average change in predicted probability between zero and one when the independent variable of interest changes by one unit. In this case it gives the average change between a graduate of an equity group (for example, regional/remote) and its counterpart (major city). The change in probability is reported in the text as percentage points (e.g. 0.15=15 percentage points).

Multivariate analyses were undertaken in two steps. The first set of models (reported under Analyses 1 further in this section) investigated the differences in employment outcomes for equity graduates without taking into account the differences between the fields of study — that is a degree is only differentiated by its level (undergraduate or postgraduate) but otherwise treated the same regardless of the subject/program. The specification of these models aims at standardising university graduates in terms of their age, gender, the level of their degree, and time since graduation. The question these models pursue is: what are the overall differences in employment outcomes for new university graduates in Australia?

However, financial returns to education vary by the area in which a higher education qualification was obtained (Norton & Cakitaki, 2016). More generally, employment outcomes of higher education graduates could be influenced by the field of study of the higher education qualification. For example, nursing graduates are likely to work as nurses, medicine graduates as doctors, and teaching graduates as teachers. Different professions face different labour market conditions, which lead to different chances of employment, employment conditions and salary structures. Labour market outcomes could then be driven by the fact that non-equity group students are more likely to enrol in “better” or more prestigious fields of study, the ones that offer better employment prospects and/or financial returns. Our second set of models (reported under Analyses 2) therefore additionally controlled for the field of study as a way of testing how robust the apparent

disadvantage/differences in the labour market outcomes are when accounting for the fields of study chosen by equity and non-equity graduates.[4]

All reported results are based on unweighted data. The modelling was repeated with weighted data to assess potential differences in the results. The pattern of results was the same in all weighted models with the majority of coefficients very close to those in the unweighted models.

Analytic variables

Outcome variables

For the purpose of this study we defined a number of "outcomes" that would be informative about graduates' positions in the labour market as well as indicative of their economic success. To facilitate the latter, we considered the likelihood of:

- employment
- full-time employment
- employment in a managerial or professional occupation
- having a relatively high personal income.

Other employment outcomes of interest were the likelihood of:

- employee status in employment
- the sector of employment.

These two outcomes are not necessarily meaningful indicators of labour market success, but they could indicate differences in employment conditions, in terms of benefits, security and competition, that graduates experience.

These outcomes were operationalised the following way:

- Employment status: a binary indicator taking the value 1 if the individual was employed (all employment types)[5] and the value 0 if the individual was not employed (including unemployment and not in the labour force).
- Full-time employment: a binary indicator taking the value of 1 if the individual was employed full-time according to the definition used in the Census and 0 if the individual was employed part-time. Non-employed individuals score missing values in this variable.
- Employee status: a binary indicator taking the value 1 if the individual worked as an employee and the value 0 if the individual worked in another arrangement (including owner manager of incorporated and unincorporated enterprises and contributing family worker). Non-employed individuals score missing values in this variable;
- Employment sector: a binary indicator taking the value 1 if the individual worked in the private sector (including community organisations) and the value 0 if the individual worked in other sectors (including local, state and national government). Non-employed individuals score missing values in this variable.
- Managerial/professional occupation: a binary variable taking the value 1 if the individual worked in a managerial or professional occupation, and the value 0 if the individual worked in another occupation. Non-employed individuals score missing values in this variable.

[4] It needs to be pointed out that in the case of logistic regression models, the change in the coefficient of the variable of interest cannot be straightforwardly attributed to the inclusion of confounding variables. For more information on this methodological issue see for example Karlson et al. (2012).

[5] This includes owner managers of incorporated and unincorporated enterprises, employees not owning an enterprise and contributing family workers.

- High income: a binary variable taking the value 1 if the individual's gross individual weekly income was over A$1,500 per week, and the value 0 otherwise — about 29 per cent of new graduates aged 20–59 in 2016 who were in full-time employment had a personal weekly income of at least A$1,500. Individuals not in full-time employment score missing values in this variable.

Key explanatory variables

In the ACLD 2011-2016 panel, the five equity groups considered in this report were defined, based on information captured in 2011, in the following way:

Low SES

Based on 2011 SEIFA Index of Education and Occupation (IEO) population-based quintile derived from individuals' usual residence in 2011. The lowest quintile was defined as low SES.

Regional/remote

Based on individuals' usual residence in 2011 using ASGS 2011. Regional was defined by combining the ASGS categories Inner and Outer Regional. Remote was defined by combining the ASGS categories Remote and Very Remote. Regional/remote was defined by Regional or Remote.

Indigenous

Persons identifying as Indigenous on the Census form in 2011.

NESB[6]

Persons who spoke a language other than English at home in 2011.

Disability

Based on the variable ASSNP (Core activity need for assistance) in 2011, which indicates profound or severe disability.

The respective comparator/reference categories of the equity group indicators (coded as zero in the analyses) exclude the "not stated" responses in the relevant variables.

Control variables

In multivariate models we control for a parsimonious set of potential confounders, which are factors likely to be associated with employment outcomes but independent of equity group status. These include gender (male versus female), age (15-19, 20-24, 25-34 35-44 45+ as defined in 2011), the level of the higher education qualification in 2016 (postgraduate[7] vs undergraduate), and whether new graduates had attended higher education in 2011. Since the graduation status (as captured in 2016) indicates graduation at some point between 2011 and 2016, those who had attended higher education in 2011 could be expected to have graduated earlier than those graduates who only commenced higher education studies after the 2011 Census. This earlier graduation could possibly be associated with more positive/successful employment outcomes (full-time employment, employment in a

[6] The NESB definition used in higher education data collections uses three criteria: born overseas; arrived within the last 10 years; and speaking a language other than English at home. This was consistent with some earlier work on graduate outcomes in Australia cited in the literature review and avoided the issue of when to capture the criterion of the 10-year arrival frame, which captures different migrants at different times under the NESB group.

[7] Postgraduate qualifications include graduate certificates and graduate diplomas.

managerial or professional occupation, having a high income) in 2016, compared with those who commenced higher education studies after the Census 2011.

Another factor that could influence employment outcomes is the field of study. For the purpose of deriving a relevant control variable, the narrow fields of study of the Australian Standard Classification of Education included in the ACLD were aggregated to 21 disciplinary groupings used in the reporting of results from the GOS (see study area concordance in Appendix 5 of QILT, 2018). This reduced the number of categories to a manageable pool while retaining vital distinctions between disciplines, which could have a bearing on employment outcomes (for example, they separate out nursing, medicine, dentistry, pharmacy and rehabilitation).

Results

Descriptive results

This section presents the proportions reflecting the relevant employment outcomes for equity groups to provide background for the subsequent statistical modelling.

Labour force status

Overall, in the sample, about 84 per cent of new graduates aged 20-59 were employed in 2016, five per cent were unemployed and 11 per cent not in the workforce (see "All new graduates" row in Table 2).

Compared to the overall results, graduates who had a disability in 2011 were dramatically less likely to be employed (52 per cent), twice as likely to be unemployed (10 per cent) and more than three times more likely to not be in the labour force (38 per cent). While not exhibiting quite as dramatic a difference, NESB graduates were also notably less likely to be employed (79 per cent) and to be out of the labour force (15 per cent) than the general graduate population. Graduates from regional/remote backgrounds had the highest employment rate (87 per cent) of all equity groups, which was also somewhat higher than the overall employment rate for all new graduates (84 per cent). Employment rates among low SES and Indigenous graduates were somewhat below the average and unemployment rates about one percentage point above the average.

The initial descriptive analysis would suggest that of the five equity groups, graduates from regional/remote backgrounds achieve the most favourable employment rates while those of graduates with disability were substantially lower. NESB graduates also appear to have below average employment rates while being more likely to be out of the labour force.

Table 2: Labour force status in 2016 by equity group, new higher education graduates^, people aged 15–54 years in 2011

	2016			
Equity group in 2011	**Employed**	**Unemployed**	**Not in labour force**	**Total***
Low SES	82.2%	5.6%	12.0%	72,693
Regional/remote	86.5%	3.9%	9.5%	120,670
Indigenous	83.9%	5.8%	10.4%	9,269
Disability	51.9%	9.9%	38.2%	4,574
NESB	78.9%	5.8%	15.2%	263,138
All new graduates	**84.3%**	**4.7%**	**10.9%**	**809,317**

^ People aged 15-54 years with no higher education qualification in 2011 who had higher education qualification in 2016.

*Total includes "Not stated", which are not shown.

Based on weighted data from ABS 2018, ACLD 2011-16, DataLab.

Next we look at the employment situation of equity graduates in employment.

Characteristics of employment

The vast majority of new graduates in employment worked as employees (93 per cent), which also applied to all five equity groups considered in this report (Table 3). Of the five groups, Indigenous graduates in employment were most likely to be employed as employee (96 per cent) and NESB graduates in employment were least likely (90 per cent). Alternatives to working as an employee are working as an owner/manager of an incorporated or unincorporated company with or without employees, or working to support a family business. The alternatives to employee status could be seen as entailing more risk in relation to employment security and employment benefits.

Indigenous graduates in employment were the most likely to work full-time (72 per cent) while graduates from the four other equity groups all saw full-time employment rates below the overall average of 69 per cent. Employed graduates with disability were least likely to work full-time (55 per cent).

Table 3: Employment outcomes in 2016, new higher education graduates in employment^, people aged 15-54 years in 2011

	2016				
Equity group in 2011	**Work as employee**	**Work full-time**	**Work in private sector**	**Work in managerial/ professional occupation**	**Personal weekly income >=A$1,500^^**
Low SES	93.4%	66.1%	71.7%	54.9%	23.2%
Regional/remote	92.6%	65.9%	64.8%	63.9%	31.3%
Indigenous	95.6%	71.5%	54.5%	63.3%	34.7%
Disability	92.6%	54.1%	76.8%	62.0%	36.3%
NESB	89.6%	67.9%	83.1%	51.9%	23.8%
All Graduates	**92.5%**	**68.7%**	**75.1%**	**60.4%**	**29.2%**

^ People aged 15-54 years with no higher education qualification in 2011 who had higher education qualification in 2016.

^^ Based on those in full-time employment only.

Based on weighted data from ABS 2018, ACLD 2011-16, DataLab.

Overall, three out of four new graduates in employment worked in the private sector (75 per cent). Private sector employment was particularly common among NESB graduates (83 per cent) and much less common among Indigenous (55 per cent) but also regional/remote graduates (65 per cent). Alternatives to working in the private sector include working in local, state or federal government. The public sector is often seen as offering higher job security and better benefits, while the private sector is typically associated with more competition, which translates into higher salaries but also potentially a higher volatility of positions.

About 60 per cent of new graduates who were in employment in 2016 worked in a managerial or professional occupation. This proportion was notably lower for low SES and NESB graduates.

About three in 10 new graduates in full-time employment had a personal income of at least A$1,500 per week. This was notably lower among full-time working low SES and NESB graduates. Disability and Indigenous graduates in full-time employment were more likely than the average full-time working graduate to have a personal income of at least A$1,500 per week.

The descriptive results suggest variation in employment outcomes among graduates of equity groups. Do these results hold when equity group membership in multiple groups as well as other potential influences on employment outcomes, such as age, sex, the level of

the higher education degree and the time since graduation are considered? This is investigated next.

Multivariate results — Analyses 1 (overall patterns)

Likelihood of Employment

The multivariate results for the likelihood of employment confirmed the descriptive finding that graduates with disability were dramatically less likely (33 percentage points less) to be employed than graduates with no disability (Table 4). They also confirmed the descriptive finding that NESB graduates have a lower employment rate. Here, they were seven percentage points less likely to be employed than graduates from English-speaking backgrounds, after adjusting for other characteristics. Further, low SES graduates were also statistically significantly less likely than their counterparts to be in employment, although the difference is small (about two percentage points).

Characteristics of employment

Low SES graduates in employment were statistically significantly more likely than graduates from higher SES backgrounds to work as an employee, although the difference between the two groups was small (1.5 percentage points). Further, low SES graduates were statistically significantly less likely to work in the private sector, with the difference to higher SES graduates being also relatively small with 2.4 percentage points. A larger difference pertained to the likelihood of employment in managerial or professional occupations: compared to higher SES graduates, low SES graduates were 5.7 percentage points less likely to be employed in such occupations. For graduates in employment, there was no statistical difference in the likelihood of working full-time. However, low SES graduates in full-time employment were eight percentage points less likely to have a high personal income than their higher SES counterparts.

Like low SES graduates in employment, graduates from regional/remote areas who were employed were also less likely to work in the private sector than their respective peers from major cities, with the difference of 5.7 percentage points being of a notable magnitude. However, graduates from regional/remote areas had a statistically significantly higher prevalence of working as a manager or professional than graduates from major cities. There were no statistical differences between regional/remote and major city graduates in the likelihood of employment as an employee, and, for those in full-time employment, in the likelihood of receiving a high personal income. While regional/remote graduates were less likely to work full-time, the substantive difference was very small (1.5 percentage points).

Table 4: Equity groups and likelihood of selected employment outcomes in 2016, new graduates (2011–16)

	Outcomes in 2016					
	Employed ^	**Employed as employee ***	**Employed full-time***	**Employed in private sector***	**Employed in managerial/ professional occupation***	**Personal weekly income >=A$1,500^^**
Equity group (2011)						
Low SES	-0.022**	0.015**	-0.012	-0.024**	-0.057***	-0.080***
Regional/remote	0.010	-0.004	-0.017*	-0.074***	0.030***	-0.007
Indigenous	-0.012	0.029	0.047	-0.134***	0.019	0.011
Disability	-0.325***	0.015	-0.121*	0.008	0.058	0.034
NESB	-0.070***	-0.025***	-0.013*	0.091***	-0.100***	-0.095***
Controls						
Gender						
Female	-0.006	0.038***	-0.126***	-0.081***	0.011	-0.112***
Age 2011(Reference: 15-19 years)						
20-24 years	0.035***	-0.019***	0.111***	-0.018**	0.073***	0.151***
25-34 years	0.028***	-0.060***	0.058***	-0.055***	0.054***	0.319***
35-44 years	0.050***	-0.098***	0.086***	-0.093***	0.098***	0.440***
45-54 years	-0.005	-0.122***	0.063***	-0.113***	0.117***	0.454***
Level of degree in 2016						
Postgraduate	0.021***	0.002	0.035***	-0.039***	0.040***	0.044***
Timing of study						
Attended HE in 2011	0.041***	0.028***	0.069***	-0.067***	0.139***	0.004
Observations	30,452	26,165	26,165	26,165	26,165	17,812
Pseudo R^2	0.0255	0.0825	0.0305	0.0351	0.0284	0.1391
p	0.000	0.000	0.000	0.000	0.000	0.000

^ People aged 15-54 years with no higher education qualification in 2011 who had higher education qualification in 2016.

* People aged 15-54 years with no higher education qualification in 2011 who had higher education qualification and were in employment in 2016.

^^ People aged 15-54 years with no higher education qualification in 2011 who had higher education qualification and were in full-time employment in 2016.

Coefficients are average marginal effects from logistic regression.

* p<0.05 ** p<0.01 *** p<0.001.

Based on unweighted data from ACLD 2011-16.

Indigenous graduates in employment were particularly less likely to work in the private sector (by 13 percentage points) while otherwise, in a statistical sense, they were equally likely to be employed as an employee, to work full-time, to work as a manager or professional, and, when in full-time employment, to have a high personal income compared to non-Indigenous graduates.

Graduates in employment in 2016 who had a disability in 2011, were significantly less likely to work full-time than graduates without disability five years earlier.

NESB graduates who were employed in 2016 were significantly less likely to be employed as an employee (by 2.5 percentage points), to be employed full-time (although only marginally by 1.3 percentage points) and notably, by 10 percentage points, less likely to be employed as manager or professional than ESB graduates. At the same time, they were more likely to be employed in the private sector (by 9.1 percentage points).

When in full-time employment, NESB graduates were also significantly less likely to have a high personal weekly income than ESB graduates in full-time employment.

Altogether, the results from the models of employment and employment characteristics were fairly consistent with the pattern of descriptive results in Table 2 and Table 3. They suggested less successful employment outcomes for new graduates from low SES, with disability and from NESB. New graduates with disability were dramatically less likely to be employed and, when in employment, less likely to be employed full-time.

New NESB graduates and new low SES graduates achieved less successful outcomes in terms of employment, employment in managerial or professional occupations and personal income. Of these two groups, NESB graduates appeared more disadvantaged as their model coefficients are larger. Like Disability graduates in employment, employed NESB graduates were also less likely to work full-time. They further appeared to be more likely to work in environments characterised by more competition and risk as indicated by the lower likelihood of working as an employee and the higher likelihood of working in the private sector. Among employed equity graduates, NESB graduates were the only ones who had a significantly lower likelihood of being an employee and a significantly higher likelihood of working in the private sector.

Multivariate results — Analyses 2 (adjusting for fields of study)

There was considerable variation in the distribution of equity graduates across fields of study. For example, among new graduates 24.3 per cent had studied business management. This percentage was considerably higher for NESB graduates (33.7 per cent) and lower for all other equity graduates (Table 5). Teaching degrees were particularly popular among Indigenous new graduates (24.4 per cent) and least prevalent among NESB graduates (6.7 per cent). Regional/remote graduates (13.4 per cent) were more likely to have a degree in nursing than other new graduates (overall 7.6 per cent). These and other differences in the field-of-study distribution of new graduates that can be derived from Table 5 could have had a bearing on graduates' employment outcomes.

Table 5: Equity groups and fields of study, new graduates (2011–16)

Fields of study	Low SES	Regional/remote	Indigenous	Disability	NESB	All new graduates
Business and Management	19.4%	16.5%	12.4%	16.5%	33.7%	24.3%
Teacher Education	19.4%	20.1%	24.4%	14.6%	6.7%	12.7%
Science and Mathematics	8.2%	6.8%	6.1%	5.8%	9.4%	8.4%
Nursing	10.4%	13.4%	8.5%	10.5%	6.1%	7.6%
Engineering	7.1%	5.7%	3.4%	5.7%	9.6%	7.4%
Humanities, Culture & Social Sciences	4.6%	5.2%	9.0%	4.8%	4.1%	5.2%
Health Services Support	5.1%	5.3%	6.2%	3.4%	3.0%	4.4%
Creative Arts	3.0%	3.7%	2.8%	6.6%	2.9%	4.2%
Computing and Information Systems	4.1%	2.3%	1.7%	6.9%	6.5%	4.1%
Law and Paralegal	2.7%	2.8%	6.5%	3.7%	3.1%	3.9%
Communications	2.2%	2.4%	3.9%	5.5%	1.7%	3.4%
Psychology	3.3%	2.9%	*suppr*	*suppr*	1.8%	2.8%
Architecture and Built Environment	1.6%	1.5%	*suppr*	*suppr*	2.4%	2.5%
Rehabilitation	1.6%	1.9%	*suppr*	*suppr*	1.2%	1.9%
Social Work	2.7%	2.6%	3.5%	5.5%	1.1%	1.7%
Environment and Environmental Studies	1.2%	2.8%	*suppr*	*suppr*	0.7%	1.3%
Medicine	0.6%	1.2%	*suppr*	*suppr*	1.6%	1.3%
Pharmacy	0.6%	0.8%	*suppr*	*suppr*	1.3%	0.8%
Tourism, Hospitality, Personal Services, Sport & Recreation	1.1%	0.5%	*suppr*	*suppr*	1.4%	0.8%
Dentistry	0.3%	0.5%	*suppr*	*suppr*	0.8%	0.4%
Veterinary Studies	0.2%	0.5%	*suppr*	*suppr*	0.2%	0.2%
Not stated	0.5%	0.4%	*suppr*	*suppr*	0.8%	0.5%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Total N	**72,693**	**120,670**	**9,269**	**4,574**	**263,138**	**809,317**

^ People aged 15-54 years with no higher education qualification in 2011 who had higher education qualification in 2016.

Suppr – suppressed due to confidentialisation.

Based on weighted data from ABS 2018, ACLD 2011-16, DataLab.

In the following we investigate whether taking account of different study areas makes a difference to the reported results in Table 4. To this end, we added a field of study variable with 22 categories (21 fields + Not stated/inadequately described, which is also used in Table 5) to the previous models. The results for the equity groups are shown in Table 6.

Introducing the control for field of study changed some model coefficients and significance levels, but the overall pattern of the results—the direction of the coefficients—was maintained. This means that differences in the way that equity graduates and non-equity graduates selected fields of study did not matter much for the differences in employment outcomes between graduates as reported in Table 4. There was particularly little difference in the results for the five groups in relation to the likelihood of being employed and the likelihood of being employed as an employee.

The largest changes in coefficients that indicated differences between an equity group and its counterpart were not associated with any changes in the direction of the difference after controlling for fields of study. All differences in coefficients associated with a change in the significance status are highlighted by shading in the relevant cells in Table 6. The three coefficients in lighter shading indicate a trivial change in coefficients by up to 0.6 percentage points compared to the results in Table 4. The two coefficients in darker shaded cells were of a somewhat larger magnitude, up to 2.9 percentage points: after taking account of

graduates' field of study employed low SES graduates were not (anymore) less likely to be employed in the private sector than employed high SES graduates, and employed graduates from regional/remote areas were not (anymore) less likely to work in managerial or professional occupations than graduates from major cities.

Table 6: Equity groups and likelihood of selected employment outcomes in 2016, new graduates (2011–16) (additional controls for fields of study)

	Outcomes in 2016					
	Employed^	**Employed as employee***	**Employed full-time***	**Employed in private sector***	**Employed in managerial/ professional occupation***	**Personal weekly income >=A$1,500^^**
Equity group (2011)						
Low SES	-0.024***	0.010	-0.006	-0.006	-0.073***	-0.072***
Regional/remote	0.004	-0.009*	-0.011	-0.044***	0.001	-0.006
Indigenous	-0.013	0.029	0.051	-0.108***	0.027	0.020
Disability	-0.321***	0.013	-0.112*	0.020	0.040	0.039
NESB	-0.069***	-0.023***	-0.038***	0.065***	-0.095***	-0.120***
Controls						
Gender						
Female	-0.015***	0.025***	-0.085***	-0.004	-0.032***	-0.062***
Age 2011(Reference: 15-19 years)						
20-24 years	0.024***	-0.020***	0.096***	-0.008	0.053***	0.142***
25-34 years	0.016*	-0.068***	0.049***	-0.036***	0.033***	0.322***
35-44 years	0.035***	-0.114***	0.077***	-0.059***	0.063***	0.436***
45-54 years	-0.028***	-0.152***	0.063***	-0.056***	0.054***	0.459***
Level of degree						
Postgraduate	0.010	0.001	0.015*	-0.030***	0.031***	0.052***
Timing of study						
Attended higher education in 2011	0.038***	0.026***	0.063***	-0.059***	0.126***	-0.002
Field of study (Reference: Science & Mathematics)						
Computing and Information Systems	0.121***	0.001	0.219***	0.076***	0.178***	0.121***
Engineering	0.123***	0.010	0.226***	0.083***	0.246***	0.187***
Architecture and Built Environment	0.135***	-0.057***	0.162***	0.142***	0.085***	0.030
Environment and Environmental Studies	0.101***	-0.039*	0.129***	0.030	0.007	-0.022
Health Services Support	0.136***	-0.028*	0.037*	-0.083***	0.052**	0.102***
Medicine	0.150***	0.018	0.256***	-0.438***	0.459***	0.371***
Nursing	0.185***	0.059***	0.023	-0.278***	0.450***	0.043*
Pharmacy	0.160***	0.023	0.229***	0.079*	0.447***	0.074*
Dentistry	0.186***	-0.196***	0.114*	0.048	0.241***	0.547***
Veterinary Studies	0.057	0.022	0.185**	0.153*	0.378***	-0.007
Rehabilitation	0.174***	-0.112***	0.156***	-0.007	0.389***	-0.023
Teacher Education	0.164***	0.036***	0.120***	-0.159***	0.299***	-0.069***
Business and Management	0.148***	-0.004	0.226***	0.106***	0.123***	0.071***
Humanities and Culture	0.061***	0.010	0.019	-0.016	-0.053**	-0.041*
Social Work	0.120***	0.035**	0.108***	-0.031	0.139***	-0.081**
Psychology	0.040*	-0.012	-0.012	0.020	0.038	-0.026
Law and Paralegal	0.130***	0.015	0.211***	-0.045**	0.068***	0.114***
Creative Arts	0.069***	-0.106***	-0.022	0.129***	0.059**	-0.088***

Communications	0.113***	-0.024	0.119***	0.115***	0.068***	-0.069**
Tourism, Hospitality, Personal Services, Sport & Recreation	0.133***	-0.012	0.059	0.164***	-0.156***	-0.139***
Not stated	0.094**	-0.016	0.132**	-0.063	0.051	0.026
Observations	30,452	26,165	26,165	26,165	26,165	17,812
Pseudo R^2	0.0497	0.1191	0.0594	0.1093	0.1007	0.1792
p	0.000	0.000	0.000	0.000	0.000	0.000

^ People aged 15–54 years with no higher education qualification in 2011 who had higher education qualification in 2016.

* People aged 15–54 years with no higher education qualification in 2011 who had higher education qualification and were in employment in 2016.

^^ People aged 15–54 years with no higher education qualification in 2011 who had higher education qualification and were in full-time employment in 2016.

Coefficients are average marginal effects from logistic regression.

* p<0.05 ** p<0.01 *** p<0.001.

Based on unweighted data from ACLD 2011-16.

The results presented above were based on people who graduated with their first higher education degree between 2011 and 2016. The models included a control for attending higher education in 2011 because those who had attended higher education in 2011 could, on average, be expected to have graduated before those who had not attended higher education in 2011 thus having had more time post-graduation to achieve success in the labour market. The model coefficients for “Attended higher education in 2011” in and Table 6 suggested that this was indeed the case: new graduates who had attended higher education in 2011 were significantly more likely to be employed, to be employed full-time and to be employed in a managerial or professional occupation. Further, they were also more likely to be employed as an employee and significantly less likely to be employed in the private sector.

Compared to the overall group of new graduates, new graduates who attended higher education in 2011 could also be expected to be more homogenous in relation to their distance to graduation. To further qualify results for this group, the analyses reported in Table 4 and Table 6 above were repeated for those who attended higher education in 2011. The pattern of the earlier results was largely maintained with the most notable exception concerning low SES graduates: new low SES graduates who had attended higher education in 2011 were equally likely to be employed than higher SES graduates. Those in employment were less likely to work full-time than their higher SES peers (see Table A-1 and Table A-2 in the Appendix). Because graduates in these analyses would have left university longer ago than in the initial analyses, these results may indicate changes in relative employment outcomes over time and the need for researchers to consider different points post-graduation when assessing graduate employment outcomes.

Moving beyond labour market outcomes: findings from the HILDA survey

This chapter draws on data from the HILDA Survey to examine the longitudinal associations between the attainment of a university degree and individual outcomes, and how these differ between equity and non-equity students. This set of analyses drew on two key advantages of the HILDA data in the context of this report:

- the ability to include outcomes that go beyond the "hard" labour market outcomes, including health and wellbeing outcomes, as well as subjective evaluation of graduates' employment and financial situation
- a long-term perspective, covering outcomes up to 15 years after graduation.

Therefore, the HILDA analyses complement the Census analyses presented in the previous chapter, which focused on labour market outcomes while also employing a shorter-term perspective.

In this part of the report, we focused on individuals who were observed to graduate at some point over the 16-year observation window covered by the 16 waves of the HILDA Survey available to date (2001–16). We then undertook two separate analyses:

- a comparison of health and wellbeing outcomes (general health, mental health, life satisfaction and social support) before and after graduation
- an examination of post-graduate trajectories on the aforementioned health and wellbeing outcomes, plus subjective outcomes related to employment and financial situation (job security satisfaction, overall job satisfaction and financial prosperity).

In both analyses, we contrasted the experiences of equity students to those of non-equity students, using individual equity groups as well as a combined indicator of being an equity student. Before introducing our empirical analyses, we briefly describe the properties of the HILDA Survey data and the way in which key variables are operationalised in this report.

Dataset and sample

The HILDA Survey

The HILDA Survey is an annual household panel survey with 16 waves available to date, covering the period 2001–16, which contains rich information from a sample of individuals aged 15 and older living in Australia. The initial HILDA survey sample (wave 1 sample) is largely representative of the Australian population in 2001. Exceptions include individuals living in remote areas and the institutionalised populations, who were not sampled. The HILDA Survey data are collected using a complex, multi-stage sampling strategy at the household level, and a mixture of self-completion questionnaires and computer-assisted face-to-face interviews. The different HILDA Survey waves have sample sizes ranging from 12,226 to 17,400 individuals, with remarkably low attrition rates. For further details on the structure and properties of the HILDA Survey see Watson and Wooden (2012) and Summerfield et al. (2017).

As noted earlier, the HILDA Survey provides a unique contribution to answering our research question for two key reasons:

- It contains rich data on a range of health and wellbeing outcomes (for example, mental health, social support and life satisfaction) as well as subjective labour market outcomes (for example, satisfaction with job).

- Its longitudinal dimension allows us to compare the outcomes of the same individuals before and after they obtain an undergraduate university degree, and to examine how outcomes evolve for up to 15 years since the attainment of the degree.

These features of the HILDA data complement the strengths of the longitudinal Census data described in the previous chapter, such as large sample size and limited non-response and missing data issues.

Analytic samples

The research questions posed in this study required us to capture the event of completing a university degree, which restricts the sample available for analysis. Pooling information from all available years of the HILDA Survey and excluding individuals who were observed only once across all 16 HILDA Survey waves (as their information is of limited value to understanding dynamics over time) rendered a sample of 12,074 observations from 1,105 individuals who were observed to obtain a degree during the life of the panel. This is our analytic sample for the first set of analyses examining the before/after effects of attaining a degree (Sample A). To maximise our sample sizes, we included individuals with information in some, but not all, of the outcome variables. A second sample (Sample B) is used in the analyses examining post-graduation trends over time. This involved retaining only observations from individuals in the previous sample after such individuals have been observed to obtain their degrees. This resulted in 4,998 observations from 935 individuals.

Analytic variables

Key explanatory variables: equity group membership

We were interested in comparing the long-term outcomes of equity and non-equity graduates. We undertook this by examining both the membership in individual equity groups, as well as using a combined indicator capturing being an equity student (or not). The use of the combined indicator was partially motivated by the somewhat limited sample size available for the HILDA analysis, but also by the fact that the results for different (individual) equity groups were often relatively similar to one another. As such, our commentary in this part of the report focuses mainly on the combined indicator, while highlighting those findings for the specific equity groups that departed from the pattern captured by the combined measure.

As was the case with the Census data, the HILDA analyses focus on five population-based equity groups:

- low socioeconomic status (low SES)
- non-English speaking background (NESB)
- residents in regional/remote areas
- Aboriginal and Torres Strait Islanders (Indigenous)
- students with disability.

The operationalisation of these five equity groups is somewhat different in the HILDA analyses, compared to the definitions used in the Census chapter of the report.

To operationalise low SES we used information on paternal and maternal occupation when the respondent was 14 years of age. We chose to use historical data to construct a low SES measure at an individual level as this helped us to overcome some well-known limitations associated with using aggregate-level measures such as SEIFA. These include temporal disjoint between concurrent and past SEIFA scores, and the possibility of mismatches between individual-level and aggregate-level disadvantage (see e.g., Australian Institute of

Health and Welfare, 2014; Bok, 2010; Dockery, Seymour, & Koshy, 2016). We constructed a dummy variable capturing low SES, which takes a value of 1 when neither the father nor the mother worked in a high-status occupation (i.e., a managerial/professional occupation), and a value of 0 otherwise. Managerial/professional occupations are those in codes 1 and 2 of the *Australian and New Zealand Standard Classification of Occupations* (ANZSCO) 2006 at the 1-digit level of aggregation (major group). Similar approach to use parental information as a low SES indicator was also employed in some of the previous studies in the Australian context (e.g., Edwards and Coates, 2011).

We approximated area remoteness using information on the characteristics of the areas in which graduates in the HILDA Survey lived *in the year before graduation*. While this may not coincide with the permanent residence of these individuals or their parents, it is the best that could be done with our HILDA analytic sample. Additionally, this treatment of the data is similar to how information on area of residence was collected until very recently in the official higher education data systems. As noted in an Australian Institute of Health and Welfare (AIHW) report (Australian Institute of Health and Welfare, 2014, p.48), this introduces a risk that the postcode of home residence reported by the students may not reflect where they are originally from given that they may move away from home for their study. The regional/remote area variable we used here is a dummy variable taking a value of 1 if the respondent lived in an inner regional, outer regional, remote or very remote area, and a value of 0 when the respondent lived in a major city. The categories were based on the classification of *Australian Statistical Geography Standard* (ASGS 2011).

Indigenous status is operationalised using information from a HILDA Survey variable asking respondents to identify as being either “not of Indigenous origin”, “Aboriginal”, “Torres Strait Islander”, or “Both Aboriginal and Torres Strait Islander”. We used this information to derive a binary variable taking a value of 1 if the respondent identified as Aboriginal, Torres Strait Islander or both, and a value of 0 otherwise.

Disability was operationalised using respondents’ reports of whether or not they had a long-term health condition, impairment or disability restricting the amount of work that they could do. This was a dummy variable taking a value of 1 if that was the case, and a value of 0 otherwise. Importantly, while individuals could enter and exit a disability status in the panel data, in our empirical analyses we anchored this measure to the time in which respondents graduated as this as this would have been a good proxy of respondents’ disability status during their studies. The resulting disability indicator was thus constant over time within individuals.

NESB is operationalised using respondents’ answers to survey questions asking where they and their parents were born. This was a dummy variable taking a value of 1 if the respondents were born in a non-English speaking country, or both of their parents were born in a non-English speaking country; and a value of 0 otherwise.

Additionally, we constructed a combined indicator of being an equity group graduate, which captured being a member of ***at least one*** of the five equity groups considered in this report. Separate analyses were carried out using this combined indicator, the results of which are presented as an initial step to capture an overall level of disadvantage of equity graduates, before discussing specific findings for the individual equity groups.

Key explanatory variables

Our first analysis involved comparing the outcomes of individuals before and after attaining an undergraduate university degree. Using the HILDA Survey, we could ascertain when an individual graduates by comparing his/her highest educational qualification at a given wave (time *t*) and the previous wave (time *t*-1). Based on this comparison, we first derived a dummy variable capturing the time at which the highest educational qualification recorded in

the data moves from any qualification lower than a degree at time *t*-1 into "undergraduate degree" at time *t*. We then create an additional dummy variable that distinguishes all observations prior to graduation (value 0) and all observations subsequent to graduation (value 1). This variable is then interacted with the dummy variable capturing equity group membership for use in our fixed-effect models (details below).

For the second analysis examining post-graduation trajectories in outcomes, we derived an additional variable counting the number of years since the individual was observed to graduate. This took the value 0 in the year immediately after graduation, the value 1 one year after graduation, the value 2 two years after graduation, and so on. Therefore, this variable ranges from 0 to 15 in the HILDA Survey data, as these comprise 16 annual observation points.

Outcome variables

Using the HILDA data gave us the advantage of being able to extend the longitudinal Census analyses by investigating a different set of outcomes, the ones that go beyond an objective assessment of the basic labour market outcomes. Specifically, we focused the HILDA analyses on two groups of outcomes:

- a set of health and wellbeing indicators
- a set of indicators related to subjective evaluations of graduates' employment and financial situation.

The analyses covered in this chapter investigated how receiving an undergraduate university degree amongst equity and non-equity individuals influenced these subjective and health and wellbeing outcomes.

Health and wellbeing outcomes

The HILDA data enabled us to capture a number of indicators related to physical and mental health, as well as measures capturing social support (or social networks that people form), and a subjective wellbeing measure in the form of life satisfaction. The following measures were used here:

- **General health** was captured using the Australian version of the SF-6D health state classification (Brazier, Roberts, & Deverill, 2002), an instrument derived out of 11 items from the SF-36 (Ware & Sherbourne, 1992). This had a theoretical range going from 0 (death) to 1 (best health).
- **Mental health** was captured using the mental health subscale of the SF-36, a five-item additive scale with transformed scores ranging from 0 to 100.
- **Life satisfaction** was captured using respondents' answers to the question *"How satisfied are you with your life?"* on a scale from 1 (totally dissatisfied) to 10 (totally satisfied).
- **Social support** was an index constructed by adding responses to 10 questions on the degree of support respondents feel that they get from other people (Berry & Welsh, 2010). This was rescaled to range from 0 (lowest support) to 100 (highest support).

Subjective assessment of employment and financial circumstances

The focus of the HILDA analyses is mainly on the subjective assessment of the labour market outcomes as this is information that could not be captured with the Census data. Here, we focused on two indicators related to satisfaction with one's job, which together with an indicator of "Financial prosperity" constitute our subjective measures capturing employment and financial situation of the graduates. These indicators were captured as follows:

- **Job security satisfaction** was determined from a question asking participants about their satisfaction with job security on a scale from 0 (totally dissatisfied) to 10 (totally satisfied).
- **Overall job satisfaction** was determined from a question asking participants to rate their overall job satisfaction on a scale from 0 (totally dissatisfied) to 10 (totally satisfied).
- **Financial prosperity** was based on a question asking participants to rate their *"prosperity given current needs and financial responsibilities"* using the following scale: 1=Prosperous, 2=Very comfortable, 3=Reasonably comfortable, 4=Just getting along, 5=Poor and 6=Very poor. We treated this as a continuous variable.

Control variables

Across both analyses, in multivariate models we controlled for a parsimonious set of potential confounders. Controls included variables capturing respondents' age (in years), gender (male; female), attainment of a postgraduate qualification (attained; not attained) and partnership status (partnered; not partnered). In the first analysis, we also include employment status (employed; not employed) as a control variable.

Method

Fixed effect models

For our first analysis, which examined the overall impact of attaining an undergraduate degree on equity and non-equity students' outcomes, we fit fixed-effect panel regression models. These compared the outcomes of the *same individuals* before and after they obtain their degree. Because of this before-after comparison, the focus of these analyses was on the health and wellbeing outcomes as these outcomes could be captured in a comparable way before and after finishing university. This was not necessarily the case for the subjective job-related outcomes as many students would not be working before they graduate, while those who did were likely to have jobs that were different to the ones obtained after graduation, which prevented meaningful comparisons of the situation before and after graduation.

In practice, the fixed-effect model is estimated by regressing deviations in person-specific means in the outcome variable on deviations in person-specific means in the explanatory variables (Allison, 2009). Our model can be formally represented as:

$$HW_{it} - \overline{HW_i} = (D_{it} - \bar{D}_i)\beta_1 + (C_{it} - \bar{C}_i)\beta_2 + (e_{it} - \bar{e}_i) \qquad (1)$$

where *i* and *t* denote individual and time; *HW* is an outcome variable capturing a given dimension of health and wellbeing; *D* is the dummy variable denoting whether individuals have obtained a degree; *C* is a vector of time-changing control variables; the *β*s represent coefficients or vectors of coefficients to be estimated; and *e* is the usual random error.

Because fixed-effect models are estimated using within-individual change over time, they cannot accommodate time-constant predictors. However, they are fit to accommodate interactions between time-constant and time-varying predictors. Our key interest was in one such interaction, namely that between equity group membership (time constant) and attainment of a degree (time varying). Hence, the models we fit are as follows:

$$HW_{it} - \overline{HW_i} = (DE_{it} - \overline{DE_i})\beta_1 + (DNE_{it} - \overline{DNE_i})\beta_2 + (C_{it} - \bar{C}_i)\beta_3 + (e_{it} - \bar{e}_i) \qquad (2)$$

where DE and DNE represent the attainment of a degree by equity and non-equity students, respectively. A comparison of the estimated *β* coefficients on these two terms via Wald tests was thus of key interest, providing the requisite evidence of whether or not degree attainment impacts the health and wellbeing of equity and non-equity students at the same rate.

Growth models

For our second analysis, which examines the post-graduation trajectories of equity and non-equity students, we fit another type of panel regression model known as "growth models" (Singer & Willett, 2003). These models are useful to determine the evolution of an outcome with time elapsed since a given event. In our case, the event is graduation from an undergraduate university degree, and the outcomes are different variables capturing health, wellbeing and subjective indicators related to labour market circumstances. Unlike with fixed effect models, subjective indicators related to employment and financial situation can be meaningfully included in these analyses as they do not involve comparing situation prior to and after graduation.

Our growth models took the following form:

$$HW_{it} = YSG_{it}\beta_{1i} + E_i\beta_2 + (YSG_{it} * + E_i)\beta_3 + C_{it}\beta_4 + u_i + e_{it} \qquad (3)$$

where *u* is an individual-specific random intercept capturing unobserved effects, *YSG* is a time-varying continuous variable capturing the number of years since graduation (ranging from 1 to 15), *E* is a time-constant binary indicator of equity group membership. The interaction effect between *YSG* and *E*, i.e., β_3, is the parameter of key interest, as it gives the differences in post-graduation trends in outcomes between equity and non-equity students.

In some specifications we used a polynomial (quadratic) specification for the *YSG* variable (and its interaction with equity group membership) to capture non-linear trends since graduation. We did this when its addition significantly improved model fit.

Results

Sample descriptive statistics

Table 7 shows descriptive statistics on the variables used in our analyses, for both Sample A (for analysis 1) and Sample B (for analysis 2).

In Sample A, in 51 per cent of the person-year observations, individuals had already attained their degrees, compared to 49 per cent of observations from the same individuals prior to degree attainment. In 59 per cent of person-year observations, individuals identified with at least one of our five equity groups. When membership was considered for each group, two per cent belonged to the Indigenous group, five per cent to the disability group, 37 per cent to the low SES group, 27 per cent to the regional/remote group, and 19 per cent to the NESB group. Concerning health and wellbeing outcomes, mean general health in this sample is 0.73 on a 0 to 1 scale, mean mental health is 73.32 in a 0 to 100 scale, mean life satisfaction is 7.95 in a 0 to 10 scale, and mean social support is 77.62 in a 0 to 100 scale. Concerning the controls, in 78 per cent of observations individuals were employed, in 40 per cent they were male, in seven per cent post-graduate qualifications had been attained, and in 34 per cent individuals were partnered. The mean age was 25.67.

In Sample B, comprising only person-year observations from after individuals were observed to graduate, the mean number of years since graduation was 4.74. In 57 per cent of person-year observations individuals identified with at least one of our five equity groups; two per cent belonged to the Indigenous group, five per cent to the disability group, 38 per cent to

the low SES group, 25 per cent to the regional/remote group, and 19 per cent to the NESB group. Concerning health and wellbeing outcomes, mean general health in this sample was 0.72, mean mental health is 73.27, mean life satisfaction is 7.85, and mean social support was 77.79. Concerning subjective labour market related outcomes, mean satisfaction with job security was 7.96 in a 0 to 10 scale, mean overall job satisfaction is 7.55 in a 0 to 10 scale, and mean financial prosperity was 4.03 on a 1-6 scale. Concerning the controls, 41 per cent of person-year observation were from men, 17 per cent were from individuals who have attained post-graduate qualifications, and 55 per cent were from partnered individuals. The mean age was 30.41.

Table 7. Descriptive statistics for Samples A and B in HILDA Survey analyses

	Sample A			Sample B		
	Mean/%	SD	Range	Mean/%	SD	Range
Degree attainment						
Observed degree attainment	51%		0-1			
Years after degree attainment				4.74	3.28	1-14
Equity group membership						
Any equity group	59%		0-1	57%		0-1
Indigenous	2%		0-1	2%		0-1
Disability	5%		0-1	5%		0-1
Low SES	37%		0-1	38%		0-1
Regional/remote	27%		0-1	25%		0-1
NESB	19%		0-1	19%		0-1
Outcome variables						
Health and wellbeing						
General health	0.73	0.19	0-1	0.72	0.20	0-1
Mental health	73.32	15.71	4-100	73.27	15.83	4-100
Life satisfaction	7.95	1.20	0-10	7.85	1.18	0-10
Social support	77.62	15.54	8.33-100	77.79	15.63	10-100
Labour market						
Financial prosperity				4.03	0.79	1-6
Job security satisfaction				7.96	2.02	0-10
Overall job satisfaction				7.55	1.47	0-10
Control variables						
Age (in years)	25.67	8.66	15-74	30.41	8.23	18-74
Male	40%		0-1	41%		0-1
Postgraduate degree attained	7%		0-1	17%		0-1
Partnered	34%		0-1	55%		0-1

Notes: HILDA Survey (2001–16).

Analysis 1: Comparison of outcomes before and after degree attainment

Table 8 shows the results from our first analysis, in which we compared the effect of obtaining a degree on the health and wellbeing outcomes using a combined indicator differentiating between equity and non-equity students. Attaining a degree was associated with a very modest but borderline statistically significant increase in general health amongst the non-equity cohort (β=0.01; p<0.05), but has no effect amongst the equity cohort (β=0.00; p>0.1). This difference was borderline not statistically significant in a Wald test of equality of coefficients (p=0.06), i.e., the "effect" of having a degree on general health was statistically the same (using a conventional significance threshold) amongst individuals who did not belong to an equity group. Attaining a degree significantly increased the mental health of non-equity (β=0.93; p<0.05) as well as equity cohort (β=0.89; p<0.1), with the difference between equity and non-equity groups not being statistically significant at conventional levels (p=0.94). Life satisfaction did not seem to be affected by the attainment of a degree for either group (βnon-equity=—0.02; p>0.1 & βequity=—0.03; p>0.1), and the difference in coefficients was not statistically significant (p=0.77). For social support, we observed a significant increase associated with degree attainment in the non-equity cohort (β=1.04; p<0.01), but no such effect was observed in the equity cohort (β=0.34; p>0.1). However, this difference in effects by equity group membership was not statistically significant at a conventional level (p=0.12). Altogether, we found that degree attainment was associated with gains in general health, mental health and social support amongst non-equity graduates, and gains in mental health amongst equity graduates. However, from a statistical point of view it cannot be ascertained whether the non-equity graduates benefited from a university degree more than equity graduates.

Table 8. Fixed-effect models of health and wellbeing outcomes

	General health	Mental health	Life satisfaction	Social support
Degree attainment				
Non-equity	0.01*	0.93*	-0.02	1.04*
Equity	0.00	0.89*	-0.03	0.34
Controls				
Age	0.00	0.00	0.00	0.00
Postgrad	-0.01	0.10	0.13**	0.24
Partnered	0.01	1.35***	0.23***	1.60***
Employed	0.01	-0.04	-0.05*	-0.36
Constant	0.77***	74.89***	8.49***	77.80***
$\beta_{equity}=\beta_{non\text{-}equity}$	*P*=0.06	*p*=0.94	*p*=0.77	*P*=0.12
n (observations)	10,834	11,056	12,073	10,952
n (individuals)	1,101	1,101	1,105	1,100

Notes: HILDA Survey (2001–16). Sample A. Statistical significance: # *p*<0.1, * *p*<0.05, ** *p*<0.01, *** *p*<0.001.

Table 9 presents the results of additional analyses considering each equity group separately. The most striking result is that individuals in the Indigenous group appeared to be worse off on a number of health and wellbeing outcomes after graduation, compared to before graduation. Specifically, attaining a university degree had negative and statistically significant effects on Indigenous graduates' general health (β=—0.06; *p*<0.05), mental health (β=—4.93; *p*<0.05) and life satisfaction (β=—0.40; *p*<0.01). All these differences were significantly worse than those for non-Indigenous individuals (*p*<0.05). Furthermore, while non-Indigenous graduates' social support improved after graduation, the reverse appears to be the case for Indigenous graduates although the difference is not statistically significant using a conventional threshold. All in all, this set of findings requires further attention particularly that it goes against the results of the labour market outcomes presented in the Census analyses chapter. However, it needs to be highlighted that the number of Indigenous graduates in the HILDA analytic sample is relatively small (211 observations, two per cent of the Sample A), and therefore any conclusions need to be drawn with an appropriate caution.

Table 9. Fixed-effect models of health and wellbeing outcomes, separate equity groups

	General health	Mental health	Life satisfaction	Social support
Not ATSI	0.00	0.49	-0.03	0.74*
ATSI	-0.06*	-4.93*	-0.40**	-1.45
$\beta_{ATSI}=\beta_{not\ ATSI}$	*<.05*	*<.01*	*<.05*	*0.21*
No disability	0.01	0.89*	0.01	0.75*
Disability	-0.02	1.42	-0.04	-1.05
$\beta_{disability}=\beta_{no\ disability}$	*<.05*	*0.66*	*0.55*	*0.09*
High SES	0.01	0.78#	-0.02	0.84*
Low SES	0.00	1.14*	-0.05	0.24
$\beta_{lowSES}=\beta_{highSES}$	*0.62*	*0.49*	*0.44*	*0.20*
Not NESB	0.00	0.69	-0.03	0.52
NESB	0.02**	1.85**	-0.03	1.07
$\beta_{NESB}=\beta_{not\ NESB}$	*<.05*	*0.07*	*0.94*	*0.35*
Metro	0.01	1.01**	-0.04	0.89**
Regional	0.00	0.49	-0.00	-0.44
$\beta_{remote}=\beta_{city}$	*0.58*	*0.39*	*0.45*	*<.05*
n (observations)	10,834	11,056	12,073	10,952
n (individuals)	1,101	1,101	1,105	1,100

Notes: HILDA Survey (2001–16). Sample A. Statistical significance: # $p<0.1$, * $p<0.05$, ** $p<0.01$, *** $p<0.001$. Control variables as for Table 2. No controls for membership in other equity groups.

The few statistically significant patterns occurring with university graduation for other equity groups are in line with the results using the combined equity indicator, and suggest that:

- graduates in the disability group reported a decline in general health, which is a significantly different pattern from graduates without disability
- NESB students improved their mental and general health with graduation — for the latter, to a greater extent than other individuals
- graduates from non-metropolitan areas report less social support after than before graduation, and comparatively less than metropolitan areas graduates.

Analysis 2: Trajectories over time after degree attainment

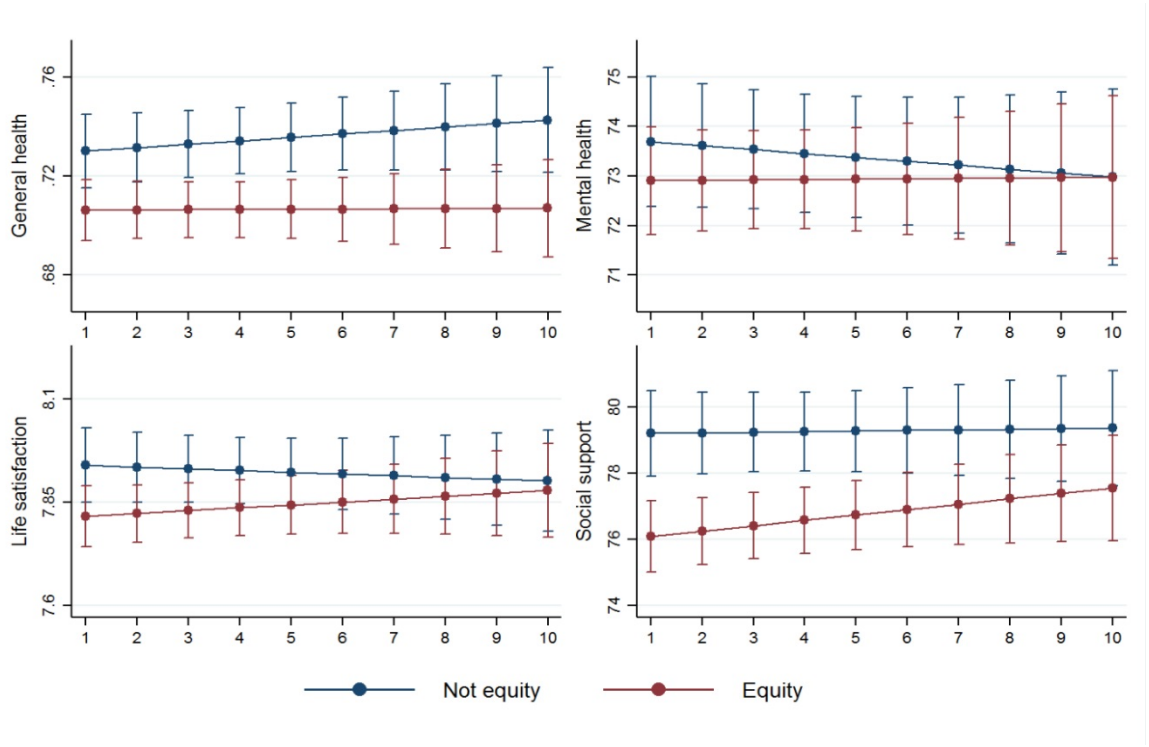
This section describes the results from our second set of analyses, in which we compared post-graduation trends in outcomes between equity and non-equity students, as reflected in health and wellbeing and subjective assessment of the labour market circumstances. Due to the complexity of these analyses and the number of parameters that needed to be interpreted jointly, the results of these models are easier to grasp by inspection of figures rather than tables of coefficients. The figures presented in this section show the marginal effects at the means of the covariates, holding the random effects constant at zero. In the below, we focus our interpretation of the findings on discussing these graphs.

Figures 1 and 2 show the results for a combined indicator of equity graduates (i.e., those graduates who belong to any of the five equity groups considered in this report). Figure 1 focuses on outcomes related to health and wellbeing, while Figure 2 shows the measures related to subjective evaluation of job and financial satisfaction. Overall, the figures provide evidence that the outcomes of equity graduates (represented by the red lines) were generally worse than the outcomes of non-equity graduates (represented by the blue lines). However, the differences are not always statistically significant, as can be inferred from overlapping 90 per cent confidence intervals (represented by the whiskers). The potential exceptions are indicators of subjective financial prosperity and job security, as well as social

support, where equity graduates appeared to have significantly poorer outcomes, at least in the first few years after graduation.

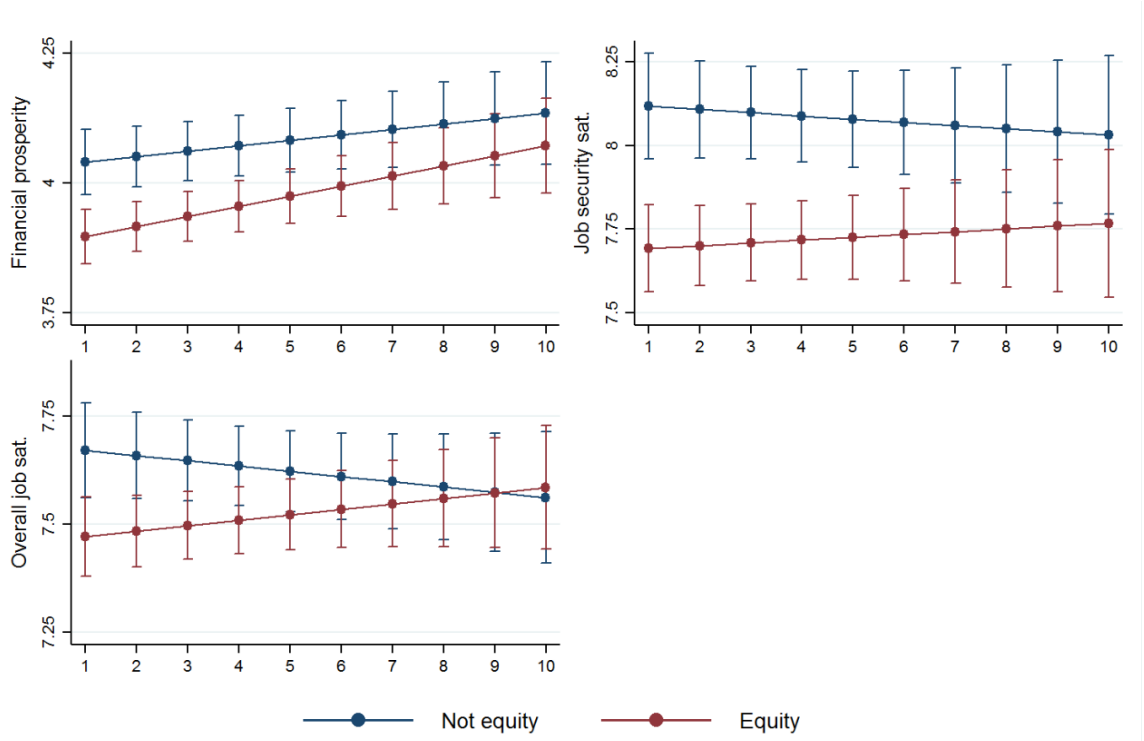
Concerning the trends in outcomes with time since graduation, some outcomes such as social support and financial prosperity appeared to increase over time, while other, like general and mental health remained rather stable. There was rather limited evidence of statistically significant differences between equity and non-equity graduates in how these outcomes trended over time over the observation window. There were instances in which there appeared to be divergences in the slopes (for example, life satisfaction, job satisfaction) between the equity and non-equity graduates, and the differences were statistically significant, at least initially. However, these differences disappeared over time, as the trajectories of equity and non-equity graduates converged so that there were no longer any differences between the two groups at around seven to eight years after graduation.

Figure 1. Marginal effects from general health, mental health, life satisfaction and social support models, by equity group membership



Notes: HILDA Survey (2001–16). Based on models in Table A-3. Covariates held at their means and random effects at zero.

Figure 2. Marginal effects from financial prosperity, job security satisfaction and overall job satisfaction models, by equity group membership



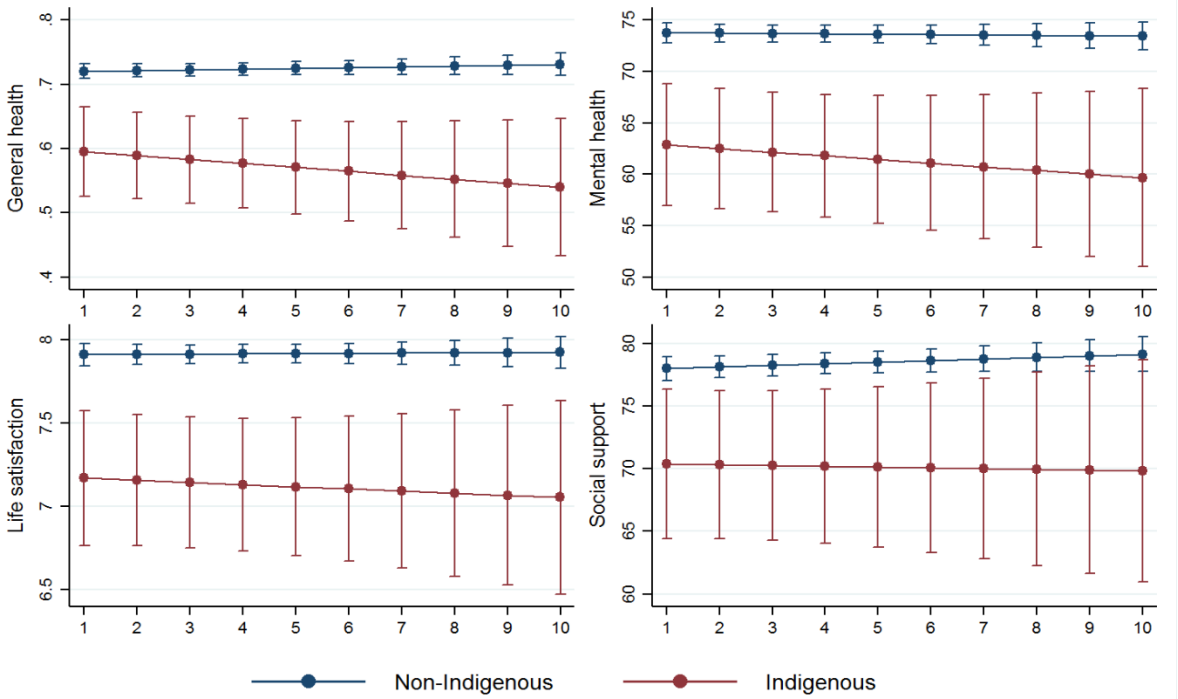
Notes: HILDA Survey (2001–16). Based on models in Tables A-3 and A-4. Covariates held at their means and random effects at zero

Altogether, results from our second analyses indicate that while there appear to be initial differences in the case of some of the outcomes considered here, the trajectories of equity and non-equity graduates move in similar directions and at a comparable pace after the attainment of undergraduate university qualifications leading to a convergence in outcomes over a longer time horizon.

As with the previous set of analyses, we repeated all models comparing individuals in each equity group to all other individuals. This yielded similar patterns across most equity groups, with the exception of the Indigenous group and people with disability. The findings for these two equity groups are presented and briefly discussed below, while the graphs for other equity groups (which do not show significant differences in trajectories between equity and non-equity graduates) are included in the Appendix.

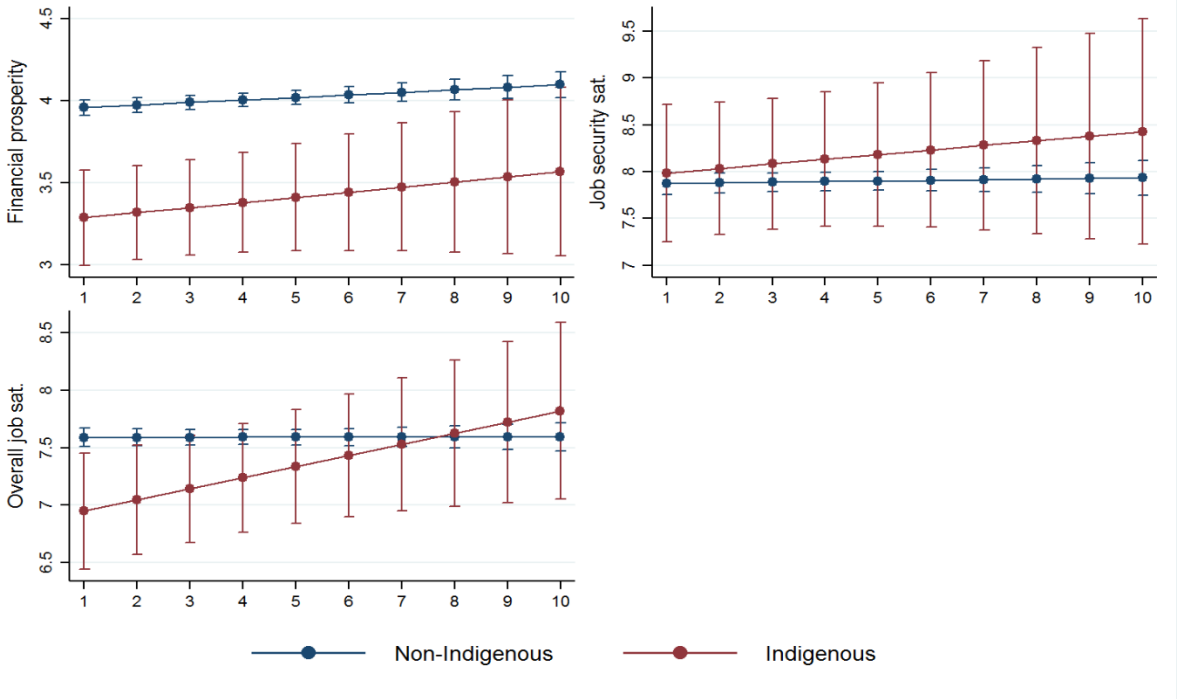
Indigenous graduates reported consistently worse general health, mental health, life satisfaction and social support than their non-Indigenous peers, with some increases over time in the magnitude of the differences (except for social support) (Figure 3). In contrast, Indigenous graduates seemed to reap similar benefits from their degrees as other graduates across subjective outcomes related to employment (job satisfaction, and satisfaction with job security), although there were still significant gaps, particularly in the first few years after graduation, between the reported financial prosperity of Indigenous and other graduates. However, both the financial prosperity and job satisfaction of Indigenous graduates increased slightly over time, resulting in a “catch up” effect towards the levels of their non-Indigenous counterparts (Figure 4).

Figure 3. Marginal effects from general health, mental health, life satisfaction and social support models, by Indigenous status



Notes: HILDA Survey (2001–16). Based on models in Table A-5 within the Appendix. Covariates held at their means and random effects at zero.

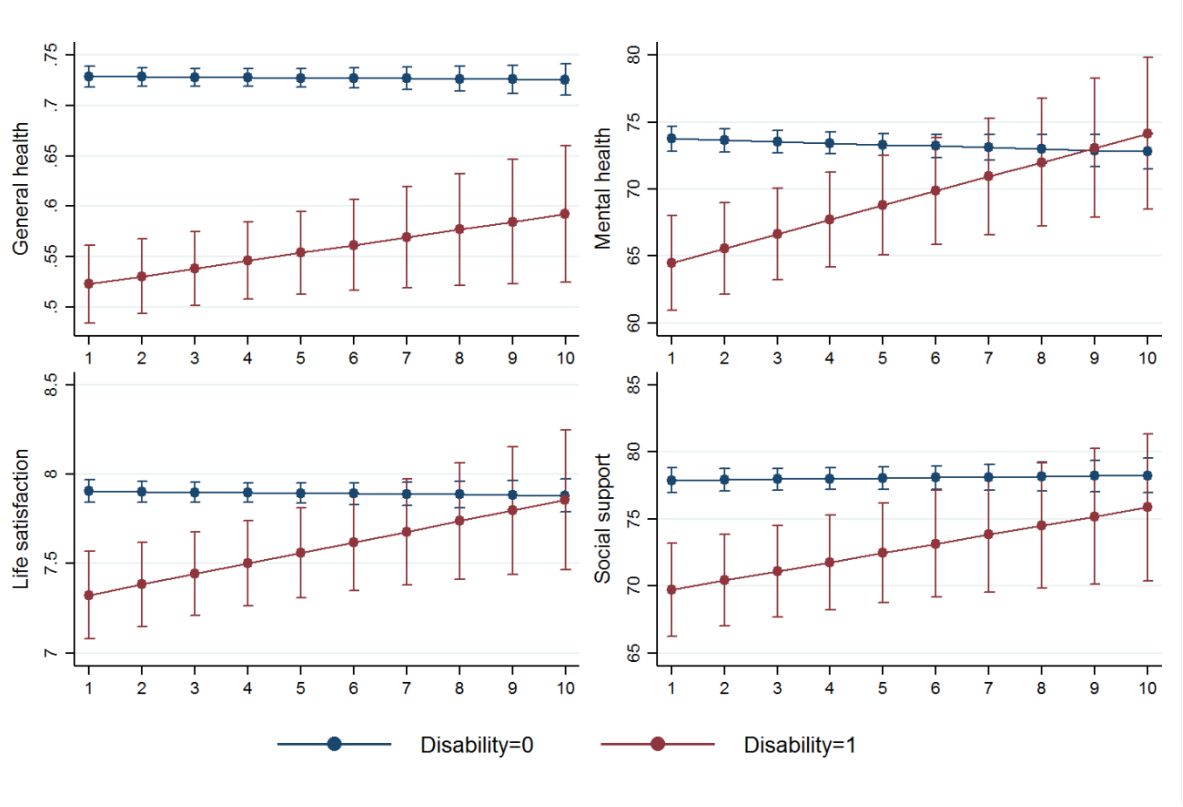
Figure 4. Marginal effects from financial prosperity, job security satisfaction and overall job satisfaction models, by Indigenous status



Notes: HILDA Survey (2001–16). Based on models in Table A-6 within the Appendix. Covariates held at their means and random effects at zero.

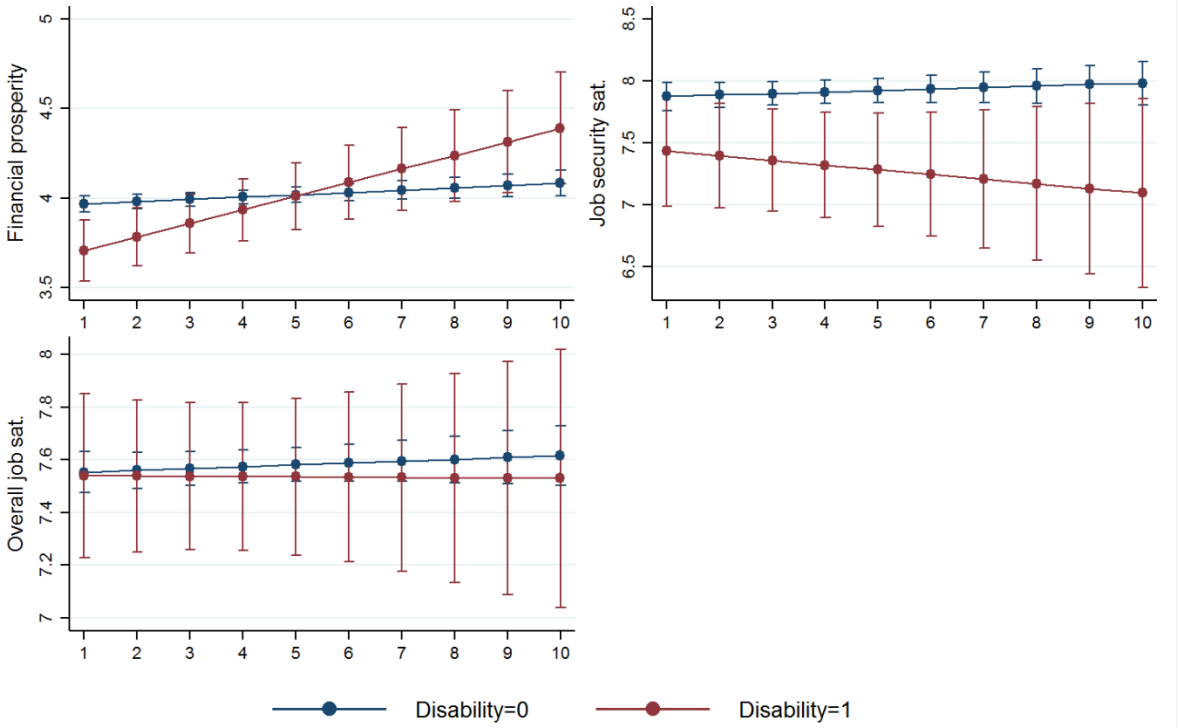
Graduates with disability reported consistently worse general health, mental health, life satisfaction and social support than their peers without disability, however the magnitude of the differences appear to decrease over time as the trajectories of the two groups converge (Figure 5). There appear to be much less differences between graduates with and without disability in terms of their subjective job-related outcomes which were reported at similar levels by both groups reported, perhaps with an exception of satisfaction with job security (Figure 6).

Figure 5. Marginal effects from general health, mental health, life satisfaction and social support models, by disability status



Notes: HILDA Survey (2001–16).

Figure 6. Marginal effects from financial prosperity, job security satisfaction and overall job satisfaction models, by disability status



Notes: HILDA Survey (2001–16).

While the trajectories for the other individual equity groups (Figures A1-A3 in the Appendix) show hardly any differences in statistical terms compared with non-equity graduates, they point at a general pattern that is consistent with much of the previous findings:

- The equity graduates appeared to generally report inferior outcomes compared with non-equity graduates—at least in the first few years after graduation—although the differences cannot be statistically confirmed.
- The trajectories of outcomes for equity and non-equity graduates converge over time so that any potential differences disappear several years after graduation.

Discussion and conclusions

This report aimed to address significant gaps in scientific knowledge about the trajectories of post-graduation outcomes of students from equity groups in Australia. Drawing on nationally representative longitudinal data from the ABS Census of Population and Housing (the Census) and the Household, Income and Labour Dynamics in Australia (HILDA) Survey, the study extended previously available evidence in two key ways:

- by analysing post-university outcomes over a long time period, capturing information up to 15 years after graduation
- by incorporating information on a broad range of outcomes, including objective labour market indicators (the Census data) as well as broader indicators capturing health, wellbeing and subjective assessment of personal circumstances (the HILDA data).

The analyses presented in this report compared post-university outcomes for graduates from the following five population-based equity groups:

- low socioeconomic status (low SES)
- non-English speaking background (NESB)
- residents in regional/remote areas
- Aboriginal and Torres Strait Islanders (Indigenous)
- students with disability.

The Census analyses focused on the variations in employment outcomes in 2016 for new graduates who completed their studies between the 2011 and 2016 Census. It covered a range of labour market outcomes, captured up to five years post-graduation, including:

- employment
- full-time employment
- employee status when in employment
- employment in a managerial or professional occupation
- the sector of employment
- having a relatively high personal income.

The particular contribution this analysis makes to higher education equity research in Australia lies in the modelling of graduate outcomes based on a very large representative sample and using highly robust data. This allowed controlling for a number of potential confounders including a larger number of different fields of study as well as including the smallest equity groups in multivariate analyses that are usually excluded from this type of analysis: Indigenous graduates and graduates with disability.

While the Census analyses were limited to those people who graduated with their first degree within the last five years, this goes considerably beyond the four to six months after graduation horizon of the GOS that has most often been used to report employment outcomes for university graduates in Australia. The post-graduation reach of the ACLD analysis design applied here is perhaps closest to the one achieved by the GOS-Longitudinal survey, which follows up GOS participants three years later.

Notwithstanding methodological differences including equity group operationalisations, the key results from the Census analyses are in line with some earlier reported results from the AGS/GOS and the GOS-L, including:

- a lower likelihood of employment of low SES graduates and lower income/salaries for those in employment (Richardson et al., 2016)

- a lower likelihood of graduates with disability[8] to be employed/full-time employed (Richardson et al., 2016, QILT, 2017, QILT, 2018).
- a lower likelihood of NESB graduates to be in employment, and lower income/salary for those in employment (Richardson et al., 2016, Pitman et al., 2017, QILT, 2018, Li et al., 2016).

It is these three groups of new equity graduates who appeared to be disadvantaged within a five-year window post-graduation. This was further corroborated by significantly lower likelihoods of being employed in managerial or professional occupations for low SES and NESB graduates, which may partially account for lower chances of realising higher personal income. NESB graduates further appeared to be more likely to work in environments characterised by more competition and risk at this stage post-graduation, as indicated by the lower likelihood of working as an employee and the higher likelihood of working in the private sector. Not working as an employee was not necessarily an indicator for a less positive employment outcome, in fact, it can also indicate career progression and/or the realisation of professional independence. However, in the context of the other labour market outcomes of the NSEB group, the lower likelihood of employee status at this point post-graduation may well indicate limited opportunities rather than preference in the type of employment.

New graduates from regional/remote areas and Indigenous graduates did not appear to be disadvantaged short- to mid-term post-graduation. This too fits with some earlier results reported from AGS/GOS data (Pitman et al., 2017, QILT, 2017, QILT, 2018, and Li et al., 2017 for regional/remote graduates only). A feature of these two graduate groups was that both were significantly less likely to work in the private sector. Public sector employment, including policies promoting equal access, may well play a significant role for graduates from these groups in facilitating employment outcomes that are comparable to those of non-equity graduates at this stage of post-graduation.

The Census analyses also suggested that, while the field of study of a degree did matter for employment outcomes and influences the extent of disadvantage, accounting for fields of study did not change the overall pattern of disadvantage of the equity graduates in the labour market: graduates from low SES backgrounds, NESB and with disability were disadvantaged with respect to the same indicators (employment and/or full-time employment and/or managerial/professional employment and/or personal income), whether fields of study were considered or not.

Finally, the Census analyses already indicated that relative changes of employment outcomes for new equity graduates can occur over time. In particular, they suggested that labour market disadvantage for low SES graduates shifts from lower chances of employment to lower chances of full-time employment in the space of a few years.

The HILDA analyses further extended the time horizon covered in the Census analyses, by capturing outcomes up to 15 years post-graduation. They also extended the scope of the study by focusing on a different set of outcomes, covering health and wellbeing indicators, as well as a set of subjective measures related to employment and financial circumstances. This makes this study the first in Australia to investigate such outcomes in relation to post-university outcomes of equity graduates.

The modelling of the HILDA data comprised two separate analyses:

- A comparison of health and wellbeing outcomes (general health, mental health, life satisfaction and social support) before and after graduation.

[8] The disadvantage in terms of employment for graduates with disability was much more indicated in the Census analysis presented here than the reported findings from the AGS/GOS. This is probably the result of the Census definition of disability capturing only more severe forms of limitations than the definition used in the AGS/GOS/HEIMS.

- An examination of post-graduate trajectories on the aforementioned health and wellbeing outcomes, plus subjective outcomes related to employment and financial situation (job security satisfaction, overall job satisfaction and financial prosperity).

Overall, the HILDA analyses suggested that for most of the outcomes investigated in this report, the trajectories of equity and non-equity graduates move in similar directions and at a comparable pace after the attainment of undergraduate university qualifications leading to a convergence in outcomes over a longer time horizon. However, while rarely statistically significant there appears to be some evidence that equity graduates generally report inferior outcomes compared with non-equity graduates, at least in the first few years after graduation. This pattern appeared to be most pronounced for indicators related to subjective assessment of financial prosperity and job security but also social support.

Although the differences between equity and non-equity graduates were often not statistically significant, or converged over time, there were two notable exceptions to this pattern: students of an Aboriginal or Torres Strait Islander background, and students with disability, both of which reported significantly inferior outcomes compared with their non-equity counterparts, particularly in terms of the physical and mental health outcomes, and subjective wellbeing as captured by life satisfaction.

These results need to be interpreted carefully, as they were based on small samples, which may not be representative of the relevant populations. Furthermore, these patterns are not necessarily constrained to university graduates from these backgrounds, but likely reflect broader disadvantage among Indigenous people, and people with disability. In particular, there is a very strong evidence base showing that health and wellbeing outcomes are poorer among people with disability compared with those without disability (e.g., Mithen, Aitken, Ziersch, & Kavanagh, 2015), and among Indigenous people compared with those of non-Indigenous backgrounds (e.g., ABS, 2009, 2010; Marmot, 2011; Shepherd, Li, & Zubrick, 2012). Therefore, the reported gaps between graduates from these two equity groups and non-equity graduates are likely to reflect some of the broader inequalities in health and wellbeing. However, what this study shows is that these inequalities did not disappear even when we zoomed in on the select, highly-educated subsets of these populations.

Furthermore, of particular concern is the apparent deterioration in the absolute levels of health and wellbeing outcomes observed among Indigenous graduates (HILDA fixed-effects analysis). This means that the health and wellbeing outcomes were not only consistently poorer among Indigenous graduates compared with graduates from non-Indigenous backgrounds, but also that they declined post-graduation, relative to the pre-university levels. While this study was unable to shed further light on the mechanisms behind this pattern, previous research has pointed to possible explanations. In particular, Kingsley, Townsend, Henderson-Wilson, & Bolam (2013) suggested that Indigenous peoples' connection to their traditional land might be a fundamental component of their wellbeing. Since participation in university studies, and subsequent employment, is often associated with relocation, it is possible that some of this connection to the land may be lost, subsequently affecting Indigenous graduates' wellbeing. Further in-depth research is needed to fully examine this, and other, possible explanations behind this finding.

In summary, while arguably reflecting a broader underlying disadvantage for Indigenous graduates and graduates with disability, the findings from HILDA analyses highlight that this underlying disadvantage is not easily alleviated by completing a university degree. Tackling these pervasive and persistent inequalities requires a sustained policy effort within and beyond the higher education sector. In case of the other equity groups investigated in this report, the trajectories of equity and non-equity graduates appear to converge over a longer run so that any initial differences disappear after seven to eight years post-graduation. However, arguably more could be done to prevent this seven or eight year-long catch up period to give an equal start to all university graduates, regardless of their background.

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Appendix Additional tables and figures

Table A-1: Equity groups and likelihood of selected employment outcomes in 2016, new graduates (2011–16) who attended higher education in 2011

	Outcomes in 2016					
	Employed ^	**Employed as employee***	**Employed full-time***	**Employed in private sector***	**Employed in managerial/ professional occupation***	**Personal weekly income >=A$1,500^^**
Equity group (2011)						
Low SES	0.005	0.009	-0.036**	-0.025	-0.039**	-0.052***
Regional/remote	0.010	0.005	-0.015	-0.083***	0.033**	0.003
Indigenous	-0.028	0.010	0.049	-0.164***	0.029	-0.007
Disability	-0.380***	-0.036	-0.138	0.083	-0.040	0.063
NESB	-0.069***	-0.005	-0.025**	0.083***	-0.064***	-0.045***
Controls						
Gender						
Female	0.012*	0.021***	-0.091***	-0.091***	0.026***	-0.096***
Age 2011(Reference: 15-19 years)						
20–24 years	0.019**	-0.012**	0.069***	-0.024**	0.068***	0.134***
25–34 years	0.011	-0.035***	-0.021	-0.084***	0.043**	0.270***
35–44 years	0.016	-0.041***	0.011	-0.128***	0.088***	0.347***
45–54 years	-0.022	-0.069***	0.011	-0.119***	0.019	0.365***
Level of degree in 2016						
Postgraduate	0.004	-0.005	0.035***	-0.061***	0.081***	0.010
Observations	16,481	14,532	14,532	14,532	14,532	10,437
Pseudo R^2	0.0182	0.0194	0.0164	0.0352	0.0119	0.0673
p	0.000	0.000	0.000	0.000	0.000	0.000

^ People aged 15–54 years with no higher education qualification in 2011 who had higher education qualification in 2016.
* People aged 15–54 years with no higher education qualification in 2011 who had higher education qualification and were in employment in 2016.
^^ People aged 15–54 years with no higher education qualification in 2011 who had higher education qualification and were in full-time employment in 2016.
Coefficients are average marginal effects from logistic regression.
* p<0.05 ** p<0.01 *** p<0.001.
Based on unweighted data from ACLD 2011-16.

Table A-2: Equity groups and likelihood of selected employment outcomes in 2016, new graduates (2011–16) who attended higher education in 2011 (with additional controls for fields of study)

	Outcomes in 2016					
	Employed^	**Employed as employee***	**Employed full-time***	**Employed in private sector***	**Employed in managerial/ professional occupation***	**Personal weekly income >=A$1,500^^**
Equity group (2011)						
Low SES	0.002	0.004	-0.029*	-0.002	-0.068***	-0.044**
Regional/remote	0.003	0.000	-0.011	-0.048***	-0.009	0.005
Indigenous	-0.037	0.008	0.052	-0.130***	0.017	0.011
Disability	-0.375***	-0.058	-0.123	0.110	-0.077	0.045
NESB	-0.073***	-0.004	-0.056***	0.055***	-0.064***	-0.080***
Controls						
Gender						
Female	0.004	0.016***	-0.047***	-0.015	-0.013	-0.040***

Age 2011(Reference: 15-19 years)						
20-24 years	0.009	-0.014***	0.055***	-0.015	0.052***	0.126***
25-34 years	-0.002	-0.042***	-0.020	-0.056***	0.025*	0.281***
35-44 years	-0.002	-0.058***	0.015	-0.078***	0.046**	0.360***
45-54 years	-0.026	-0.082***	0.037	-0.090***	0.021	0.389***
Level of degree						
Postgraduate	-0.008	-0.004	0.020	-0.050***	0.065***	0.018
Field of study (Reference: Science & Mathematics)						
Computing and Information Systems	0.143***	-0.029*	0.228***	0.090***	0.153***	0.104***
Engineering	0.153***	0.003	0.260***	0.102***	0.284***	0.205***
Architecture and Built Environment	0.174***	-0.036**	0.191***	0.178***	0.073*	0.029
Environment and Environmental Studies	0.104**	-0.032	0.103*	0.019	0.008	0.016
Health Services Support	0.152***	-0.047***	0.070**	-0.065**	0.058*	0.089***
Medicine	0.190***	0.015	0.283***	-0.515***	0.475***	0.397***
Nursing	0.210***	0.026***	0.017	-0.274***	0.460***	0.031
Pharmacy	0.183***	0.018	0.209***	0.085*	0.453***	0.077
Dentistry	0.212***	-0.226***	0.166**	0.102	0.344***	0.617***
Veterinary Studies	0.140*	0.005	0.165*	0.249**	0.440***	0.004
Rehabilitation	0.190***	-0.097***	0.146***	0.014	0.391***	-0.022
Teacher Education	0.206***	0.017**	0.147***	-0.193***	0.383***	-0.092***
Business and Management	0.182***	-0.018*	0.234***	0.139***	0.109***	0.064**
Humanities and Culture	0.061**	-0.025*	-0.019	-0.007	-0.092***	-0.052*
Social Work	0.167***	0.005	0.109***	0.006	0.167***	-0.084**
Psychology	0.059**	-0.023*	-0.014	0.006	0.046	-0.035
Law and Paralegal	0.163***	0.001	0.230***	0.019	0.136***	0.112***
Creative Arts	0.109***	-0.105***	-0.040	0.156***	0.052	-0.089**
Communications	0.141***	-0.019	0.116***	0.129***	0.060*	-0.084**
Tourism, Hospitality, Personal Services, Sport & Recreation	0.164**	-0.061*	0.050	0.126	-0.199**	-0.174*
Not stated	0.135*	-0.012	0.197*	0.040	0.033	0.074
Observations	16481	14532	14532	14532	14532	10437
Pseudo R^2	0.0599	0.0758	0.0549	0.1278	0.1197	0.1240
p	0.000	0.000	0.000	0.000	0.000	0.000

^ People aged 15-54 years with no higher education qualification in 2011 who had higher education qualification in 2016.
* People aged 15-54 years with no higher education qualification in 2011 who had higher education qualification and were in employment in 2016.
^^ People aged 15-54 years with no higher education qualification in 2011 who had higher education qualification and were in full-time employment in 2016.
Coefficients are average marginal effects from logistic regression.
* p<0.05 ** p<0.01 *** p<0.001.
Based on unweighted data from ACLD 2011-16.

Table A-3. Growth models of health and wellbeing outcomes, general equity group

	General health	Mental health	Life satisfaction	Social support
Key explanatory variables				
Equity	-0.02	-0.77	-0.09	-3.09**
Years after degree	0.01	0.32	-0.01	0.42
Years after degree ^{2}	-0.00	-0.03	0.00	-0.03#
Equity * years after degree	-0.00	0.05	-0.01	0.07
Equity * years after degree^2	0.00	0.00	0.00	0.01
Controls				
Age	-0.00***	-0.05	-0.02***	-0.24***
Male	0.04***	1.21	-0.01	-3.11***
Postgrad	-0.01	-0.94	0.05	-0.01
Partnered	0.00	1.44**	0.35***	2.22***
Constant	0.84***	73.53***	8.39***	85.70***
n (observations)	4,472	4,543	4,997	4,508
n (individuals)	895	899	935	896

Notes: HILDA Survey (2001–16). Sample B. Statistical significance: # $p<0.1$, * $p<0.05$, ** $p<0.01$, *** $p<0.001$.

Table A-4. Growth models of labour market outcomes, general equity group

	Financial prosperity	Job security	Job satisfaction
Key explanatory variables			
Equity	-0.27***	-0.40*	-0.24*
Years after degree	-0.03	0.07	-0.03
Years after degree ^{2}	0.00*	-0.01#	0.00
Equity * years after degree	0.08***	-0.00	0.03
Equity * years after degree^2	-0.01***	0.00	-0.00
Controls			
Age	-0.01***	-0.02*	0.01
Male	0.03	-0.03	-0.10
Postgrad	0.04	-0.09	-0.01
Partnered	0.02	0.22**	0.15**
Constant	4.49***	8.46***	7.51***
n (observations)	4,534	4,488	4,490
n (individuals)	898	902	902

Notes: HILDA Survey (2001–16). Sample B. Statistical significance: # $p<0.1$, * $p<0.05$, ** $p<0.01$, *** $p<0.001$.

Table A- 5. Growth models of health and wellbeing outcomes, Indigenous

	General health	Mental health	Life satisfaction	Social support
Key explanatory variables				
ATSI	-0.09	-9.94*	-0.59	-6.94
Years after degree	0.00	0.29	-0.02	0.47*
Years after degree ^{2}	-0.00	-0.03	0.00	-0.03*
ATSI * years after degree	-0.02	-0.68	-0.09	-0.48
ATSI * years after degree^2	0.00	0.03	0.01	0.03
Controls				
Age	-0.00***	-0.09	-0.02***	-0.25***
Male	0.04***	1.71	-0.02	-2.97**
Postgrad	-0.01	-0.94	0.08	-0.07
Partnered	0.00	1.28*	0.36***	2.14***
Constant	0.85***	74.87***	8.45***	84.95***
n (observations)	3,747	3,809	4,174	3,786
n (individuals)	758	761	789	759

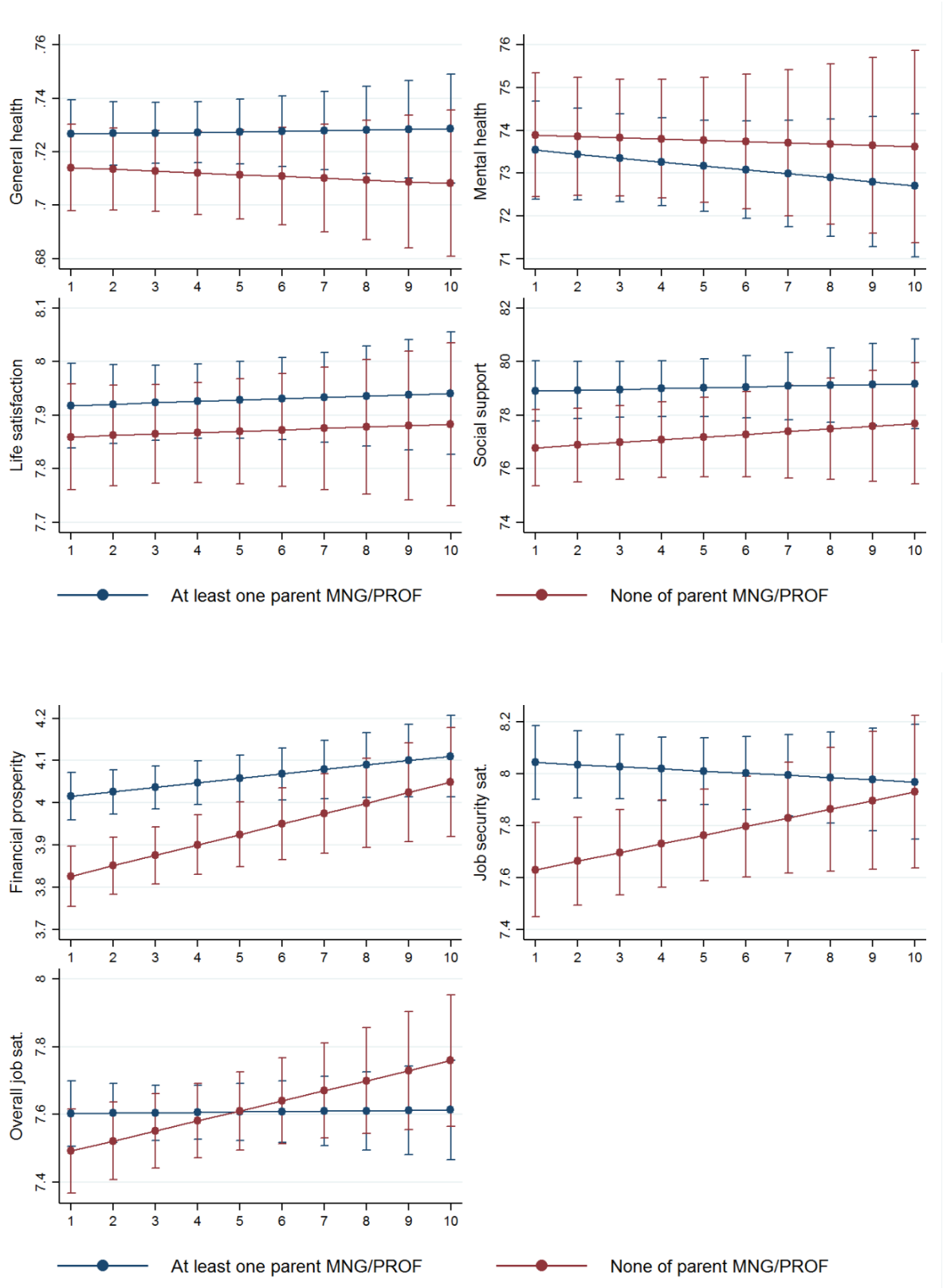
Notes: HILDA Survey (2001–16). Sample B. Statistical significance: $^{\#}$ p<0.1, * p<0.05, ** p<0.01, ***p<0.001.

Table A-6. Growth models of labour market outcomes, Indigenous

	Financial prosperity	Job security	Job satisfaction
Key explanatory variables			
ATSI	-0.66**	0.40	-0.90
Years after degree	0.01	0.08*	-0.02
Years after degree ^{2}	0.00	-0.01*	0.00
ATSI * years after degree	0.00	-0.14	0.18
ATSI * years after degree^2	0.00	0.01	-0.01
Controls			
Age	-0.02***	-0.03***	-0.00
Male	0.04	0.03	-0.07
Postgrad	0.08	-0.05	0.09
Partnered	0.02	0.26**	0.20***
Constant	4.37***	8.49***	7.55***
n (observations)	3,802	3,756	3,758
n (individuals)	761	759	759

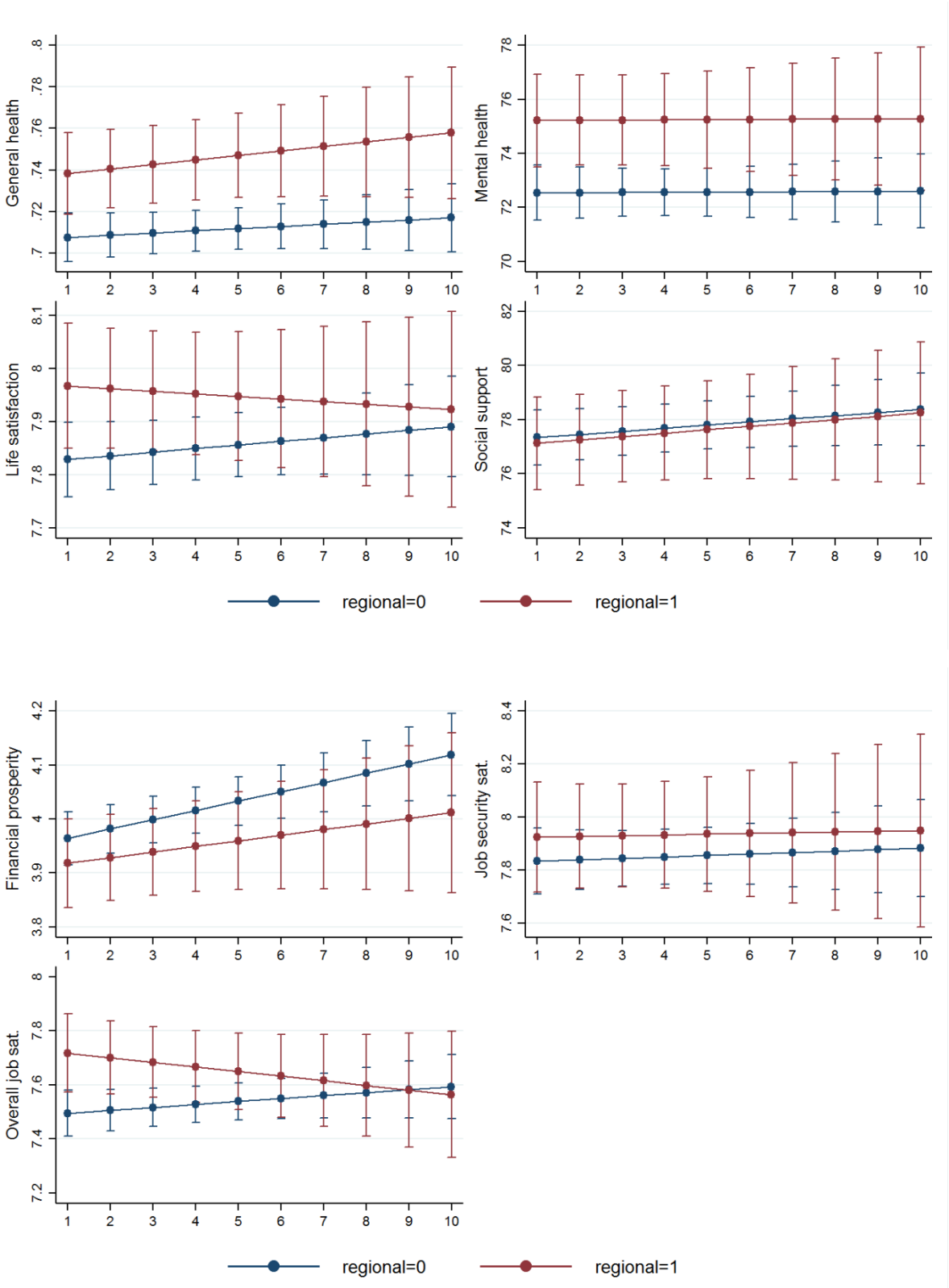
Notes: HILDA Survey (2001–16). Sample B. Statistical significance: $^{\#}$ p<0.1, * p<0.05, ** p<0.01, ***p<0.001.

Figure A-1. Marginal effects from general health, mental health, life satisfaction, social support financial prosperity, satisfaction with job security and overall job satisfaction models, by SES



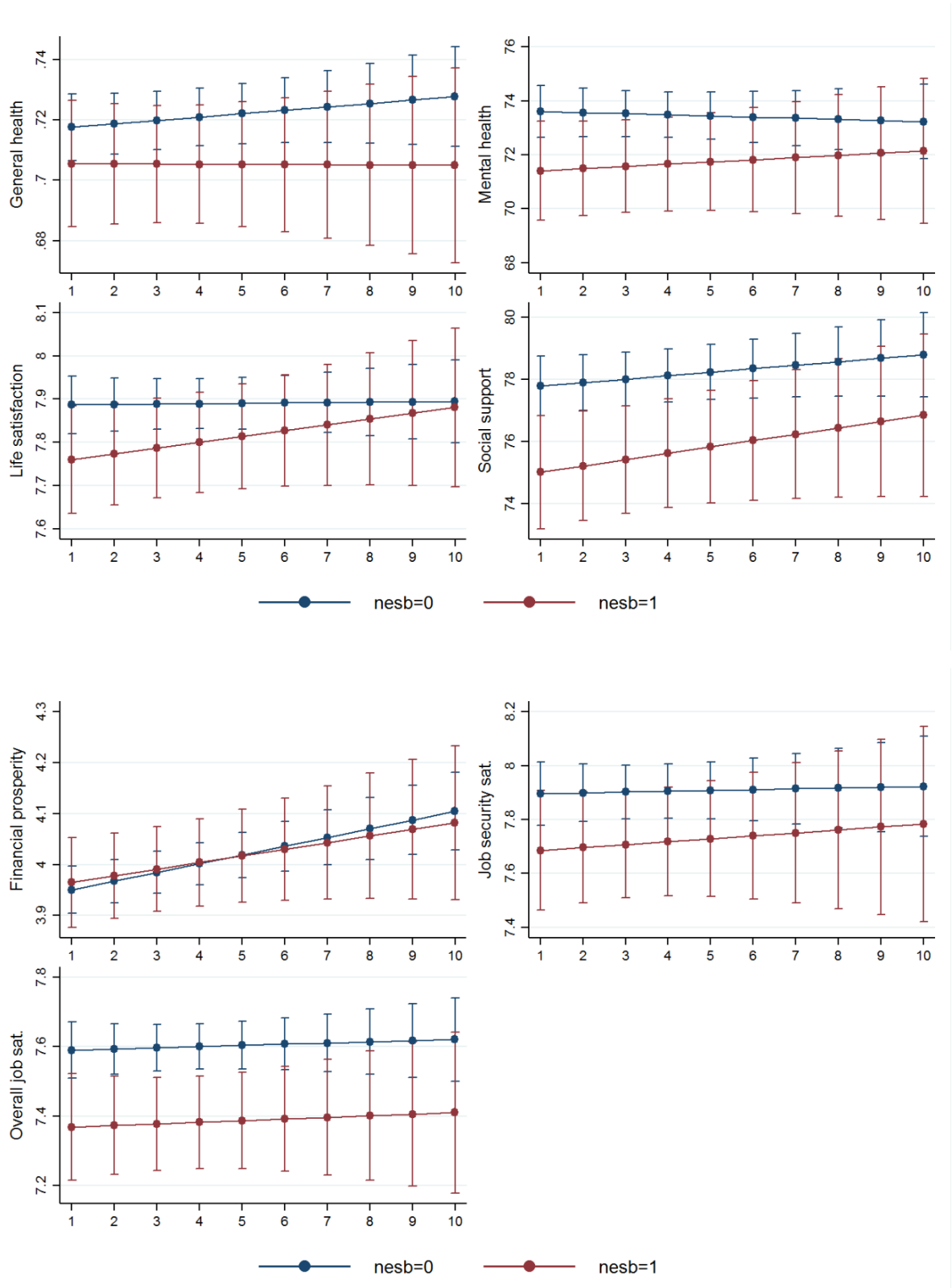
Notes: HILDA Survey (2001–16).

Figure A-2. Marginal effects from general health, mental health, life satisfaction, social support financial prosperity, satisfaction with job security and overall job satisfaction models, by SES, by regional/remote location



Notes: HILDA Survey (2001–16).

Figure A-3. Marginal effects from general health, mental health, life satisfaction, social support financial prosperity, satisfaction with job security and overall job satisfaction models, by SES, by NESB status



Notes: HILDA Survey (2001–16).