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Beyond Graduation: Socio-economic Background and Post-university Outcomes of Australian Graduates

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Abstract
Research consistently shows that higher-education participation has positive impacts on individual outcomes. However, few studies explicitly consider differences in these impacts by socio-economic background (SEB), and those which do fail to examine graduate trajectories over the long run, non-labor outcomes and relative returns. We address these knowledge gaps by investigating the short- and long-term socio-economic trajectories of Australian university graduates from advantaged and disadvantaged backgrounds across multiple domains. We use high-quality longitudinal data from two sources: the *Australian Longitudinal Census Dataset* and the *Household, Income and Labour Dynamics in Australia Survey*. Low-SEB graduates experienced short-term post-graduation disadvantage in employment and occupational status, but not wages. They also experienced lower job and financial security up to 5 years post-graduation. Despite this, low-SEB graduates benefited more from higher education in relative terms—that is, university education improves the situation of low-SEB individuals to a greater extent than it does for high-SEB individuals.

Keywords Higher education · Post-graduate outcomes · Longitudinal trajectories · Panel data · Australia

Background

The benefits of attaining university-level educational qualifications are well documented. Individuals who complete university education generally enjoy better labor-market prospects. For example, across OECD countries 7% of university-educated adults aged 25–34 year-olds are unemployed, compared to 9% for those with upper-secondary and post-secondary qualifications, and 17% of those with lower credentials (OECD 2017). In Australia, the focal country in this study, employment rates are substantially higher for individuals holding postgraduate (82%) and bachelor (80%) degrees than for individuals

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without post-school qualifications (54%) (ABS 2017a). University graduates are also more likely to receive higher wages and work in more prestigious occupations, internationally (Card 1999; Desjardins and Lee 2016; Heckman et al. 2016), and in Australia (Cassells et al. 2012; Daly et al. 2015). The positive outcomes of university education are not confined to the labor market, with research documenting positive influences in other domains, including mental health (Heckman et al. 2017), general health (Cutler and Lleras-Muney 2008), and subjective wellbeing (Oreopoulos and Salvanes 2011).

Because of this, sociologists have long been interested in the social patterning in access to and completion of higher education, as well as in how the benefits of higher-education participation differ across social strata. Of key importance has been the role of socio-economic background (SEB), as its associations with education are pivotal to the study of social mobility and equality of opportunity. Over two decades ago, Hout (1984) reported no association between social origins and occupational status among US higher-education graduates, a finding which some interpreted as a sign of the meritocratic function of university (Breen and Jonsson 2007). Yet more recent studies paint a more complex picture, suggesting differing returns to university participation by SEB, with such returns depending also on factors such as qualification level or field-of-study (Torche 2011). This paper contributes to the literature on the returns to higher education for low- and high-SEB graduates in several ways. First, it expands the focus from employment outcomes to broader measures of health and wellbeing—hence providing a more comprehensive picture of the benefits of higher-education participation. Second, it examines how post-graduation trajectories in outcomes evolve over time using longitudinal data and methods—thereby offering a better window into the short- and long-term outcomes of low- and high-SEB graduates. Third, it focuses on both absolute and relative returns to higher education for low- and high-SEB graduates.

Conceptual Framework

In this section, we discuss key perspectives from multiple disciplines, including sociology, economics, and industrial relations, theorizing the relationship between higher-education participation and individual outcomes. While these approaches generally aim to explain the '*higher education participation → personal outcomes*' association, we build on them to derive testable hypotheses about the '*higher education → differences in personal outcomes by SEB*' nexus. We first discuss perspectives suggesting that higher-education attainment should result in more similar outcomes between low- and high-SEB individuals (human capital, signaling, and rational action theories). Collectively, we refer to the mechanisms proposed by these theories as 'levelling forces'. Second, we discuss perspectives postulating that higher-education attainment should result in more disparate outcomes between low- and high-SEB individuals (social and cultural capital, effectively maintained inequality, and life-course theories). We refer to the mechanisms suggested by these theories as 'stratifying forces'. In doing so, we explicitly recognize that multiple—often competing—mechanisms might operate at the same time, contributing to either narrowing or widening differences in personal outcomes between low- and high-SEB graduates. That is, we acknowledge that—far from being mutually exclusive—'levelling' and 'stratifying' forces operate concurrently. Importantly, while we use these frameworks to develop hypotheses about *overall differences* in post-graduation outcomes by SEB, the aim of this study is not

to provide specific tests of each theory (e.g., by including variables approximating social networks, productivity or socio-cultural capital in the models).

Levelling Forces

Several perspectives lead to the expectation that low-SEB graduates will benefit from degree attainment to a similar extent as high-SEB graduates. Under *human capital theory* (Becker 1964), university participation is a key mechanism whereby people learn new knowledge and skills that increase their labor-market productivity. Accordingly, studies have documented causal effects of higher-education participation and attainment on a range of outcomes, with the effects of university education being driven by learnt cognitive and non-cognitive skills (Heckman et al. 2016). If university education raises productivity to a similar level for low- and high-SEB individuals, we should expect no differences in the returns to their university qualifications. *Signaling theory* (Spence 1973) also predicts that university-degree attainment will be associated with better outcomes, but differs from human capital theory in the proposed mechanisms. Because employers are unable to directly assess the productivity of job applicants, they use their educational credentials (e.g., a university diploma) as a 'signal' of productivity. From this perspective, employers should not differentiate between low- and high-SEB applicants in their hiring practices, so long as they have attained commensurate levels of education. Arguments based on *rational action theory* (Goldthorpe 1996) lead to a similar set of expectations: because the relative costs of attending university are higher for low- than high-SEB individuals, low-SEB individuals weigh the potential costs and benefits of higher-education participation more carefully than their high-SEB peers (Flaster 2016). Only those low-SEB individuals that have the highest success chances (e.g., through demonstrated excellent academic aptitude) choose to pursue higher education. These positively-selected low-SEB individuals are likely to accrue cognitive and non-cognitive skills from university participation at similar rates as their high-SEB peers.

Stratifying Forces

Unlike the theories discussed thus far, several other perspectives postulate greater returns to higher-education participation amongst high-SEB than low-SEB individuals. *Social capital theory* (Coleman 1988) draws attention to the importance of access to information channels for individuals to navigate social structures. Low-SEB graduates have less developed social networks and their networks usually comprise other relatively under-resourced low-SEB individuals (Lin 1999). This hinders their ability to access information about high-end jobs, or navigate selection processes (Coleman 1988; Lin 1999). Similarly, *cultural capital theory* (Bourdieu 1984) posits that employers are biased towards hiring individuals similar to them (homo-social reproduction), restricting low-SEB graduates' ability to access high-status, high-paying occupations. The *theory of effectively maintained inequality* (Lucas 2001) posits that, as higher-education participation becomes more common, high-SEB parents increase their investments in their children so that they can differentiate themselves from other university graduates. This includes subsidizing higher-status tertiary-education options, including more prestigious disciplines (e.g., medical, engineering) and institutions (e.g., Australian Go8 institutions). Finally, according to the *life-course approach* (Elder et al. 2003), inter-relationships between life domains are important in structuring individual outcomes. As such, low-SEB graduates may be more likely to experience negative

life events in domains other than employment or education (e.g., health problems, family breakdown, financial difficulties) than their high-SEB peers (Umberson et al. 2014). Exposure to these stressors may restrict the ability of low-SEB graduates to pursue, focus on and develop their work careers, so as to benefit from their educational attainment to the same extend as their high-SEB peers.

Theoretical Expectations and Existing Empirical Evidence

Socio-Economic Stratification of Graduate Outcomes

As outlined before, some theories postulate similar outcomes for low- and high-SEB graduates, while others hypothesise inferior outcomes for low- than high-SEB graduates. As noted earlier, we recognize that 'levelling' and 'stratifying' forces will operate concurrently. For examples, university degrees may provide all graduates with the same skills and signals to employers but, *at the same time*, high-SEB graduates may graduate from better universities, enjoy higher levels of socio-cultural capital, and experience fewer challenges in other life domains. Therefore, despite 'levelling forces' potentially generating similar skills amongst low- and high-SEB graduates that send comparable signals to employers, it is likely that high-SEB graduates can draw on their social or cultural capital to obtain competitive advantages or avoid other life stressors. Therefore, all in all, we hypothesize that:

Hypothesis 1 Low-SEB graduates will achieve worse post-graduation outcomes than high-SEB graduates.

Several studies from OECD countries have generated empirical evidence consistent with this proposition. For Example, Hansen (2001) documented that high-SEB individuals in Norway received higher economic returns to university participation than low-SEB individuals, net of qualification level and field of study. Similarly, Triventi (2013) found that European graduates in Norway, Italy and Spain whose parents had also university qualifications were more likely to have attained a high-status occupation 5 years post-graduation than similar graduates whose parents did not hold university qualifications. However, no such pattern was observed amongst German graduates. The limited Australian evidence available is nevertheless mixed. Richardson et al. (2016) found that low-SEB graduates were less likely than high-SEB graduates to be employed 6 months post-graduation, while Li and colleagues (2017) found no significant employment differences. In the longer run, Edwards and Coates (2011) found that, 5 years post-graduation, low- and high-SEB graduates had similar rates of employment and employment in a high-status occupation and median annual salaries.

The present study provides more robust Australian evidence encompassing labor and non-labor personal outcomes. This is an important contribution, as it recognizes that university education can be a driver for positive personal outcomes beyond the realm of work. Critically, it also expands the international evidence base by postulating and testing (i) differences in the longitudinal trajectories of low- and high-SEB graduates, and (ii) the relative—rather than absolute—returns to university participation for these two groups. The next sections present theoretical arguments that enable us to postulate testable hypotheses about these.

Change Over Time in the Relationship Between Socio-Economic Background and Graduate Outcomes

As argued before, social and cultural capital are 'stratifying forces' leading to better graduate outcomes for high-SEB than low-SEB individuals. Yet previous studies suggest that social and cultural capital play a more prominent role immediately after graduation: high levels of social capital may enable high-SEB graduates to deploy their social networks to obtain (better) first jobs earlier than their low-SEB peers (Coleman 1988; Jackson et al. 2005; Lin 1999). In contrast, human capital—which was characterized as a 'levelling force'—may play a more important role over the long run (Jacob et al. 2015). If low- and high-SEB graduates possess similar skills, their demonstrated job performance should serve as a more direct signal to employers than their social origins as time elapses. Altogether, these arguments suggest that less favorable initial outcomes for low-SEB graduates (as proposed in Hypothesis 1) should fade over time, as these graduates socialize into their work environments, learn skills on-the-job, and provide employers with opportunities to directly assess their performance. Therefore, we hypothesize that:

Hypothesis 2 Any differences in the post-graduation outcomes of low- and high-SEB graduates will fade over time.

To our knowledge, only one empirical study has compared to some extent the post-graduation longitudinal trajectories in outcomes of low- and high-SEB individuals. Jacob et al. (2015) examined the effect of parental education on university graduates' occupational outcomes at labor-market entry and 5 years post-graduation in Germany and the UK. Their findings are consistent with our second hypothesis: high-SEB individuals had a comparative advantage over low-SEB graduates in entering high-status occupations, but this effect was stronger at labor market entry than 5 years after graduation.

Relative Returns to University Education by Socio-Economic Background

The reviewed theories have been predominantly applied to investigate *absolute* differences in outcomes between low- and high-SEB university graduates. However, a separate and equally important question is whether or not low-SEB graduates gain more or less from a university degree in *relative* terms (i.e., compared to themselves prior to graduation). Even if high-SEB graduates have better labor-market outcomes than low-SEB graduates, the benefits accrued with graduation may be greater for low- than high-SEB graduates in relative terms. Low-SEB individuals and their families experience less favorable objective circumstances than high-SEB graduates (e.g., financial situation, living standards). As a result, access to high-paying jobs within the graduate job market will often translate into significant improvements in income and financial prosperity for low-SEB individuals (Brand and Xie 2010). This may not be true for high-SEB graduates, for whom the same employment outcomes may not represent commensurate changes in objective circumstances. For example, a young medicine graduate working as a doctor who comes from a family of blue-collar workers will experience more substantial *relative* improvement in their circumstances than an otherwise similar medicine graduate working as a doctor who comes from a family of doctors. Based on these considerations, we formulate a final hypothesis:

Hypothesis 3 Positive before/after graduation differences in outcomes will be larger amongst low-SEB than high-SEB graduates.

Our review of the available literature identified only one previous study examining the *relative* rather than *absolute* returns to higher education by SEB. Drawing on US longitudinal data, Brand and Xie's (2010) found that low-SEB graduates benefit more from higher education than high-SEB graduates in terms of their earnings.

Data

We use data from two authoritative sources: the Australian Census Longitudinal Dataset (ACLD) and the Household, Income and Labour Dynamics in Australia (HILDA) Survey.

The Australian Census Longitudinal Dataset

The Australian Census of Population and Housing (the Census) is undertaken by the Australian Bureau of Statistics (ABS) every 5 years, collecting information from the complete Australian population (ABS 2017b). To evaluate the short-term labor-market outcomes of recent university graduates we analyze data from the ACLD, 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 and 2016) for a 5.7% random sample of the Australian population. Of the 1,221,057 records selected from the 2011 Census, 76% were linked to 2016 records. The majority of these records (72.7%) were linked using deterministic matching based on personal and demographic characteristics, with the remainder being linked by probabilistic matching (ABS 2018b). This resulted in 927,520 linked records. We focus on a sample of young people aged 15–17 in 2011 and 20–22 in 2016 ($n=48{,}399$). This allows capturing socio-economic background information when cohort members attended secondary education in 2011, as well as early employment post-university destinations in 2016. We then restricted the sample to those young people who completed a Bachelor degree between 2011 and 2016 ($n=3040$). The final analytic sample varies depending on the outcome variable of interest, ranging from 3023 individuals (employment) to 1207 individuals (weekly income for individuals in full-time employment). The age of the selected cohort of young people (15–17 years in 2011) means that cohort members are observed at ages 20–22 years in 2016. Hence, the outcomes for most of these young people are observed up to 2 years post-graduation (OECD 2017). The advantages of ACLD are its reliability, robustness and large sample size to study small subpopulations. Its disadvantages include the limited scope of the information collected (which restricts our analysis to labor-market outcomes) and the relatively short-term timeframe post-graduation (up to 2 years).

The Household, Income and Labour Dynamics in Australia (HILDA) Survey

The Household, Income and Labour Dynamics in Australia (HILDA) Survey is an annual household panel survey covering the 2001–2016 period that contains rich information from a sample of individuals aged 15 and older (Watson and Wooden 2012). The initial HILDA Survey sample is largely representative of the Australian population in 2001. The

HILDA Survey data are collected using a complex, multi-stage sampling strategy at the household level, and a mixture of self-complete questionnaires and computer-assisted face-to-face interviews. Sample sizes range between 12,226 and 17,400 individuals across the 16 HILDA Survey waves utilized. Pooling all HILDA Survey waves we obtained a sample of 12,074 observations from 1105 individuals who were observed at least twice and obtained a Bachelor degree during the life of the panel. This sample is used to examine the differences before/after attaining a degree on health and wellbeing outcomes. It will be referred to as the *before/after sample*. To examine trends in outcomes post-graduation, we exclude those observations prior to individuals obtaining their degrees (7076 observations dropped). This yields a subsample of 4998 observations from 935 individuals. This will be referred to as the *trajectory sample*. Of note, we do not exclude individuals with information in some but not all of the outcome variables. Hence, the final analytic numbers will depend on the outcome under consideration. The HILDA Survey offers distinct analytic advantages: it collects rich information on non-labor outcomes (e.g., health and wellbeing) and its panel structure allows examining how post-graduation outcomes evolve for up to 15 years. A disadvantage of the HILDA Survey is its comparatively small sample size for the target population, as 'only' 1105 individuals are observed to graduate from university.

Measures

Socio-Economic Background

We use information on parental occupation to operationalize SEB. In ACLD, we extract information about the occupational status of parents co-residing with our sample of young people in 2011. Young people in households in which at least one parent worked in a managerial/professional occupation were considered to be 'high-SEB', and the remaining young people as 'low-SEB'. In the HILDA Survey, paternal and maternal occupation information was captured using respondent-reported retrospective data pertaining to when the respondent was 14 years of age. Individual in households in which at least one parent worked in a managerial/professional occupation qualified as 'high-SEB', and the remaining individuals as 'low-SEB'. In both datasets, managerial/professional occupations are those in codes 1 and 2 of the Australian and New Zealand Standard Classification of Occupations 2006 at the major-group level (ABS 2006).

Outcome Variables

Three labor-market outcome variables are used in the ACLD analyses. Employment status is captured through a binary indicator taking the value 1 if the individual was employed, and the value 0 otherwise (including unemployment and not in the labor force). Work in a managerial/professional occupation is denoted by a binary variable taking the value 1 if the individual worked in a managerial/professional occupation (defined as for the parents above), and the value 0 if the individual worked in another occupation—non-employed individuals are assigned missing values. Finally, high income is captured through a binary variable taking the value 1 if the individual's gross individual weekly income was over AU$1250 per week, and the value 0 otherwise. Of note, income information in the Census is banded (e.g., AU$1000–AU$1249 per week, AU$1250–AU$1499 per week; AU$1500–AU$1749 per week, etc.). As such, we cannot select a specific percentile of the income distribution (e.g., the usual 20th or 25th percentile) when defining our high-income

variable. The AU$1250 threshold identifies a small—but not *too* small—proportion of top income earners (about 17% of Bachelor degree holders in full-time employment). Using the immediately preceding or immediately posterior thresholds of AU$1000 and AU$1500 would have resulted in too many (46%) or too few (5%) individuals in the top-earning group.

In the HILDA Survey analyses, we focus on four outcome variables pertaining to labor-market circumstances, health and wellbeing. Hourly wages are generated by dividing current weekly gross wages and salary from all jobs by weekly hours usually worked in all jobs. The resulting figure is adjusted to 2016 prices using the Consumer Price Index. To correct for a right-skewed distribution, in regression models we use the natural log of hourly wages. Job-security satisfaction is determined from a question asking participants about their satisfaction with job security on a scale from 0 (totally dissatisfied) to 10 (totally satisfied). Mental health is captured using the mental health subscale of the SF-36, a 5-item additive scale with transformed scores ranging from 0 to 100 (Ware and Sherbourne 1992). Financial prosperity is based on a question asking participants to rate their *"prosperity given current needs and financial responsibilities"* using the following response options: 1 = Prosperous, 2 = Very comfortable, 3 = Reasonably comfortable, 4 = Just getting along, 5 = Poor and 6 = Very poor. In regression models, we treat this as a continuous-level variable.

Control Variables

In multivariate models we control for a parsimonious set of potential confounds measured in 2011. In ACLD analyses these include gender (male; female), residence in a regional or remote area (based on the Remoteness Area classification of the Australian Statistical Geography Standard, ABS 2018c), and area-level socio-economic disadvantage (based on the lowest quintile of the Index of Education and Occupation of the Socio-Economic Indexes for Areas, ABS 2018d). In the HILDA Survey, controls include time-varying variables capturing respondents' age (in years), gender (male; female), attainment of a post-graduate qualification (attained; not attained) and partnership status (partnered; not partnered). When modelling health and wellbeing outcomes in the HILDA Survey, we also control for employment status (employed; not employed). Tables 1 and 2 present descriptive statistics for all analytic variables in ACLD and HILDA respectively.

Analytic Approach

ACLD Analyses

Analyses of ACLD rely on standard, cross-sectional logistic regression models of the following form:

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

where *EO* is a given employment outcome measured in 2016, SEB is a binary indicator for low SEB, C is a vector of control variables, the βs represent coefficients or vectors of coefficients to be estimated, and e is the usual random error in regression. The key model coefficient is β_1l, which gives the estimated difference in employment outcomes between high-SEB and low-SEB individuals. To facilitate the interpretation of results, we present

Table 1 Descriptive statistics of ACLD data. ACLD 2011–2016, unweighted data extracted using TableBuilder

	%	Range	Obs.	Population
Outcomes				People aged 15–17 years in 2011
Employed	80.1	0–1	3023	with a Bachelor degree in 2016
Works in professional/managerial occ.	48.1	0–1	2429	with a Bachelor degree and in employment in 2016
Weekly income of $1250 or more	16.7	0–1	1207	with Bachelor degree and in full-time employment in 2016
Key predictor				
High SEB	51.4	0–1	3023	People aged 15–17 years in 2011 and with Bachelor degree in 2016
Controls				
Lowest SEIFA quintile	9.2	0–1	3023	People aged 15–17 years in 2011 and with Bachelor degree in 2016
Regional/remote	17.8	0–1	3023	People aged 15–17 years in 2011 and with Bachelor degree in 2016
Female	61.6	0–1	3023	People aged 15–17 years in 2011 and with Bachelor degree in 2016

Table 2 Descriptive statistics of HILDA survey data

	Trajectory sample				Before/after sample			
	Mean/ %	SD	Range	Obs.	Mean/ %	SD	Range	Obs.
Degree attainment								
Observed degree attainment					51%		0–1	12,074
Years after degree attainment	4.74	3.28	1–14	4998				
Key predictor								
Low SEB	38%		0–1	4998	37%		0–1	12,074
Outcomes								
Mental health	73.27	15.83	4–100	4543	73.32	15.71	4–100	11,056
Financial prosperity	4.03	0.79	1–6	4534	4.01	0.80	1–6	
Log of hourly wages	3.47	0.41	−0.73 to 5.74	3883				
Job-security satisfaction	7.96	2.02	0–10	4488				
Controls								
Age (in years)	30.41	8.23	18–74	4998	25.67	8.66	15–74	12,074
Male	41%		0–1	4998	40%		0–1	12,074
Postgraduate degree attained	17%		0–1	4998	7%		0–1	12,074
Partnered	55%		0–1	4998	34%		0–1	12,074

HILDA Survey (2001–2016)

average marginal effects (AMEs) (for details see Greene 2012, Chapter 17; for applications see Manly et al. 2019; Tieben 2019).

HILDA Survey Analyses: Growth-Curve Modelling

Two sets of analyses are executed using the HILDA Survey: one examining long-term post-graduation trajectories in outcomes and one examining changes in outcomes before and after individuals obtain a university degree. To track the post-graduation trajectories of low- and high-SEB graduates, we fit growth-curve models (Singer and Willett 2003: Chapter 8). Growth-curve models are statistical techniques that expand multilevel, random-intercept models to *"allow for the estimation of inter-individual variability in intra-individual patterns of change over time"* (Curran et al. 2010, p. 2). 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 outcome are different variables capturing health, subjective wellbeing and labor-market circumstances. We fit *linear* growth-curve models, as the outcomes of interest in this part of the analysis are—or can be treated as—continuous:

$$HW_{it} = YSG_{it}\beta_{1i} + SEB_i\beta_2 + (YSG_{it} * + SEB_i)\beta_3 + C_{it}\beta_4 + u_i + e_{it} \quad (2)$$

where i and t denote individual and time; HW is an outcome variable capturing a given dimension of health and subjective wellbeing, YSG is a time-varying continuous variable capturing the number of years since graduation (ranging from 1 to 15), SEB is a time-constant binary indicator of low-SEB; C is a vector of time-changing control variables, the βs represent coefficients or vectors of coefficients to be estimated, e is the usual random error in regression, and u is an individual-specific random intercept capturing unobserved effects. The interaction effect between YSG and SEB (i.e., β_3) is the parameter of

key interest, as it gives the differences in post-graduation trends in outcomes between low- and high-SEB graduates. In some specifications we used a polynomial specification for the *YSG* variable (and its interaction with low-SEB) to capture quadratic trends since graduation. We do this when its addition significantly improves the model fit.

HILDA Survey Analyses: Fixed-Effect Panel Regression Models

Our second set of HILDA analyses compares the outcomes of individuals before and after attaining an undergraduate university degree. Using the HILDA Survey, we can 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 derive 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 (G) 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 the low-SEB for use in fixed-effect panel regression models. These models compare the health and subjective wellbeing of the *same individuals* before and after they obtain their degree.[1] 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; Perales 2019). We fit *linear* fixed-effect models, as the outcomes of interest in this part of the analysis are continuous. An initial version of our model can be formally represented as:

$$HW_{it} - \overline{HW}_i = \left(G_{it} - \bar{G}_i\right)\beta_1 + \left(C_{it} - \bar{C}_i\right)\beta_2 + \left(e_{it} - \bar{e}_i\right) \tag{3}$$

where all notation is as for Eq. (2) above. Because fixed-effect models are estimated using within-individual change over time, they cannot accommodate time-constant predictors. However, they can accommodate interactions between time-constant and time-varying predictors (Allison 2009; Perales 2019). Our key interest is in one such interaction, namely that between low-SEB (time constant) and attainment of a degree (time varying). Hence, the models we actually fit are as follows:

$$HW_{it} - \overline{HW}_i = \left(DL_{it} - \overline{DL}_i\right)\beta_1 + \left(DH_{it} - \overline{DH}_i\right)\beta_2 + \left(C_{it} - \bar{C}_i\right)\beta_3 + \left(e_{it} - \bar{e}_i\right) \tag{4}$$

where *GL* and *GH* represent graduating from a degree by low- and high-SEB individuals, respectively. A comparison of the estimated β coefficients on these two terms via Wald tests provides the requisite evidence of whether or not degree attainment impacts the outcomes of low- and high-SEB individuals to the same extent.

[1] These fixed-effect models are not to be confused with difference-in-difference models (Donald and Lang 2007). Difference-in-difference models compare the pre/post outcomes of a group of individuals exposed to a 'treatment' (in our case degree attainment) and a control group of individuals *not exposed* to the same 'treatment'. Difference-in-difference models require additional assumptions. This includes the parallel trend assumption—namely that, in the absence of the treatment, differences in outcomes between the treatment and control groups would be constant over time.

Table 3 Descriptive analyses of ACLD data

	Employed	Worked as manager or professional	Weekly income ≥ $1250
Low-SEB	78.2%	44.2%	17.0%
High-SEB	81.9%	51.7%	16.3%
t test (*p*-value)^	0.012	< 0.001	0.729
n (individuals)	3023	2429	1207

ACLD 2011–2016, unweighted data extracted using TableBuilder

^Two-sample *t* tests with unequal variances

Table 4 Results from logistic regression models of ACLD data (average marginal effects)

	Employed[a]		Employed as manager or professional[b]		Weekly income ≥ $1250[b]	
High-SEB	0.037*	0.038**	0.075***	0.079***	− 0.007	− 0.015
Controls						
Lowest SEIFA quintile		− 0.024		0.022		− 0.061
Regional/remote area		0.043*		0.070**		0.035
Female		0.085***		− 0.002		− 0.053*
n (individuals)		3023		2429		1207
Pseudo R^2		0.015		0.007		0.009

ACLD 2011–2016, unweighted data extracted using TableBuilder

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

[a]In 2016; population aged 15–17 in 2011 with a Bachelor degree in 2016

[b]Population aged 15–17 in 2011 with a Bachelor degree and in employment in 2016

Results

ACLD: Comparison of Outcomes After Degree Attainment (Hypothesis 1)

Consistent with Hypothesis 1, results of the ACLD analyses (Table 3) yield bivariate evidence of poorer outcomes for low-than high-SEB graduates concerning employment (mean high-SEB: 82%, mean low-SEB: 78%), and employment in a managerial/professional occupation (mean high-SEB: 52%, mean low-SEB: 44%). *t*-tests indicate that these differences are statistically significant. However, the proportion of high-income earners is not significantly different by SEB (mean high-SEB: 16%, mean low-SEB: 17%, *p*: 0.73). Results from multivariate logistic regression (Table 4) largely confirm the descriptive results: high-SEB graduates enjoy better outcomes concerning employment (AME = 0.038, $p < 0.01$) and work in managerial/professional occupations (AME = 0.079, $p < 0.001$), but not income (AME = − 0.015, $p > 0.05$).

HILDA Survey: Trends Over Time After Degree Attainment (Hypothesis 2)

Results from the first set of HILDA analyses, compare post-graduation trends in outcomes between low- and high-SEB graduates using growth-curve models (Table 5). Due to the

Table 5 Results from growth-curve models using HILDA Survey data (coefficients)

	Log hourly wage	Job-security sat.	Mental health	Financial prosperity
Key explanatory variables				
Low-SEB	−0.00	−0.30**	−0.59	−0.26***
Years after degree	0.05***	0.07*	−0.07	−0.02
Years after degree, squared	−0.00**	−0.01*		0.00#
Low-SEB * years after degree	0.01		0.08	0.06**
Low-SEB * years after degree, squared	−0.00			−0.00**
Controls				
Age	0.01***	−0.02*	−0.05	−0.01***
Male	0.05**	−0.05	1.21	0.02
Postgrad	−0.01	−0.08	−0.85	0.04
Partnered	0.05**	0.22**	1.55**	0.02
Constant	2.97***	8.38***	74.03***	4.46***
n (observations)	3883	4488	4543	4534
n (individuals)	875	902	899	898

HILDA Survey (2001–2016). Before/after sample

#$p < 0.1$, *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

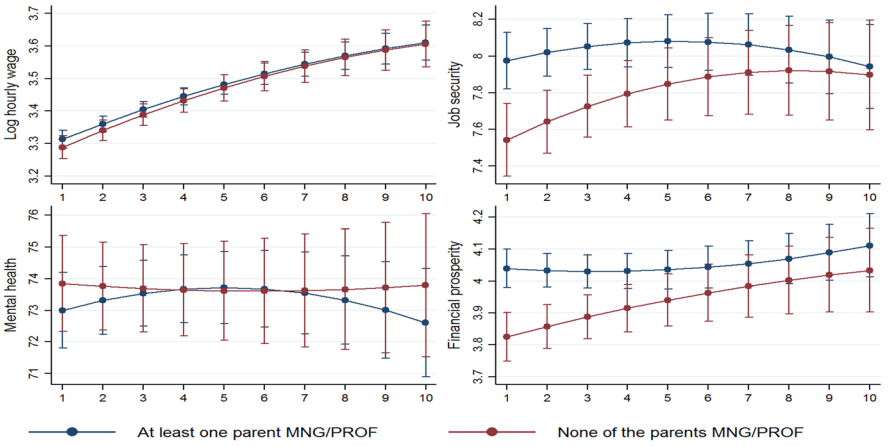

Fig. 1 Marginal effects from growth-curve models. HILDA Survey (2001–2016). Based on results from growth-curve models presented in Table 5. Covariates held at their means and random effects at zero. Whiskers denote 90% confidence intervals

complexity of these analyses and the number of parameters that need to be interpreted jointly, the results of these models are easier to grasp by visually inspecting the marginal effects in Fig. 1. Overall, hourly wages and financial prosperity increase with time since graduation, while mental health and job-security satisfaction remain stable. Concerning differences in outcomes by SEB (Hypothesis 1), the picture is mixed. The hourly wages and mental health of low-SEB graduates (red lines) appear to be on par with those of high-SEB graduates (blue

Table 6 Results from fixed-effect panel regression models using HILDA Survey data (model coefficients)

	Mental health	Financial prosperity
Key explanatory variables		
High-SEB	0.78	0.04
Low-SEB	1.14*	0.09***
Controls		
Age	−0.10*	−0.01**
Postgrade	0.12	−0.02
Partnered	1.36***	0.02
Employed	−0.04	0.09***
Constant	74.89***	4.10***
$\beta_{\text{Low-SEB}} = \beta_{\text{High-SEB}}$ (p-value of Wald test)	0.49	< 0.05
n (observations)	11,056	11,029
n (individuals)	1101	1101

HILDA Survey (2001–2016). Trajectory sample

$^{\#}p < 0.1$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

lines). Differences between the two groups are not statistically significant, as can be inferred from overlapping 90% confidence intervals. However, consistent with Hypothesis 1, job-security satisfaction and financial prosperity are comparatively worse amongst low-SEB graduates in the first 4 years post-graduation. Furthermore, consistent with Hypothesis 2, low- and high-SEB trajectories for these outcomes converge over time. That is, there is a 'catch up' effect for low-SEB graduates resulting in outcomes comparable to those of high-SEB backgrounds.

HILDA Survey: Within-Individual Changes in Outcomes Before and After Degree Attainment (Hypothesis 3)

Results from fixed-effect models comparing the relative returns to a university degree for low- and high-SEB individuals are presented in Table 6. Attaining a degree significantly improves the mental health of low-SEB ($\beta = 1.14$; $p < 0.05$) but not high-SEB ($\beta = 0.78$; $p > 0.05$) individuals. Yet, in Wald tests, differences in these estimates are not statistically significant ($p = 0.49$). Low-SEB individuals also report significant improvements in perceived financial prosperity after attaining an undergraduate degree ($\beta = 0.09$; $p < 0.001$), which again is not the case for high-SEB individuals ($\beta = 0.02$; $p > 0.1$). The difference in the magnitude of these effects is statistically significant in a Wald test ($p < 0.05$). Altogether, these results suggest that obtaining a university degree is associated with significant gains in mental health and financial prosperity, but these gains are restricted to low-SEB individuals. Therefore, these results provide support for Hypothesis 3; that is, low-SEB graduate appear to benefit more from university degree in *relative* terms.

Discussion and Conclusion

In this paper, we have leveraged longitudinal data from two high-quality, longitudinal, nationally representative Australian datasets—the ACLD and the HILDA Survey—to compare the absolute and relative returns to university degrees of low- and high-SEB graduates, and how these evolve with time since graduation. In doing so, we contributed to the literature on the returns to higher education, as well as the literature on social stratification. Key study contributions included the modelling of a broad set of outcomes that go beyond labor-market indicators, considering long-run trends in post-graduation trajectories, and undertaking explicit comparisons of the absolute and relative returns to higher education.

'Stratifying Forces' Prevail, but 'Levelling Forces' also Matter (Hypothesis 1)

Our first hypothesis was formulated based on conceptual premises from social and cultural capital theory, the theory of effectively maintained inequality, and life-course theory, all of which highlighted the role of "stratifying forces" post-graduation. Specifically, we hypothesised that *low-SEB graduates would achieve worse post-graduation outcomes than high-SEB graduates*. Consistent with this theoretical prediction, we found that low-SEB graduates received lower returns to higher-education qualifications than high-SEB graduates for employment and managerial/professional work (ACLD) and job-security satisfaction and financial prosperity (HILDA). These results echo those from previous studies in Norway (Hansen 2001), Italy and Spain (Triventi 2013), as well as previous Australian evidence (Richardson et al. 2016). However, some of our results were consistent with the predictions of human capital, signaling and rational action theories, which pointed to higher education as a "levelling force" and expected low-SEB graduates to exhibit outcomes comparable to those of their high-SEB counterparts. This applied to the likelihood of having a high weekly income (ACLD) and hourly wages and mental health (HILDA Survey). Similar patterns of effects have been reported in earlier international (Hout 1984) and Australian (Li et al. 2017) studies. Altogether, our findings for different outcomes lent some support to different perspectives. This heterogeneity in associations underscores the importance of considering multiple outcome variables when examining differences in the returns to education by social origin. Further, they suggest that some of the "leveling" and "stratifying" mechanisms discussed before may apply more prominently for some of the outcomes. For instance, high-SEB graduates having better chances of employment and managerial/professional work may be due to their superior social networks and cultural capital. Meanwhile, the comparatively lower levels of financial prosperity reported by low-SEB graduates might result from more complicated life courses and greater associated financial responsibilities—such as paying off education loans or supporting dependents. Yet other observed associations may be driven by different processes. For example, the similar income and earnings of low- and high-SEB graduates may emerge due to the high regulation of graduate-job salaries in the Australian labor market.

Differences in Outcomes Fade Over Time (Hypothesis 2)

One of the key contributions of this study was the consideration of longitudinal trajectories in post-graduation outcomes. Based on the "stratifying" and "levelling" frameworks, we expected that *any differences in the post-graduation outcomes of low- and high-SEB graduates would fade over time*. Consistent with this hypothesis (Hypothesis 2), for those

outcomes in which an initial penalty associated with having a disadvantaged background was observed, this disappeared over time—fading at about 4 years after graduation. This 'catch up' effect by low-SEB graduates was observed for job-security satisfaction and financial prosperity. This pattern of results indicates that the relevance of different "stratifying" and "levelling" forces may shift over graduates' post-university life courses. Specifically, the 'closing gaps' scenario observed in our data is consistent with the proposition that social capital may play a greater role at labor market entry, while human capital may play a greater role thereafter (Lin 1999; Jacob et al. 2015). The latter could be due to an erosion in any initial differences in productivity by social origins through work experience (Heckman et al. 2016), or the superior social networks of high-SEB graduates being more important in opening job opportunities immediately after graduation than later on (Jacob et al. 2015). Overall, the longitudinal associations in our analyses resemble those found in previous international (Jacob et al. 2015) and Australian (Edwards and Coates 2011) research.

Relative Returns are Greater for Less Advantaged Graduates (Hypothesis 3)

Our final hypothesis, Hypothesis 3, posited that *before/after graduation differences in outcomes will be larger amongst low-SEB than high-SEB graduates*. In other words, we expected that the *relative* returns to degree attainment would be greater amongst low-SEB than high-SEB, due to relatively more substantial changes to their circumstances brought about by university participation. Consistent with this, our analyses yielded evidence that a significant within-individual before-after graduation improvement was observed for low-SEB graduates but not for high-SEB graduates. This applied to both mental health and perceived financial prosperity—although the difference was only statistically significant for the latter. The pattern is consistent with arguments that similar outcomes post-university (e.g., income or wages) reflect more pronounced relative benefits (e.g., greater perceived financial prosperity) for low- than high-SEB graduates because of the poorer financial conditions that low-SEB graduates experienced pre-graduation (e.g., lower financial support from family) (Brand and Xie 2010).

Limitations and Further Research

Despite the importance of our findings, some study limitations must be acknowledged. First, our analyses do not account for self-selection into university participation/completion and—as explained previously—this selection is likely to be more pronounced amongst low-SEB individuals (Goldthorpe 1996). Low-SES individuals are less likely than high-SES individuals to access higher education in the first place, and more likely to drop out of a higher-education program after gaining access. Hence, the subsample of low-SES individuals observed after attaining a degree may not be representative of all low-SES individuals, but may instead comprise a subset of highly capable low-SES individuals. An implication of this potential source of sample selection is that our estimates should not be readily taken as evidencing causal relationships, as the positive selection of low-SES individuals into the sample may have attenuated the observed differences in post-graduation outcomes by socio-economic status. Taken together with our findings, this potential selectivity can also be seen as suggesting that even the smartest and most determined low-SEB students captured in our sample fail to achieve post-graduation labour-market outcomes comparable to those of their—less positively selected—high-SEB counterparts. Future

studies could model these selection processes explicitly using fit-for-purpose estimation approaches. Second, despite drawing on large, nationally representative datasets, we had relatively small sample sizes in our target group of university graduates. As such, we were unable to incorporate further granularity into the analyses—e.g., stratifying the models by gender, or comparing undergraduate versus postgraduate degrees. Future research leveraging larger datasets (e.g., administrative data) could circumvent this issue. Third, our data lacked robust proxies to test the specific mechanisms proposed by the theories discussed in our conceptual framework (e.g., social networks, productivity, or socio-cultural capital), which prevented us from investigating their individual contributions to overall differences in the returns to university education between low- and high-SEB individuals. Finally, our analyses do not consider the possibility that attendance to university, without completion, may exert some influence on individuals' subsequent health and employment outcomes (see Toutkoushian et al. 2013). Theorizing and testing this premise should be the focus of further research.

Concluding Remarks

Our findings carry important implications for policy and practice. Overall, they suggest that in the contemporary Australian context social origin continues to play a role in shaping up the labor-market and personal outcomes of university graduates. This is manifested by the lower chances that low-SEB graduates have—at least initially—to find employment and access managerial/professional occupations, and by their poorer job-security satisfaction and perceived financial prosperity. Other study findings, however, could be read with more optimism: low-SEB graduates eventually 'catch up' with their high-SEB peers in some of the longitudinal outcomes considered, and benefit comparatively more from their university degrees in *relative* terms. We also found some support for the meritocratic or levelling function of higher education—including comparable income, wages, and mental health amongst low- and high-SEB graduates.

All in all, our findings contribute to those from a broader body of work in Australia (Harvey et al. 2016) and internationally (e.g., European Union 2014) that demonstrates that low-SEB individuals are less likely to choose to attend higher education, enact choices to attend higher education, and complete their higher-education courses. These processes represent significant barriers to equality of opportunity, and the mechanisms that produce them need to be identified and addressed. Adding to this pool of evidence, our findings suggest that addressing educational inequalities by SEB requires additional attention to post-graduation outcomes, to complement the current emphasis on access and completion. Policies should explicitly consider the need to ensure that all graduates make a successful transition from education to employment and enjoy equal chances to succeed post-graduation—regardless of their social origins. This will require coordinated education and labor-market policies. Universities have also an important role to play here, and should provide not only high-quality curricula, but also training on employability skills and adequate career guidance. Strengthening the latter could help reduce the length of time it takes for low-SEB graduates to 'catch up' with their high-SEB peers.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

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