

The role of achievement, gender, SES, location and policy in explaining the Indigenous gap in high-school completion

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Funding Information

This article was funded by Australian
Research Council grant (LP160100332).

Abstract

Internationally, there is a gap in high-school completion rates for Indigenous and non-Indigenous students. In Australia, gap estimates are commonly based on lag indicators, precluding examination of underlying mechanisms. Using two longitudinal representative samples of Australian youth, we explored differences in high-school completion between Australian Indigenous and non-Indigenous rates, and whether the gap varies for students of similar academic ability. Using an intersectional approach, we show the Indigenous gap is significant, is mostly a function of differences in academic achievement, but varies by socioeconomic status (SES) and location. Specifically, high SES and living in urban settings are protective factors for non-Indigenous students, but not for Indigenous students. Conversely, rural and poor non-Indigenous students appeared to have dropout rates as large or even larger than similarly poor and rural Indigenous youth. Overall, the results suggest the need for a more nuanced perspective on 'Indigenous gaps' in educational attainment.

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KEYWORDS

dropout, high-school completion, Indigenous, socioeconomic status

Key insights**What is the main issue that the paper addresses?**

The gap in high-school completion between Australian Indigenous and non-Indigenous students is well recognised, where lower academic achievement for Indigenous students is a major contributor. However, the relation between achievement and graduation is highly nuanced. Failure to understand these nuances has contributed to a failure to close this gap.

What are the main insights that the paper provides?

Addressing the school graduation gap requires a quantitative intersectional approach that considers contextual factors (e.g. location, race capital), considering diversity among Indigenous children. Non-completion varied with SES for non-Indigenous students, but not Indigenous students. Raising compulsory school leaving ages is likely to reduce the gap in high-school completion.

INTRODUCTION

Internationally, governments and education authorities struggle to provide education to Indigenous students that recognises their strengths, talents and worldviews. Education programmes based on mainstream (i.e. non-Indigenous) cultural values and English proficiency seem to fit poorly with Indigenous values and skills (Guenther, 2013). Factor in the often lower socioeconomic status (SES) of Indigenous populations, and poorer educational outcomes are rampant for Indigenous youth (Calver, 2015; Chain et al., 2017). In Australia, where this problem is particularly salient (Song et al., 2014), the federal government set and evaluate annual national targets related to Indigenous health, education and wellbeing (Australian Government, 2020). One key target was to halve the gap for Indigenous Australians in Year 12 attainment or equivalent by 2020. Closing the high-school completion gap is important because of the link between high-school completion and access to secure, full-time, prestigious jobs and occupations (Australian Government, 2020). In 2008, only 45% of Indigenous youth graduated high school, a 40 percentage point gap relative to non-Indigenous students. But the latest report has shown an improvement for Indigenous students, with a graduation rate of 66% for 2018–2019 (Australian Government, 2020). Importantly, this statistic is based on lag indicators (i.e. proportion of 20–24 year-olds who have completed high school) not on lead indicators that could best be estimated via longitudinal data that follows students through high school. Longitudinal data use would also allow research to examine mechanisms that may help explain this gap.

This research explores the gap in high-school completion between Indigenous and non-Indigenous youth using two longitudinal samples starting in 2003 and 2009. Informed by Boudon's (1974) primary (academic achievement influences) and secondary (non-achievement

influences) mechanism distinction, we also consider the size of this gap for students with similar levels of academic ability. Further, in recognition that too often quantitative research on Indigenous people results in ‘prescriptively destructive grand narratives’ (Covarrubias, 2011, p. 104), we incorporate Indigenous approaches to intersectionality (e.g. Walter, 2015) to undertake a quantitative intersectional approach (Else-Quest & Hyde, 2016), where intersectionality is defined as ‘the various ways in which multiple social categorizations interact to shape the dimensions of the experiences of individuals’ (Jang, 2018, p. 1269).

Failure to recognise the intertwining and multidimensional experiences of participants can result in datasets that are decontextualised, potentially leading to what Covarrubias et al. (2018, p. 253) call ‘majoritarian interpretations’. To restore some context, Dillon et al. (2020) discuss the impact of British invasion on Indigenous people’s health and wellbeing, while Mooney et al. (2016) state that acknowledging Australian Indigenous history provides important context for understanding Indigenous children’s educational experience. Despite efforts by successive governments, many Indigenous Australians continue to miss opportunities that most non-Indigenous Australians take for granted.

Given the historical context and the value of adopting an intersectional approach, we extend beyond just considering academic scores, which place the student as the sole source of achievement (and failure), and consider the roles of gender, SES and place, conditioning on achievement. Finally, using a multi-cohort representative longitudinal study, we explore whether a change in government policies that lifted the compulsory school leaving age across Australia to 17 years of age influenced high-school completion gaps; a policy intervention shown in other countries to have a positive influence on high-school completion (Rumberger, 2011a).

Indigenous education and high-school completion: An international concern

The achievement gap for Native American students has widened as academic achievement increases in the general student population. Based on an analysis of the National Assessment for Educational Progress, a large nationally representative mathematics and reading exam, Fischer and Stoddard (2013) report a raw achievement gap of about 60–70% of a standard deviation for both mathematics and reading for Native American students, a gap that widens with age. Canada reports a remarkably similar story. For example, Canadian Aboriginal high-school completion rates are about 72% compared to non-Aboriginal students at 88%, resulting in lower participation rates in university education for Canadian Aboriginal students (Calver, 2015). Researchers from Australia and New Zealand studying their respective Indigenous student populations report similar results. Song et al. (2014), in their analysis of the Programme for International Student Assessment (PISA) results from Australia and New Zealand, found significant achievement gaps exist for their respective Indigenous students.

Indigenous groups also share similar barriers to educational access as many ethnic minorities—particularly in multi-nation states—across the world (Kymlicka, 2009), making research on Indigenous disadvantage an international concern. Thus, while we focus on Australia, we expect many of the findings to be relevant to Indigenous educational inequality, and indeed ethnic minority inequality, internationally.

High-school completion fail

When discussing Indigenous Australians, we are mostly concerned with non-completion of high school. However, we do refer to dropout, which is a slightly different, yet closely

related phenomenon. While successful high-school completion opens pathways to work, further education and social mobility, dropping out has significant negative personal and social consequences (Lamb & Huo, 2017). For example, early leavers exhibit higher rates of depression (Rumberger, 2011b), illicit substance use and criminal behaviour (Lansford et al., 2016), and ultimately experience earlier mortality (Molla et al., 2004). Not completing high school is likely to negatively influence young people's future educational attainment and career prospects (Rumberger, 2011b), resulting in attainment disadvantages that have grown over time (Bowen et al., 2009). Compared to high-school graduates, dropouts have higher unemployment and reduced earnings (Rumberger, 2011b). With greater social service dependency and lower tax contributions (Lansford et al., 2016; Waldfogel et al., 2005) than their graduated peers, the financial cost to society of those who drop out is enormous. Addressing Australian Indigenous disadvantage specifically will benefit government budgets through higher revenues and lower expenditure, with estimated net gains in the next decade of approximately \$11.9 billion (Deloitte Access Economics, 2014).

High-school graduation is increasingly seen as a minimum requirement for successful participation in work and further study (Lamb & Markussen, 2011), resulting in young people increasingly staying in education longer to secure employment (Piketty, 2014). With more young people graduating, those without a secondary education fall further behind (Goldin, 2018). Across Organization for Economic Cooperation and Development (OECD) member countries, high-school graduation increased by 6 percentage points on average from 2005 to 2017. While this is encouraging, 15% of 25 to 35 year-olds had not successfully completed upper secondary education in 2018 (OECD, 2019). The negative consequences of dropping out appear to be worsening as greater demands are made by employers for a more educated workforce (Lamb et al., 2015; Rumberger, 2011b).

Australia's education system has not capitalised on Australian Indigenous people's strengths to promote better school participation. Internationally, Indigenous adolescents have higher rates of dropout than non-Indigenous adolescents (Manojan, 2018; Singar & Zainuddin, 2017; UNDESA, 2020). A 'significant and sizable Indigenous effect' has been demonstrated by Parker et al. (2015) in predicting adolescent university entry, to be attributable to non-academic achievement-related mechanisms like distinct patterns of Indigenous social capital, lower racial capital (see below), relative risk aversion and structural barriers, including Bourdieu's concept of symbolic violence, and racism and prejudice (Parker et al., 2021; Sikora & Biddle, 2015; Walter, 2015). In part, this 'Indigenous effect' is due to the family, school and community environments of Indigenous youth varying uniquely from those of the majority adolescent populations (Guenther & Osborne, 2018).

Primary and secondary effects model and an Indigenous intersectionality

Boudon (1974) noted the critical importance in educational inequality of distinguishing between primary (achievement-related) and secondary (non-achievement-related) effects of social background. Primary effects indicate the extent that social origins affect individuals' educational outcomes through acquired performance, and include transmission of genetic traits, environmental conditions and parent-child interactions, with parents transmitting sociocultural resources valuable to the cognitive and non-cognitive development of their offspring (Ress & Azzolini, 2014). Primary effects acknowledge the now persistent findings that disadvantaged groups have lower academic achievement levels than their more advantaged peers. For example, Indigenous youth have lower academic achievement at every PISA cycle (De Bortoli & Thomson, 2010; Song et al., 2014; Thomson et al., 2013). Secondary effects consider the condition of the gap in educational outcomes between advantaged and

disadvantaged peers after controlling for academic achievement. Secondary effects are the social differences in educational attainment that persist after previous academic achievement is held equal across groups. Social background is seen as affecting sensitivity to risk aversion, and to direct and indirect costs associated with educational investments. Thus, the more privileged are expected to be more inclined towards longer periods of investment in education than the less privileged (Erikson & Jonsson, 1996). Parker et al. (2015) found that approximately half of the Indigenous disadvantage in university entry was due to these secondary effects (including the mechanisms outlined in the previous section). Other research (e.g. Ress & Azzolini, 2014; Schindler & Lorz, 2012) has demonstrated that secondary effects play a much larger role than primary effects on educational attainment outcomes. As secondary effects reflect the residual disadvantage in education outcomes, they capture a large range of 'non-meritocratic' mechanisms of inequality. We note that the concept of meritocracy in education is deeply problematic (see Brown, 2010). But equally, disadvantages in educational outcomes that are present even after controlling for achievement are uniquely concerning. Hence, we place considerable emphasis on knowing (a) whether gaps exist between Indigenous and non-Indigenous youth in high-school completion and (b) whether these gaps persist when controlling for academic achievement.

A limitation of the primary and secondary effects is an underlying assumption of relative homogeneity within groups. Social scientists have long been obsessed with average causal effects (Morgan & Winship, 2015). Indigenous research is dominated by well-meaning research that treats Indigenous peoples as homogenous, potentially exacerbating internal conflicts and inequalities (Osborne et al., 2019). As Walter (2015) notes, intersectional perspectives for Indigenous issues, particularly in relation to social class, gender and geography, are critical. The concept of capital provides an Indigenous intersectional hypothesis that SES will be less beneficial for Indigenous peoples' educational outcomes than for non-Indigenous youth. Walter (2015) argues that Indigenous youth lack the racial capital that is critical to educational success. Racial (or ethnic) capital reflects a person's access to opportunities, resources and other forms of capital due to their race or ethnicity (Kim, 2019; Waring, 2017). Walter has strong grounds for claiming that Indigenous youth lack racial capital, given that Anglo-Australian Whiteness commands the highest value in the deployment of race capital for facilitating or inhibiting resource acquisition. In the Australian schooling context, Anglo-Australian Whiteness is more advantaged where race capital is concerned, given that the Australian education system is founded on Eurocentric epistemologies, resulting in what Bodkin-Andrews and Carlson (2016) call 'epistemological racism' (p. 786). In addition to the founding Eurocentric epistemologies (still evident today), in a systematic review of empirical research on racism and the schooling experiences of Australian Indigenous students, Moodie et al. (2019) explore the effects of racism more generally, summarising its effects to include 'school withdrawal, deidentifying as Indigenous, emotional distress and internalisation of negative beliefs about Indigenous intelligence and academic performance' (p. 274). This can only reduce race capital for Indigenous people.

Parker et al. (2021) argue that reduced racial capital restricts Indigenous youths' ability to access and deploy other forms of capital commonly associated with advantaged socioeconomic position. For example, they show that SES has a weaker relationship with university entry for Indigenous youth than for non-Indigenous youth. The lack of effect of SES on educational attainment for Indigenous youth is striking, given the strong relationship observed in general population samples (Dalton et al., 2009; Devenish et al., 2017; Lamb & Huo, 2017; Polidano et al., 2013).

Taking an intersectional perspective, Sikora and Biddle (2015) found that the gender gap in educational and occupational expectations was generally larger—favouring females—among Indigenous youth than non-Indigenous youth. It is also likely that the influence of Indigenous status on school completion is dependent on place. Place for Indigenous youth is often associated

not just with physical distance between urban and rural but with cultural distance, with rural and remote Indigenous youth often having different ontological, cosmological, epistemological and axiological orientations to their urban Indigenous peers (Guenther & Osborne, 2018; McRae-Williams, 2014). This may influence the approach and value rural and remote Indigenous students place on education, and may be a reason that educational attainment tends to be lower in rural and remote locations (Gray et al., 2000). However, macro-structural issues also play a large role in the rural/urban divide, with declining economic fortunes in rural locations likely hitting Indigenous people harder than their rural non-Indigenous peers (Gray et al., 2000). The declining rural fortunes and how they affect already vulnerable groups is an issue shared by other Anglophone countries (e.g. Carr & Kefalas, 2010; Tieken, 2014).

Thus, we not only consider whether there is an Indigenous disadvantage in high-school completion and whether this gap persists for equally able children, but also whether this gap varies as a function of SES, gender and geography.

Policy effects

Numerous Anglophone countries have introduced policies to increase compulsory school leaving age in the belief that numbers of students obtaining upper secondary qualifications will increase (Markussen & Sandberg, 2011). In Australia, compulsory school leaving age increased from 15 to 17 years from 2008 to 2010, leading to an increase in retention rates from secondary school to senior high school (Parker et al., 2019). Raising the age that one is legally able to leave formal schooling has been associated with increased retention in subsequent non-compulsory years, and with lower dropout rates and higher graduation rates (Rumberger, 2011a). It is therefore expected that increasing compulsory school leaving age in Australia between 2008 and 2010 is associated with higher rates of school completion. But did it help close the Indigenous gap in school completion?

Exploratory hypotheses

In formulating these hypotheses, we are mindful that terms such as 'gap' can mask cultural nuances, resulting in a deficit view of achievement by students of minority ethnic groups (Carey, 2014; Jang, 2019). The term 'gap' is used for convenience and simply reflects differences in academic achievement measures between Indigenous and non-Indigenous students in mainstream or Westernised educational settings.

Hypothesis 1a *There is a gap between Indigenous and non-Indigenous students in high-school completion rates.*

Hypothesis 1b *This gap varies as a function of SES, gender and place (urban or rural).*

Hypothesis 1c *This gap narrowed as a function of a change in legislation that increased the compulsory school leaving age to 17 between 2008 and 2010.*

Hypothesis 2a *There is a gap between Indigenous and similar-achieving non-Indigenous students in high-school completion rates.*

Hypothesis 2b *This gap varies as a function of SES, gender and place (urban or rural).*

Hypothesis 2c *This gap narrowed as a function of a change in legislation that increased the effective compulsory school leaving age to 17 between 2008 and 2010.*

Hypothesis 2d *Does this gap vary as a function of academic achievement? That is, is the gap between similarly low-achieving Indigenous and non-Indigenous students the same as the gap between similarly high-achieving Indigenous and non-Indigenous students?*

METHODS

Participants

This study used publicly available data from two cohorts of a nationally representative and large-scale longitudinal Australian database, the Longitudinal Surveys of Australian Youth (LSAY). LSAY follows cohorts of young people from the age of 15 enrolled at school, contacting them once a year for 10 years until age 25. The samples used in this study come from the LSAY 2003 cohort (Y03; Australian Government Department of Education, 2020a) ($N = 12,551$; 50.82% male) and from the LSAY 2009 cohort (Y09; Australian Government Department of Education, 2020b) ($N = 14,251$; 48.90% male). Sampling involved the initial data collection of the PISA in the first year and follow-up telephone interviews of the LSAY questionnaire conducted annually (NCVER, 2018). PISA sampling, conducted by the OECD, involved a complex two-stage clustered sampling design. In the first stage, school selection was based on probability proportional to school size, where larger schools were more likely to be chosen. A total of 355 schools in 2003, and 353 schools in 2009, were selected. The sample was designed to be representative of students across Australia in terms of state/territory, school sector and metropolitan/regional areas. The second stage of PISA sampling involved random selection of a set number of non-Indigenous students (50 in Y2003 and 48 in Y2009), and all Indigenous 15 year-old adolescents, at each sampled school. At schools with fewer than the set number of students, all 15 year-olds were selected. Indigenous students and areas with fewer participants were over-sampled to allow representative results to be produced by Indigenous status and state (NCVER, 2018).

Variables

The dependent variable *non-completion of high school* was based on the derived variables that measure whether the adolescent had left school before completing Year 12, had completed Year 12 or was still at school. Adolescent *Indigenous status* was determined by asking 'are you of Aboriginal or Torres Strait Islander heritage?' (1 = identifies as being of Indigenous Australian or Torres Strait Islander heritage, 0 = identifies as being of neither heritage). Adolescent *socioeconomic background* was obtained using an index of economic, social and cultural status—the PISA ESCS index—based on adolescent self-report of highest level of parental education, highest-status parental occupation and home possessions including wealth, cultural possessions and home education resources. An *academic achievement* index was derived using a principal component of the PISA mathematics, reading and science scores. *Place* was measured on the basis of whether the student was located in an urban or rural location based on Australian Bureau of Statistics postcode assignments. *Gender* was self-reported as male or female. *Cohort* was assigned as 0 if the participant was in the 2003 cohort or 1 if the participant was in the 2009 cohort. We also controlled for *year in school* (hereafter *grade*) for the first time wave. *State of residence* was also controlled for. However, when including state there were some empty cells in the more complex models, hence we choose to report models without state, yielding almost identical results in both cases.

Analysis

All models were estimated using logistic regression with a binomial link function. These models were estimated with the combined attrition weights and sample weights, and Fay replication weights ($\rho = 0.5$) to account for clustering within schools using the survey package

in R (Lumley, 2011). Results are presented in log odds with marginal effects for predicted probabilities of not completing high school plotted for focal comparisons. Marginal effects are evaluated at the simple average for all other variables.

Missing data

To account for attrition in our sample from the first LSAY wave to the second, we used the attrition weights provided by the survey organisers. Once accounting for attrition, there was minimal missing data (<0.6%). We focused on high-school continuance and completion rates from wave 2 in LSAY due to the fairly steep attrition in subsequent waves that is of particular concern given the relatively modest sample of Indigenous students in the initial sample. This would have resulted in underpowered tests of our hypotheses. In addition, the vast majority of the sample was in Grade 10 at the first wave, with non-completion from Grade 10 to 11 being a particularly crucial transition (see Ciarrochi et al., 2017). Thus, focusing on waves 1 to 2 provided a pragmatic approach to the data. Noting that students may remain in school at wave 2 but drop out in subsequent waves, we used information on high-school continuance and completion information in LSAY waves 3 to 5 to update our primary outcome variable (last observation carried backward). Much of the sample was missing due to attrition in these later waves. To account for this, we include a *missing by attrition* flag (1 for missing at wave 5, 0 otherwise) to all models.

Data availability

Data for LSAY 2003 and 2009 is available at the Australian Data Archive Dataverse at <https://doi.org/10.4225/87/5IOBPG> and <https://doi.org/10.4225/87/6BW27V>, respectively.

RESULTS

Descriptive statistics are presented in Table 1. Indigenous students have much higher non-completion rates than their non-Indigenous counterparts, as well as lower achievement and SES. The gender and urban/non-urban balance was close to 50%.

Hypothesis 1a. There is a gap between Indigenous and non-Indigenous students in high-school completion rates

We next examined the main effects of Indigenous status and our key covariates on non-completion. As expected, there was a significant main effect of Indigenous status on non-completion (log odds = 0.365, 95% CI [0.133, 0.596]). The average marginal effects suggest a 0.12 [0.11, 0.13] probability of not completing high school for non-Indigenous youth compared to 0.16 [0.13, 0.19] for Indigenous youth.

Hypotheses 1b and c. Cohort and demographic variables moderate the effect of Indigenous status on high-school completion

We next examined whether SES, gender, place or cohort (before or after change in compulsory school leaving age) impacts the rate of high-school completion. These hypotheses

TABLE 1 Descriptive statistics of variables

Variable	Non-Indigenous	Indigenous
HS non-completion %	15.83%	27.55%
Cohort 2003	97.96%	2.04%
Cohort 2009	96.92%	3.08%
Girls %	50.14%	51.20%
Urban %	54.16%	45.84%
Year 10 or higher %	90.64%	89.98%
Achievement index (mean)	-0.09 [-0.13, -0.06]	-0.90 [-0.98, -0.82]
Socioeconomic status index (mean)	0.31 [0.28, 0.33]	-0.15 [-0.20, -0.10]

Note: HS = high school. Numbers in square brackets are 95% confidence intervals. $N_{2003} = 9378$ (Indigenous = 191; non-Indigenous = 9187); $N_{2009} = 8759$ (Indigenous = 270; non-Indigenous = 8489).

TABLE 2 Moderators of the gap between Indigenous and non-Indigenous non-completion

	Interaction: single			Interaction: multiple		
	Log odds	-95% CI	+95% CI	Log odds	-95% CI	+95% CI
Indigenous × SES	0.584	0.371	0.796	0.574	0.369	0.779
Indigenous × Gender (boys)	-0.313	-0.745	0.119	-0.321	-0.711	0.069
Indigenous × Urban	0.413	0.023	0.803	0.358	-0.023	0.739
Indigenous × Cohort (2009)	-0.317	-0.707	0.072	-0.407	-0.784	-0.029

Note: Shaded areas are considered significant because the confidence interval does not overlap with zero. SES = socioeconomic status (z-scored).

were examined with moderators tested one at a time (single interaction) or simultaneously (multiple interaction); the main effects for all covariates were included in each model and full results can be found in the online Supplementary Material (Tables S1–S4). Table 2 (significant log odds shaded) shows that SES moderated the link between Indigenous status and non-completion. The lower-right panel of Figure 1 illustrates these effects. Higher SES was associated with reduced odds of non-Indigenous students failing to complete high school but had no relationship with Indigenous student completion.

There was also evidence of location moderation effects in the single-interaction but not in the multiple-interaction model. Cohort also had a significant moderation effect in the multiple-interaction model but not the single-interaction model. Figure 1 illustrates these effects. There was a bigger gap between rural and urban children who were non-Indigenous than Indigenous (upper-right panel). The policy change of increasing the compulsory school leaving age was associated with a completion gap, with Indigenous children experiencing a greater decline in the probability of not completing high school than non-Indigenous children (upper-left panel).

Hypothesis 2a. There is a gap between Indigenous and *similar-achieving* non-Indigenous students in high-school completion rates

Consistent with Boudon's (1974) primary and secondary effects model, we next considered whether there was a gap in probability of not completing high school for equally able Indigenous and non-Indigenous children. Controlling for achievement in the model used to

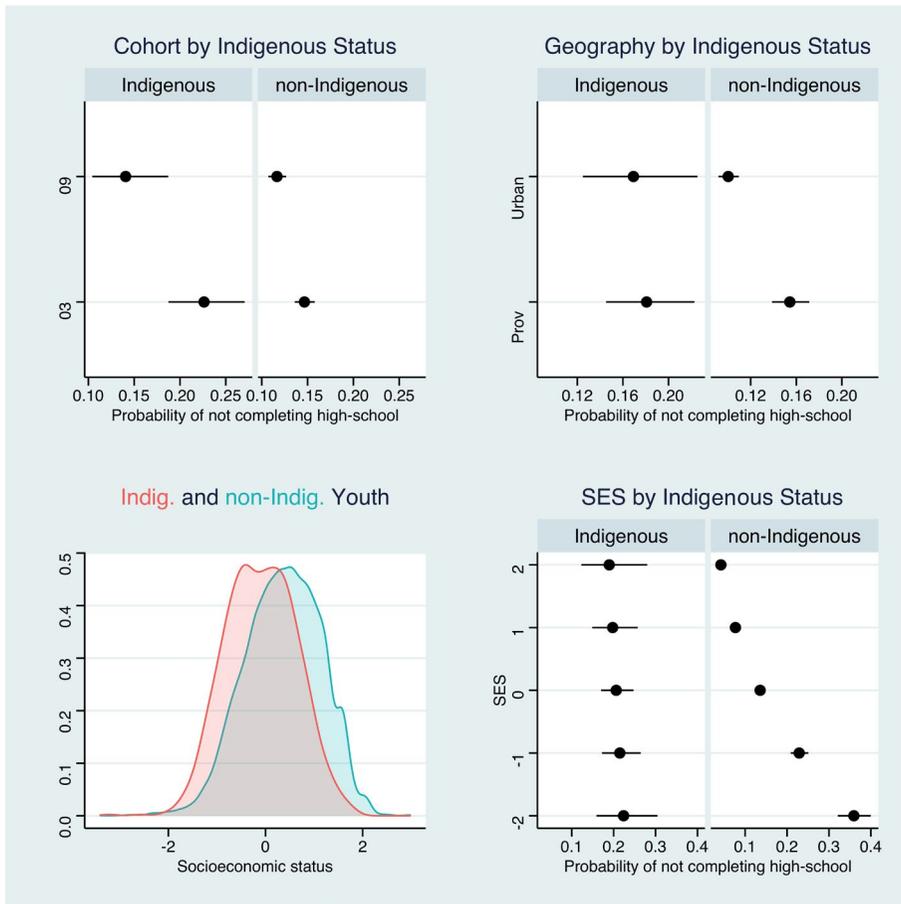


FIGURE 1 Moderation of the gap in non-completion between Indigenous and non-Indigenous youth (conditional plot). *Note:* Prov = provincial/rural; 03 and 09 indicate LSAY 2003 and 2009 cohort; Indig = Indigenous status. Socioeconomic status is z-scored

test Hypothesis 1a reduced the effect of Indigenous status on high-school non-completion substantially (log odds = 0.136, 95% CI [-0.094, 0.365]; see Table S5 for full results). Marginal probabilities indicated that both Indigenous and non-Indigenous children of average academic achievement had a probability of not completing high school of ~0.10. Figure 2 illustrates both the achievement distribution and high-school non-completion for Indigenous and non-Indigenous children.

Hypotheses 2b–d: Achievement, SES and place moderate the probability of not completing high school for equally achieving Indigenous and non-Indigenous children

Table 3 summarises the key moderation effects (see Tables S6–S11 for full results) for Indigenous and non-Indigenous children on the probability of not completing high school. Figure 3 illustrates these effects. The differential influence of SES between Indigenous and non-Indigenous children was consistent with the findings for Hypothesis 1b. For non-Indigenous children of equal achievement, there was a clear SES gradient to the probability

of not completing high school. For equally achieving Indigenous children, SES had little influence on not completing high school. The surprising finding from Hypothesis 1b, that place had a greater influence on non-Indigenous children than Indigenous children, was replicated here after controlling for achievement. There was no significant moderation by cohort, indicating that increasing the compulsory school leaving age did not close the gap when comparing equally achieving Indigenous and non-Indigenous youth.

Finally, lower achievement was associated with higher risk of not completing school. However, this effect was moderated by Indigenous status, as illustrated in the bottom-right panel of Figure 3. Achievement was more strongly linked to non-Indigenous dropout than Indigenous dropout. Put simply, there was a much stronger achievement gradient to dropout for non-Indigenous students than there was for Indigenous students.

Sensitivity analyses

Our final analysis sought to examine the reliability of our effects. Our first sensitivity test was to examine the effects within, rather than across, cohorts. We conducted logistic regression with a binomial link function within the 2003 and 2009 cohort, utilizing all main effects

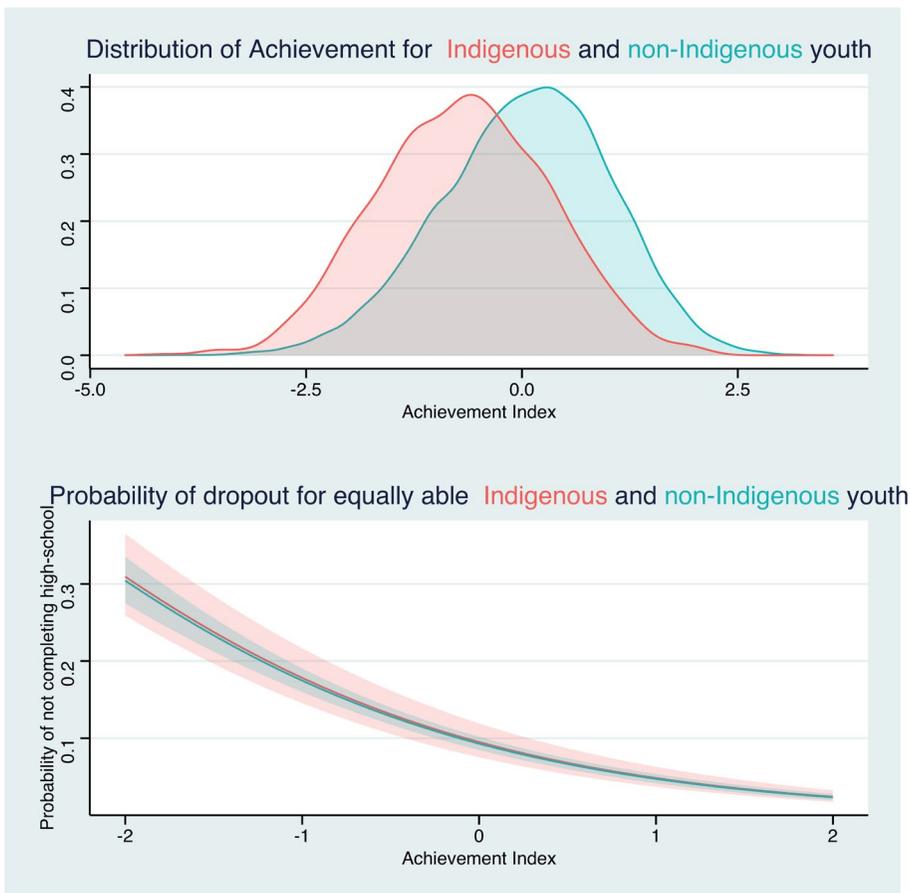


FIGURE 2 Descriptives for level of dropout and achievement. *Note:* Non-completion = high-school non-completion. Indigenous and non-Indigenous youth refer to students of equal ability

TABLE 3 Comparison of equally achieving Indigenous and non-Indigenous youth: does the gap persist?

	Interaction: single			Interaction: multiple		
	Log odds	-95% CI	+95% CI	Log odds	-95% CI	+95% CI
Indigenous × SES	0.478	0.248	0.707	0.385	0.162	0.607
Indigenous × Gender (boys)	-0.381	-0.846	0.084	-0.326	-0.73	0.077
Indigenous × Urban	0.490	0.056	0.923	0.431	0.032	0.830
Indigenous × Cohort (2009)	-0.258	-0.678	0.163	-0.329	-0.714	0.057
Indigenous × Achievement	0.388	0.18	0.596	0.306	0.087	0.526

Note: Shaded areas are considered significant because the confidence interval does not overlap with zero.

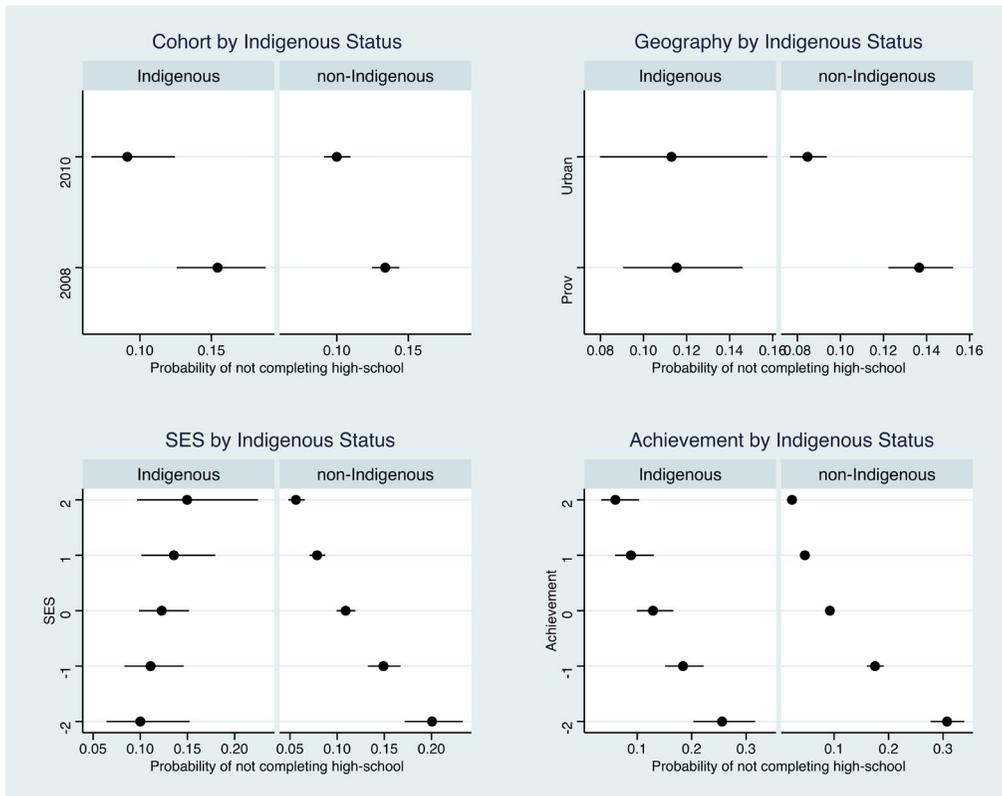


FIGURE 3 Moderation of the gap in dropout between Indigenous and non-Indigenous youth after controlling for academic achievement. Note: Prov = provincial or rural

and hypothesized interaction terms to predict dropout. Table 4 presents the within-cohort results for our key hypothesis. The key Indigenous status and SES interaction was significant in 2003 and was replicated in 2009, as was the interaction between achievement and Indigenous status. The Indigenous moderation effects involving gender and geography were less reliable, being significant only in the 2009 cohort.

In our second sensitivity analyses, we utilized a multiple imputation (MI) procedure to deal with missing data (Sterne et al., 2009), as an alternative to the *missing by attrition* flag used above. MI replaces each missing value with a set of plausible values that represent

the uncertainty about the right value to impute. We created 25 imputed datasets utilizing Amelia in R statistics (Honaker et al., 2011) and utilized MIcombine from the R package mi-tools (Lumley, 2019) to combine results of the analyses. The MI analyses replicated the key results using the attrition flag, with the effects of Indigenous status on dropout moderated by SES (log odds = 0.245, 95% CI [0.001, 0.49]), location (log odds = 0.363, 95% CI [0.05, 0.66]) and achievement (log odds = 0.266, 95% CI [0.086, 0.446]). There was, however, no significant moderation due to cohort (log odds = -0.173, 95% CI [-0.491, 0.146]) or gender (log odds = 0.098, 95% CI [-0.226, 0.422]).

DISCUSSION

Closing the gap in Indigenous high-school completion requires more than descriptive research. We also need to narrow down what mechanisms are involved. Further, for policy to be effective, it cannot treat Indigenous children as a single homogenous group. Failure to recognize their diversity will compromise the school experience of Indigenous students.

Our aim was to explore disparities in high-school completion between Indigenous and non-Indigenous Australian youth. Using Boudon's (1974) primary and secondary effects theory, we explored gaps in high-school non-completion both in total and for equally achieving Indigenous and non-Indigenous students. Using a quantitative intersectional perspective, we also considered if the Indigenous gap in high-school non-completion varied as a function of SES, gender and place. This approach provides more useful information for policy and intervention, going beyond a mere reporting of gaps that can contribute to a deficit view of Indigenous Australians (Fogarty et al., 2017).

Finally, we tested whether the Indigenous gap in high-school non-completion narrowed from 2004 to 2010 after Australia increased the compulsory school leaving age. There was some evidence for effects of time cohort, gender and geography, but these were not reliable across all analyses and covariates. However, three effects were consistent across cohorts and analyses: (a) there was a notable gap in high-school non-completion; (b) this gap disappeared almost completely when comparing equally achieving Indigenous and non-Indigenous youth; (c) Indigenous children from all different social backgrounds had surprisingly similar levels of high-school non-completion, while non-Indigenous children's rates of high-school non-completion varied as a function of SES background.

Comparing equally achieving Indigenous and non-Indigenous youth

We found that Indigenous students were less likely to complete high school than non-Indigenous students (marginal probabilities of 0.12 and 0.16, respectively). However, after

TABLE 4 Comparison of equally achieving Indigenous and non-Indigenous youth within cohort: does the gap persist?

	2003 Cohort			2009 Cohort		
	Log odds	-95% CI	+95% CI	Log odds	-95% CI	+95% CI
Indigenous × SES	0.419	0.273	0.565	0.329	0.095	0.563
Indigenous × Gender (boys)	-0.022	-0.307	0.263	-0.614	-0.924	-0.305
Indigenous × Urban	0.187	-0.064	0.439	0.522	0.155	0.89
Indigenous × Achievement	0.257	0.073	0.441	0.356	0.129	0.584

Note: Shaded areas are considered significant because the confidence interval does not overlap with zero.

controlling for academic achievement (primary effect), we found no difference in high-school non-completion (see Figure 2). Academic achievement is known to be lower for Indigenous students (Parker et al., 2021) and clearly impacts on school completion and post-school options (e.g. university participation). This is a concern as achievement gaps are relatively resilient to change in high school (Heckman, 2006). The finding that the gap in high-school completion is eliminated when controlling for achievement suggests that interventions most likely to close the high-school non-completion gap may be preschool interventions like the Perry preschool programme and Head Start (Heckman, 2017). Reaffirming the value of early intervention, in research looking at children in Australia's Northern Territory, Silburn et al. (2018) demonstrated a positive association between preschool attendance and attendance in the early years of primary school, which has a positive influence on National Assessment Program – Literacy and Numeracy outcomes. Specifically, children who had attended preschool then attended up to between 11 and 22 more school days per year, depending on the type of preschool attended (i.e. general preschool, early years class, mobile preschool). The association between preschool attendance and early primary school attendance was statistically significant for both Indigenous and non-Indigenous students across all remoteness strata, but was stronger for Indigenous students.

Intersectionality

Given the volume of literature attesting to the value of the intersectional approach to data analysis (e.g. Jang, 2019; Penner & Saperstein, 2013), we also focused on how the school completion gap between Indigenous and non-Indigenous youth varied according to SES, place (i.e. urban, provincial) and gender. We found there was no variation for gender. There was some evidence for a location effect, but this result was not reliable when controlling for all other interactions (Table 2), and thus caution is warranted in interpreting it. We found that SES moderated the link between Indigenous status and non-completion, with the moderation association also present after controlling for achievement. Perhaps surprisingly, the overall finding from these analyses was that Indigenous youths' risk of non-completion was relatively stable across the SES gradient and approximately equal in both urban and rural settings. In contrast, high-school non-completion was quite responsive to SES for non-Indigenous youth.

While the literature has consistently shown a clear SES divide on many educational outcomes (e.g. Reardon, 2011), the current study shows that this appears to not be the case for Indigenous students. One explanation for this unexpected finding is accounted for by the Sen–Bourdieu framework (Pham, 2019). Under this framework, a student's stock of capital (cultural and social) represents the *habitus*, that is, the norms, skills and dispositions, of their past experience and family background (Bourdieu, 2006), which shapes their school attitudes, participation and behaviour. Further, within this framework, Indigenous and non-Indigenous students possess different social capital (Parker et al., 2021) and differing interplays between forms of capital. The different forms of capital and their interaction influences how easily social and cultural capital can be transformed to economic capital, and, in turn, into educational capability and the opportunities students perceive as available. A school's policies and practices determine the extent that a student's forms of capital assist or limit their capacity to transfer resources to educational capability (Pham, 2019). Central to the work of Bourdieu is the use and reproduction of power. Bourdieu's work focuses on how cultural socialisation locates groups within competitive status hierarchies, interlocked between relatively autonomous domains of conflict; how groups struggle over valued resources; how group members pursue strategies to achieve their interests within such domains and how, in doing so, group members unwittingly reproduce the social stratification order (Swartz,

1997). It has been argued that Bourdieu's framework is not entirely suitable in examining how groups with little economic capital may generate social mobility, given his focus on how the dominant class reproduces its domination (Modood, 2004). The unequal social capital of parents may contribute to persistent inequality in educational attainment along the lines of race, ethnicity, social origin and gender (Fasang et al., 2014; Grodsky et al., 2008). Social closure (Parkin, 1979, p. 44), 'the process by which social collectives seek to maximize rewards by restricting access to resources and opportunities to a limited circle of eligibles', can contribute to educational inequalities. While informal social closure in parent networks benefits educational attainment in low-poverty schools, in high-poverty schools, social closure lowers educational attainment (Fasang et al., 2014). Similarly, wealth-based opportunity hoarding involves limiting access to economic opportunity by exclusionary devices that regulate who can and cannot enjoy such privileges (Tilly, 1999) and is a mechanism by which parents pass on their socioeconomically privileged positions to their children (Hansen & Toft, 2021).

The particular form of capital relevant here is racial capital. Previous research has argued that this may be due to Indigenous people's access to racial capital that is generally not rewarded to the same degree as is Whiteness in the Anglo-Australian context (Parker et al., 2021; Walter, 2015). Other possibilities are that forms of social and cultural capital available to high-SES non-Indigenous youth are not readily available to Indigenous youth, or that Indigenous-specific forms of capital are poorly valued by Western society, essentially flattening the SES gradient in relation to educational outcomes. Where Indigenous cultural capital is valued, for example in culture-based education in Hawaii, culture may be advantageous to positively influencing the educational outcomes of Indigenous students (Kana'iaupuni et al., 2017).

Modood (2004) highlights the practical concern of how ethnic minority groups can have a genuine sense of belonging without having to disavow their 'ethnic' identities. Examples in the Australian context of strengthening Indigenous cultural capital in the promotion of educational success include school-based Indigenous cultural programmes. Lowe et al. (2021), in their review of the impact of school-based Indigenous cultural programmes on Indigenous students, provided evidence of the importance of student participation in programmes that facilitated immersion in local language and culture. Positive outcomes of involvement in such programmes included enhanced student resilience to renegotiate their two-world identities (Armstrong et al., 2012), greater student connection to their school, increased student wellbeing and strengthening of their sense of Indigenous identity (Cairney et al., 2017; Colquhoun & Dockery, 2012). Strengthening of Indigenous cultural capital in this way offers potential to weaken unequal 'us–them' relationships at play (Modood, 2010).

For equally achieving Indigenous and non-Indigenous children, school completion is moderated by achievement level (see Table 3). From Figure 3 it appears that moderation occurs for students of low academic ability. Specifically, for Indigenous and non-Indigenous children of equal low ability, Indigenous students were more likely to complete high school. This finding may be due to non-Indigenous students and their families having social capital that affords them opportunities external to formal schooling (vocational education, jobs or apprenticeships) that do not require Year 12 completion.

Amongst high-achieving students, high-achieving Indigenous youth appeared to have higher rates of high-school non-completion than comparably achieving non-Indigenous youth. This may suggest that it is important to have specific programmes for academically gifted Indigenous students that engage such promising youth to remain in school. High-achieving Indigenous youth not completing high school represents a significant waste of talent.

International Indigenous populations

Indigenous Australians, with their history of colonisation, dispossession and marginalisation, share many experiences with other Indigenous people internationally (Prout & Hill, 2012). Given the similar histories, minority group status and marginalisation to Australian Indigenous people, these findings have relevance for other Indigenous populations around the world.

Limitations and further directions

The current study contains a limitation common to all PISA studies; including longitudinal studies like the present that use a PISA sample as their base. PISA studies are representative of the in-school population of 15 year-olds. Accordingly, a hidden selection variable exists that excludes from consideration the population of students who have dropped out of school before the age of 15. This tends to be a larger concern for low and middle-income countries compared to countries like Australia (Wils et al., 2019). However, Australian Indigenous students are more likely to drop out of school early. Irregular school attendance can also be a reason for exclusion from PISA. For example, in some rural and remote communities, students could have very irregular attendance due to family mobility and are therefore unlikely to be considered for PISA inclusion (Prout & Hill, 2012; Sarra, 2014). This likely means that the estimation of high-school non-completion for Indigenous students is lower than the likely true rate in the population.

Another limitation is the attrition rate in LSAY, which leads us to focus most strongly on the pathway of students through school at traditional age-graded rates. However, Indigenous students may take non-traditional pathways through school that mean they graduate later or through alternative channels (Biddle et al., 2014; Jorgensen, 2020). It is worth noting, however, that lifetime attainment rates tend to be best for people who take traditional developmental pathways consistent with socially age-graded transitions. Indeed, it is well established that students in the USA who take traditional pathways at typical ages tend to fare better than those who take alternative pathways like the General Education Development test (Rumberger, 2011a).

Finally, future research needs to stretch further into the post-schooling years to explore the long-term attainment outcomes of Indigenous and non-Indigenous students (from different social identity groups) who fail to complete high school. Future research should also focus on developing a model of non-completion for Australian Indigenous students. Rumberger (2011a) summarises several models that provide a useful means to understand why students drop out of high school. While each of these models has some relevance to Indigenous students, there is much to gain from developing a model that incorporates intersectionality and takes into account the special characteristics of Indigenous students.

CONCLUSION

Indigenous children in Australia and other countries around the world are less likely to complete high school than non-Indigenous children. This longitudinal study indicates that a significant contributor to the lower school completion rates for Indigenous students is the primary effect of lower academic achievement rates. Encouragingly, our analysis of potential secondary effects found that Indigenous students' probability of dropping out of high school

were very similar to non-Indigenous students of similar academic ability. Further, the probability of high-school completion for non-Indigenous students was impacted by both location and SES, but not so for Indigenous students. High SES and living in urban settings were identified as protective factors for non-Indigenous students in terms of high-school completion. For Indigenous students, no such protection benefits were evident. The current results suggest that raising compulsory school leaving ages and investing in preschool interventions are likely to improve educational outcomes for Indigenous children and reduce the gap in high-school completion.

ACKNOWLEDGEMENTS

Open access publishing facilitated by Australian Catholic University, as part of the Wiley - Australian Catholic University agreement via the Council of Australian University Librarians.

ETHICAL GUIDELINES

This study was marked as exempt by the university ethics committee because it used publicly available data.

CONFLICT OF INTEREST

The authors report no conflict of interest.

DATA AVAILABILITY STATEMENT

All data are available from the Australian Data Archive Dataverse.

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SUPPORTING INFORMATION

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How to cite this article: Schellekens, M., Ciarrochi, J., Dillon, A., Sahdra, B., Brockman, R., Mooney, J., & Parker, P. (2022). The role of achievement, gender, SES, location and policy in explaining the Indigenous gap in high-school completion. *British Educational Research Journal*, 00, 1–21. <https://doi.org/10.1002/berj.3791>