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Introduction

The importance of motivational factors for explaining differences in educational outcomes is broadly accepted by social scientists, but the explanations themselves vary by discipline. Educational psychologists have found that academic performance is enhanced when students learn to attribute the results they achieve to controllable, internal factors such as effort, rather than to uncontrollable factors (Weiner, 1985). However, a longstanding view in sociology is that the schooling system reproduces status inequalities by reinterpreting these as individual differences in preferred dispositions and behaviors. Children may internalise the legitimacy of status inequalities when they accept the school's meritocratic ethos: that success depends on individual ability, merit and hard work above all else (Bourdieu and Passeron, 1970).

In this article we draw on these contrasting perspectives to investigate the relationship between young people's beliefs about what causes academic success and their educational attainment. We explore how such beliefs can enable young people to assume greater control over their learning, whilst potentially compounding existing educational disparities. By analysing data from Australian secondary students, we examine these issues in a cultural context where meritocratic ideology features in public discourse, in recent educational policies, and in the academic socialisation of Australian youth.

Although Australia has income and wealth inequality above the OECD average, on several measures it is a relatively meritocratic society when compared to similar countries (Kunovich and Slomczynski, 2007; OECD, 2016). Cross-national data from the International Social Science Program (ISSP) show that, compared to other Anglo-Saxon countries such as Canada, Great Britain and New Zealand, Australia has higher levels of actual meritocracy (i.e. a strong positive correlation between education and income levels) and perceived meritocracy (i.e. the belief that people are rewarded for their efforts and skills) (Duru-Bellat and Tenret, 2012; Kunovich and Slomczynski, 2007). Amongst 15-year-old Australian school students participating in the Programme of International Student Assessment (PISA), Marks (2010) found that occupational aspirations were better predicted by academic achievement than by socio-economic status (SES). This effect of achievement relative to SES - another indicator of meritocracy - was stronger for Australia than it was for two-thirds of all developed countries participating in PISA (Marks, 2010).

The PISA data depict Australia as a country in which young people's opportunities for social mobility hinge on their own academic performance, or more precisely, on being able to perform well independently of one's social and class origins. It is unsurprising, then, that declining PISA achievement scores amongst Australian school students, coupled with entrenched achievement gaps according to gender, SES and indigeneity (OECD, 2015), have prompted calls for tougher academic standards, greater emphasis on STEM education over vocational learning, and a doubling down on meritocratic rhetoric (e.g. '*It's high time to foster meritocracy in education*', The Australian, 2013). Similar to the U.S. and the U.K, the quantification of school performance through national standardised testing has become a defining feature of Australian schooling reform (Lingard, 2010). School performance data are published online and used by parents, educators and policymakers to differentiate between apparently effective and ineffective schools, albeit with an option to display 'fair and meaningful' comparisons between schools with students from similar socioeconomic contexts (ACARA, 2016, 1). Yet in reducing student performance to quantifiable factors, such as SES, teacher quality, or school resources, such a data-driven model arguably does not account for how students' academic motivations and beliefs contribute to their educational outcomes (Kohn, 2000). Effective motivational traits are thus identified on the basis of performance - as traits which high-achievers possess and which low-achievers lack - prompting some analysts to suggest that such traits might be reverse-engineered by raising performance standards and remedying those 'stragglers' at risk of falling further behind (Goss et al., 2016, 1). However, similar levels of attainment can mask different levels of subjective effort, motivational resources, and other non-cognitive 'soft skills' of individuals (Gutman and Schoon, 2013). Policy interventions designed to promote values and beliefs that are effective for performance, measured in the aggregate, may therefore be less effective or even counterproductive for students who are coping well given their personal characteristics and structural circumstances.

To examine this proposition, we investigate young Australians' beliefs about what causes academic success, how these relate to their educational outcomes, and how they interact with the broader material advantages and disadvantages they have in life. We do so by drawing on longitudinal survey data on the educational beliefs and pathways of a large cohort (n=2,145) of students attending secondary school in Queensland, Australia, between 2006 (aged 12/13 years) and 2010 (aged 16/17 years).

The cultivation of academic agency and attributional styles

Motivation and locus of control are important concepts for explaining individual differences in academic achievement and human capital formation (Ryan and Deci, 2000; Rotter, 1966). Much research has demonstrated better academic performance amongst intrinsically motivated individuals - that is, those who are driven to engage in activities for their own sake, out of interest or enjoyment (Deci and Ryan, 1985; Linnenbrink and Pintrich, 2002). Since extrinsically motivated students engage in schoolwork as a means to achieving certain ends, such as avoiding punishment or achieving good grades, the impetus for this behavior may be less sustainable in the absence of these external conditions (Ryan and Deci, 2000). Intrinsic and extrinsic motivations orientate an individual's developing locus of control. This latter concept equates to individual agency, or one's sense of whether outcomes are the product of one's own behaviors (internal locus) or external circumstances (external locus) (Rotter, 1966). Australian research has shown that young people with a more internal locus of control are likelier to complete secondary school, to obtain a university entrance rank, and to achieve a higher rank than those with a more external locus of control (Baron and Cobb-Clark, 2010).

According to attribution theorists such as Weiner (1985) and Borkowski et al. (1988), beliefs about what causes academic success and failure are key building blocks of academic motivation and agency. Causal attributions have three dimensions - stability, controllability, and internal/external locus - which combine to shape young people's learning in different ways (Weiner, 2010). For instance, attributions to internal causes tend to reinforce an internal locus of control and intrinsic motivations (Borkowski et al., 1988; Chan and Moore, 2006). Yet while ability and effort are both perceived as internal causes, ability is a stable and uncontrollable factor whereas effort is relatively unstable and controllable. Attributions of the latter type (unstable/controllable) are regarded as particularly beneficial or adaptive (Marsh, 1984). This is because students who perceive failure as resulting from a lack of effort can process this outcome in a way that preserves their self-esteem, whilst identifying a factor they can change in future (i.e. their level of effort). It has been suggested that educational practitioners may improve young people's academic self-concept and achievement by directing their praise or criticism towards such factors (Chan and Moore, 2006).

While attributions for success have been shown to more strongly predict student achievement levels than attributions for failure, the manner in which students reference internal and external factors in both kinds of explanations is also important (McClure et al. 2011). External attributions can lessen the degree of accountability an individual ‘wears’ for his or her learning outcomes (Weiner, 2010). For example, task difficulty and luck are perceived as external causes, but task difficulty is relatively stable and controllable (i.e. by the teacher) whereas luck is unstable and uncontrollable. Attributing successes to either factor (i.e. low difficulty or good luck) can be a form of ‘self-handicapping’ by less confident students, whereas attributing failure to luck rather than task difficulty can also encourage students to persist in the hope of better luck in future (Linnenbrink and Pintrich, 2002). External attributions often contain a relational component, where causes are perceived as linked to individuals such as parents, peers, or teachers (as in the example of task difficulty above). Relationship characteristics, such as the sense of autonomy or closeness individuals feel with respect to those involved in their education, may affect student motivation and attributional beliefs (Ryan et al. 1994). For instance, students whose behaviors are highly regulated by parents or teachers (thus restricting their autonomy) tend to become less interested in their given tasks and more likely to blame poor performance on these broader relationships (Pintrich and Schunk, 2002). Moreover, feelings of closeness or relatedness to teachers and parents can enhance students’ internalisation of academic values and behaviors (Ryan et al. 1994). While some research has explored how parents and teachers influence students’ attributional styles through the feedback and reinforcement they provide, less work has examined relational attributions themselves and how these affect academic outcomes (Martin and Dowson, 2009; see McClure et al. 2011 for an exception).

How children interpret their prior experiences is closely related to their outcome goals and expectations. Goal theorists employ a distinction between ‘mastery’ and ‘performance’ orientations which imply different attributional styles (Elliot 2005; see Hodis et. al, 2015 for a more recent example in this journal). Mastery-orientated individuals adopt task-based goals focused on developing skills and abilities, learning strategies, and effort expenditure, all of which imply belief in the salience of internal factors. By contrast, performance-orientated individuals adopt ego-based goals emphasising favorable performance appraisals and outperforming their peers, which instead imply belief in the salience of environmental or relational factors.

As well as underpinning other aspects of their motivational orientations, young people's attributional styles may also affect their learning outcomes in ways which align with broader socio-educational disparities. Numerous studies report a 'self-serving bias' in the attributional styles of adolescent boys, who learn to attribute academic successes to ability and failures to lack of effort, or external factors, thereby preserving their academic self-esteem and confidence (Burgner and Hewstone, 1993; Meece et al. 2006). By contrast, 'a self-derogating bias' has been found for girls, who more strongly interpret failure as evidence of a lack of ability (Burgner and Hewstone, 1993). Over time and as task difficulty increases, this latter orientation is thought to erode female students' confidence, intrinsic motivation, and agency in cumulative manner known as 'learned helplessness' (Meece et al. 2006). Some theorists contend that parents' and teachers' gender stereotypes, such as the belief that males are better equipped than females to do well in STEM subjects, influence young people's own beliefs about their abilities, thus perpetuating these gendered attributional styles and their associated outcomes (Gunderson et al., 2011; OECD, 2015). In a large study of New Zealand secondary students, McClure et al. (2011) found that attributional styles can also differ by ethnicity, with students from Pacific and Maori groups more likely to attribute their outcomes to their relationships with family, teachers, and peers, than to internal factors.

Bourdieu and Passeron's (1977) theory of social and cultural reproduction describes how similar processes preserve educational disparities between of young people based on other background factors, such as family SES. According to this theory, children enter the schooling system with distinct sets of beliefs and dispositions (referred to as 'habitus') that are heavily influenced by upbringing and their parents' status and resources, and which in turn structure their academic practices. Meanwhile, schools and educators reinforce existing status advantages and disadvantages when they reward students who display certain preferred forms of habitus, both through formal means (e.g. achievement tests) and informal means (e.g. by praising or criticising certain dispositions or behaviors in students). When attributional styles emphasising meritocracy and individual responsibility are preferred, this de-emphasises relational factors, helping to justify and reproduce status hierarchies (Major & Townsend, 2011; Warikoo and Fuhr, 2013). 'Meritocracy' is a widespread attributional belief system in which the distribution of social goods is believed to correspond with the merit and effort displayed by individuals (more so than to background or relational factors (Major & Townsend, 2011)).

Although high-status individuals benefit more from meritocratic beliefs that legitimise their positions, McCoy et al. (2013) note that low-status individuals still endorse such beliefs even when they justify their relative disadvantage. McCoy et al. (2013) note that meritocratic beliefs can serve as a ‘palliative’ for low-status groups, who experience improved self-esteem and physical health as a result of the sense of control which these beliefs afford them. Such findings warrant specific exploration in the context of young people’s academic development. The potential for attributional beliefs to impact differently on young people’s academic agency and outcomes underpins claims about a ‘social inequality of motivation’ compounding other inequalities early in the life course (Walther, 2009, 126). Walther (2009) and others (see Stauber (2007) for an overview) argue that today’s increasingly diverse post-schooling careers place growing emphasis on distinct and unevenly distributed motivational traits. In particular, difficult transitions in which young people have insufficient resources or qualifications to realise their aspirations may require stronger intrinsic motivation and ‘self-serving’ attributions than those in which there are no such obstacles to one’s aspirations.

[FIGURE 1 HERE]

Conceptual framework and research questions

In Figure 1 we outline a conceptual framework for investigating the relationship between young people’s social backgrounds, attributional styles and educational outcomes. While students’ attributional styles encompass their explanations for both success and failure, in this study we focus solely on attributions for success (and changes in these) as a starting point for exploring a wider set of internal and external attributions than is typically examined within the literature. The grey oval at the centre of the diagram represents young peoples’ academic habitus: the set of socially-structured dispositions producing their academic behaviors.

Research question 1 explores the different kinds of attributional beliefs which comprise young people’s academic habitus:

1. What proportions of secondary students attribute their academic success to intrinsic and extrinsic-relational factors?

We explore how these attributional styles mediate the relationship between young people’s social background and context (i.e. the top of the diagram) and their educational behaviors and outcomes (at the bottom of the diagram). Solid lines connecting boxes in the diagram represent relationships which are assumed based on prior research, and dotted lines stand for relationships investigated in our analysis. For instance, background factors such as gender and parental SES are understood to structure habitus both directly (e.g. by exposing

individuals to different formative experiences) and indirectly via other influences on academic dispositions (e.g. parental involvement in schoolwork). Habitus in turn produces varying behaviors (e.g. study practices) and outcomes (e.g. educational attainment). Less clear is how attributional styles moderate these relationships. To assess this, we first examine relationships *a* and *b* connecting young people's attributional styles and educational outcomes (controlling for background factors):

2. How do intrinsic and extrinsic-relational attributions predict academic attainment net of other influences on academic habitus formation?

Prior research suggests that attributing success to internal factors will enhance academic attainment, especially when these are controllable. Outcomes experienced by individuals with such beliefs are interpreted in a way that further strengthens their sense of mastery over such outcomes (i.e. a positive feedback loop). In general, attributions of success to extrinsic factors are likelier to be negatively correlated with academic outcomes. Individuals with such beliefs will interpret their outcomes as further evidence that these are connected to factors beyond their control, thereby degrading their sense of mastery over such outcomes (i.e. a negative feedback loop). However, research suggests that the effect of extrinsic-relational attributions may vary depending on the type of relationship in question. Attributions to close, supportive social or family ties, or relationships over which young people have some autonomy, may be positively correlated with academic outcomes. Finally, by investigating *c* and *d* in Figure 1, we examine whether any linkages between attributional styles and academic outcomes differ according to background factors involved in the reproduction of educational inequalities:

3. How do relationships between attributional styles and academic attainment vary according to other influences on academic habitus formation?

For instance, if the positive and negative feedback loops described above depend on attributional styles which are unevenly held amongst students from higher and lower SES backgrounds, or which are treated differently schools and teachers, these feedback loops may compound differences in academic outcomes between those students.

Methods

Data and Sample

Data for this paper are from waves 1-5 of the Social Futures and Life Pathways ('Our Lives') project, which is a longitudinal survey of young people from the state of Queensland (QLD), Australia. The survey monitors respondents' emerging values, behaviors, and aspirations, as

well as their developing career pathways. Using a QLD-based sample is beneficial for this research as QLD is broadly representative of Australia as a whole in terms of its performance on national testing in 2010, the year in which the cohort completed school (ACARA, 2010). In 2006, an attempt was made to sample all QLD high schools, including private and public schools, and all Year 8 students (i.e. the start of high school; aged 12/13 years) in those schools. This yielded a school-level response of 55% ($n = 213$ schools) and a within-school response of 34% ($n = 7,031$ students). Due to the small size of the research team, it was necessary to rely on teachers nominated by school principals to assist in data collection. This included distributing and collecting consent forms from students and parents, administering the survey in class, and return of all materials by post. Factors impacting on the final school and student response rates included: the involvement of schools in multiple research studies, the level of commitment in terms school resources and classroom time, and the logistics of obtaining active consent from principals, parents and children themselves. In later survey waves participants were contacted directly using contact details they provided during wave 1. These waves were conducted in the middle of high school (2008, aged 14/15), at the end of school (2010, aged 16/17), three years after school (2013, aged 19/20) and five years after school (2015, aged 21/22).

The wave-on-wave retention rate was 52 percent in wave 2 ($n=3,649$), 88 percent in wave 3 ($n=3,206$), 69 percent in wave 4 ($n=2,206$), and 97 percent in wave 5 ($n=2,150$). Our analysis focuses on the relationship between attributional beliefs measured in waves 2 and 3, and schooling outcomes measured in waves 4 and 5. The final analytic sample is a smaller subset ($n=2,145$) of those who completed all or most of these waves and had valid data on key analytic measures. Table 1 contains sample characteristics for the dependent, background and intervening variables.

[TABLE 1 HERE]

Appendix Table A provides details on sample representativeness and attrition. Relative to the target population of all QLD Year 8 students, the wave 1 sample was reasonably representative of young people in different geographic regions and of those born overseas. There was disproportionately higher initial participation, and ongoing retention, of female students, those in (typically wealthier) independent schools, and students with higher self-reported achievement. The sample's representativeness in terms of educational attainment is discussed in the next section. By controlling for factors associated with non-

response and attrition, including all those noted above, our analytic approach addresses these sources of bias (Winship & Radbill, 1994). Nonetheless, we exercise caution as to the generalisability of our findings.

Dependent Variables

The two dependent variables measure young people's educational attainment at the end of high school. The variables are based on entrance scores used to allocate university degree places (known as the 'Australian Tertiary Admission Rankings' or 'ATARs')¹. ATARs are calculated using students' grades in the final two years of high school, and their performance on a state-wide examination at the end of school. ATAR-eligible students receive percentile scores ranging 0 from 99.95, situating their performance relative to their cohort. Students may not be eligible for a rank if they leave school without completing Year 12 (e.g. in order to seek full-time work), or if they completed more vocationally-orientated courses or subjects resulting in a qualification other than an ATAR.

Accordingly, we analyse binary and continuous measures relating to university entrance rankings. This has become a common approach for analysing such outcomes in Australia (Baron and Cobb-Clark, 2010) as it allows us to examine differences between young people who take tertiary and vocationally-orientated post-schooling pathways. The binary measure distinguishes between two groups: (1) students who received a 'competitive' entrance rank, i.e. an ATAR that was above a given cut-off point; and (2) all those school-leavers (irrespective of whether they received an ATAR) who did not. Although many below 70 ATAR students attend university, below this cut-off the proportion of applicants decreases significantly, as does the likelihood of these applicants being admitted into their first preference course/institution (DEEWR 2011). The continuous measure for analysis is the distribution of ATARs achieved by all school-leavers who received one.

A vast majority (over 70%) of all QLD school leavers who applied to university in 2010-11 with ATARs above 70 received and accepted offers of a university place. Attrition has resulted in an underrepresentation of below 70 ATAR students in the longitudinal sample - 29 percent (n=622) compared to 60 percent in the QLD population in 2010 (QLD Government, 2011). Nonetheless, these students are included in sufficient numbers to explore the relationship between their attributional beliefs and non-tertiary pathways from school.

¹ Since QLD employs a different ranking system to the Australian Tertiary Admission Ranking (ATAR) system, we have converted the QLD scores to ATARs using the same procedure undertaken for interstate tertiary admissions.

The continuous ATAR measure was also skewed towards higher attainment when compared with the overall Year 12 population in 2010 (QSA 2010). The mean ATAR for QLD school leavers in 2010 was approximately 77, whereas for the analytic sample it was 82.7.

Background Variables

To help ensure that any observed relationships between attributional beliefs and educational attainment are specific to the time period under examination (i.e. secondary school), we controlled for respondents' self-reported academic performance when they began high school in wave 1. This was measured using Trapnell's (1994) 'Smart Scale', a well-established self-assessed proxy measure of IQ. Background factors affecting educational performance were controlled for. Young Australian males are generally less likely than females to receive a university entrance rank, and those who do are on average ranked lower than females in terms of performance (Baron and Cobb-Clark, 2010). Sex is controlled for with a dummy variable coded 0=Male and 1=Female. A school sector variable, measured at wave 1, differentiates between three main school types: public State schools, private independent schools, and private Catholic schools. Independent schools have certain characteristics, such as exclusive admission processes, high fees, and low pupil-teacher ratios, which reproduce educational advantages at the expense of students in State or Catholic schools (Dearden et al. 2011). Educational attainment and university participation is lower amongst young people living outside major cities in Australia, who are likelier to undertake vocational training (Lamb and McKenzie, 2001). Geographic location at wave 1 is controlled for with a measure of whether a respondents' postcode was inside or outside a major city.

Parental SES is a key determinant of educational performance. Wealthier and better-educated parents have been found to devote more attention and resources to cultivating their children's academic dispositions (Coleman 1988). To assess parental SES, respondents were asked about their mother's and father's education and occupation in waves 1-3. The measures employed here are based primarily on wave 1 data, with data from waves 2 or 3 substituted in cases where earlier data was missing or unknown. Parental education is coded as follows: 1=Tertiary or higher; 2=Vocational; 3=Year 12 or less; 4=Missing or unknown. Responses to an open-ended parental occupation question were coded as 1 = Managers and professionals, 2= Working-class occupations; 3=Not in the labour force (NILF), missing or unknown (i.e. 'Don't know'). Changes affecting family arrangements may moderate parental influences on educational performance by altering the parental contact and support young people receive. In waves 1-3, respondents were asked about their parental union status. A cross-wave

parental union measure was created with four groups: (1) “Stable couple”: where a union between parents/carers persisted across waves 1-3; (2) “Dissolved”: where such a union was present in wave 1 but not in waves 2 or 3; (3) “Stable lone/other”: where respondents lived with a single parent, or in some ‘other’ arrangement, across waves 1-3; (4) “Re-partnered”: where a single parent/‘other’ arrangement in wave 1 was replaced by a union in wave 2 or 3.

Intervening variables

Several other relational factors likely to moderate young people’s attributional beliefs and educational outcomes were accounted for². The extent to which young people feel that they are influenced by various personal relationships was one such factor. Respondents were asked “*How much do the following people influence your decisions about your future?*” with reference to the following items: Father or male carer, mother or female carer, grandparents, teachers, and friends. The possible response options were coded as follows: “*Never*” = 0; “*To some extent*” = 1; “*A lot*” = 2; “*Not applicable*” = missing. Items were repeated across waves 1-3, allowing cross-wave averages to be calculated.

Parental encouragement of school work was accounted for with a question asking “*How often do your parents do the following?*” Amongst the included items were “*Check if you have done your homework*”, “*Help you with your homework*” and “*Give you special privileges because of good grades*” (responses ranging from 1 = “*Never*” to 4 = “*Often*”). Participation in structured extra-curricular activities may also affect educational attainment and aspirations by exposing young people to opportunities to interact with peers who have different values, resources and abilities. We control for the frequency of respondents’ participation in six clubs/activities: sports, religious/church, hobbies, performing arts, community/volunteering, music/band/choir (ranging from 0 = “*Never*” to 4 “*Everyday*”). Indices for both parental encouragement and extracurricular involvement were created for waves 2 and 3, allowing cross-wave averages to be generated.

Explanatory measures

The analysis investigates how young people’s attributions for academic success predict their educational attainment. In waves 2 and 3, respondents were asked on a 5-point Likert scale ‘*How important are the following factors in succeeding at school?*’ The measure was adapted from an earlier Australian study (Cooper, 2001) with two new items added. This measure was selected due to its mix of intrinsic (e.g. ‘*Own abilities and talents*’) and extrinsic-relational

² To produce a better model fit, not all factors initially accounted for were retained in the final models. Here we only describe those variables which were retained due to their significance in preliminary models.

(e.g. ‘*Having rich parents*’) attributions and its previous validation with a similar cohort. Although this measure explores a broader range of attributions than typically considered in previous research, the lack of a more widely employed measure (at the time of survey design in 2007-08) does limit the scope for direct comparability with such research. Nonetheless, the measures approximates concepts that will be familiar to researchers of attributions, outcome goals, and academic motivation more generally. Intrinsic attributions involving effort (i.e. ‘hard work’) and ability - which align with concepts such as intrinsic motivation and mastery goals - are represented. Extrinsic-relational factors, such as ‘Competing with one’s peers’, align with the idea of performance goals and are linked to the concept of extrinsic motivation. Table 2 shows the means and standard deviations for each beliefs at each wave, as well as the change between waves and whether this change was statistically significant. For the analysis, we generated cross-wave averages for all attribution measures as well as measures of change between waves. We examined correlations between these measures and the two outcome variables. Attributions highlighted in Table 2 were correlated with one or both outcomes, net of the other attribution measures; only these measures are included in the final analysis³.

[TABLE 2 HERE]

In line with prior research, including the earlier study in which these measures originated (Cooper, 2001), respondents attributed their success more frequently to intrinsic factors, such as hard work, ability/talent, and having a good study habits. Extrinsic-relational attributions for success were less widely held. One notable exception to this was attribution of success to having a supportive family. Most beliefs weakened between waves, highlighting the dynamic nature of respondents’ attributional styles during the final years of schooling. Consistent with an emphasis on individual performance and self-responsibility during this time, belief in the importance of ‘having educated parents’ and ‘popularity among pupils’ displayed the largest decreases, whilst belief in the importance of ‘competing with others’ and ‘having good habits’ increased between waves.

Finally, we undertook a factor analysis to examine whether the attribution measures were indicative of underlying attributional styles (see Appendix Table B). The results indicate two factors accounting for half of the variation on these measures, and which display a weak positive association with one another. The primary factor includes all intrinsic

³ One notable omission resulting from this was the belief in the importance of one’s own abilities or talents, which was no longer associated with either outcome when all other attributions were present. This may be due to a mixture of other internal attributions which together account for its effect.

attributions and the secondary factor includes most extrinsic-relational factors. However, we note that two attributions that may be conceptualised as extrinsic-relational ('having a supportive family' and 'doing what teachers say') aligned more closely with the intrinsic attribution set. Thus, while this intrinsic/extrinsic distinction is a useful heuristic tool, it likely does not fully reflect how certain relational factors are perceived and internalised by young people. By accounting for each attributional belief individually in the analysis we explore how these beliefs relate to academic outcomes in a finer-grained way.

Analytic Approach

Our analysis examines the relationship between attributional beliefs and two measures of educational attainment. First, logistic regression analysis is used to analyse whether or not respondents received a competitive university entrance rank (i.e. ATAR score of 70+). This binary measure is coded 0 = Did not receive a competitive rank; 1 = Received competitive rank. Coefficients for these models are presented as odds ratios. Next, we analyse differences in the rank attained by only those respondents who received one, using ordinary least squares (OLS) regression. The original ATAR measure has been rescaled to create a new measure ranging 0-100, where each unit equates to a percentage increase or decrease in rank.

The analysis for each dependent variable proceeded in four stages. First, we identified those measures in each of the variable blocks (i.e. background, intervening and explanatory variables) which best predicted each outcome measure. To do so, separate models (not displayed here) were estimated for each variable block, and only measures that were significantly associated with each outcome were retained in the final analysis⁴. The second step involved modeling each outcome measure on the independent and intervening variables, before adding in the attributional belief measures in the third step. In the fourth step, we conducted interaction tests to see whether the relationship between attributional beliefs and attainment differed according to other predictors in the earlier models. All models included an option to account for within-school clustering when calculating standard errors, allowing for more robust tests of significance. All analyses were run in Stata 13 (StataCorp 2013).

Results

Receiving a Competitive University Entrance Rank

⁴ Two measures of ethnicity (a respondents' country of birth and their parents' country of birth) were omitted during due to lack of association with the outcome measures (net of other background factors).

Table 3 displays the results for the logistic regression models analysing the odds of receiving a competitive (ATAR 70+) university entrance rank. Model 1 (column 1) examines how the odds of receiving a competitive rank vary after controlling for self-assessed intelligence, background measures, and intervening measures. The odds ratio for the Smart Scale (1.1, $p < 0.001$) indicates that, after controlling for the other measures, every one point increase in self-assessed intelligence at wave 1 predicted a 10 percent increase in a respondents' odds of receiving a competitive rank five years later. A respondent's gender, schooling sector, and geographic region all predicted their likelihood of being competitively ranked. Female respondents were around 50 percent likelier to receive a competitive rank than their male counterparts, and students in independent schools were 2.3 times likelier than State school students to obtain such a rank. Meanwhile, respondents who grew up in a regional or rural area were 30 percent less likely than urban residents to receive a competitive rank.

Parental background was also found to be important. Respondents whose parents/carers separated or re-partnered while they were in high school were, respectively, 50 percent and 30 percent less likely to receive a competitive rank than those whose parents/carers remained stably partnered. The association between parental occupation and receiving a competitive rank was similar in size and significance for mother and father. In either case, a respondent whose parent was employed in a working class occupation was less likely to receive a competitive rank than if their parent held professional or managerial employment. There was a similar, albeit larger, negative association for respondents whose mothers were classified as not in the labor force, or having missing/unknown occupational data. Of all the intervening measures considered, only one - the influence of grandparents on decisions about the future - was significant. Every one unit increase in perceived influence of grandparents predicted a 40 percent decrease in the odds of receiving a competitive rank.

[TABLE 3 HERE]

Model 2 incorporates key measures of respondents' attributional beliefs in the final years of high school. Respondents who attributed academic success to hard work, competing with others, and a positive attitude to school work were significantly likelier to receive a competitive rank. Conversely, those who attributed success to obeying their teachers and having a supportive family were less likely to receive such a rank. Of all these beliefs, it was the emphasis on hard work which displayed the strongest association: each increment in the level of importance placed on effort (on a scale of one to five) predicted a 70 percent increase in their chances of being competitively ranked at the end of high school.

Lastly, we tested for interactions between background/intervening measures and attributional beliefs. Five significant interactions were identified and included in Model 3. The positive association for belief in hard work was stronger for females than it was for males. Figure 2a plots the predicted marginal probabilities of obtaining a competitive rank across each level of importance placed on hard work. The results show that belief in hard work was associated with larger increases in the odds of being competitively ranked for female students than it was for male students. Meanwhile, the positive effect of a belief in competing with others was significantly weaker for rural students than for urban students. Figure 2b shows that the increases accompanying this belief are almost solely confined to students living in urban areas, and virtually non-existent for regional/rural students.

[FIGURE 2 HERE]

For two beliefs negatively associated with receiving a competitive rank, there were notably different experiences for respondents with vocationally-educated mothers. As shown in Figures 2c and 2d, for these respondents, the association for a belief in obeying teachers was reversed from negative to positive, whilst the negative association for a belief in having a supportive family grew stronger at higher levels of importance (relative to the other education groups). Finally, the negative association between belief in having a supportive family and achieving a competitive rank weakened as the perceived influence of grandparents increased.

Tertiary Entrance Rank Attained

Table 4 displays the results for the OLS regression models examining the rank attained by those who received a university entrance rank at the end of high school. The rank measure has been rescaled to 0-100 so that coefficients represent a percentage increase or decrease in rank achieved. Model 1 accounts for self-perceived intelligence, as well as the background and intervening measures found to be significant in the preliminary models. Each increase in respondents' self-perceived intelligence in wave 1 predicted a 1.4 percent increase in their rank at the end of high school: put differently, a 20 percent increase on this measure equates to a 10 percent increase in the rank they attained five years later.

[TABLE 4 HERE]

Of the background measures included, schooling sector and parental occupation are significantly correlated with respondents' educational attainment. On average, independent school students' entrance ranks were around 8 percent higher than those of State school students. Mother's and father's occupation displayed similar associations as in the previous

models. Respondents with mothers or fathers in working class occupations achieved ranks that were 3.5 percent and 5 percent lower, respectively, than those whose parents who were managers or professionals. For respondents whose mothers were not in the labour force, or had unknown or missing occupational data, the negative association was larger still. Two intervening measures predicted significant decreases in rank attained. Parental involvement such as helping with or checking homework, or rewarding good grades, was negatively associated with the respondents' ranks. Each one unit increase on this parental involvement scale (0-12) corresponded with a 1.2 percent decrease in respondents' ranks. Increases in the perceived influence of grandparents on respondents' decision-making were also negatively associated with entrance ranks.

Model 2 accounts for respondents' attributions for academic success. The three beliefs that positively predicted achieving a competitive entrance rank (hard work, competing with others, and a positive attitude to school work) were also found to increase the rank that respondents attained. Once again, the strongest of these associations was for the belief in hard work: each increase in the importance a respondent placed on hard work corresponded with an increase of around 6 percent in rank. While the belief in obeying teachers remained a significant negative predictor (as it was in the previous set of analyses), another attributional belief was negatively associated with respondents' entrance ranks. Respondents achieved lower ranks when they attributed academic success to having rich parents: for every one level increase in importance they placed on this factor they experienced 3 percent decrease in rank.

Model 3 includes five significant interactions identified during interaction tests. First, the positive association for a belief in hard work was weaker for rural/regional students than for their urban counterparts. The results of this interaction are illustrated in Figure 3a. The shallower incline displayed for rural/regional respondents indicates that these respondents experienced smaller increases in achievement relative to urban students who displayed similar attributions to hard work.

[FIGURE 3 HERE]

Figures 3b and 3c display how associations for several beliefs vary by mother's education. Believing that academic success depends on a positive attitude towards school work was less positively associated with a respondent's rank if they had a mother who was not educated past high school (Figure 3b). Meanwhile, the negative association between rank attained and the belief in obeying teachers was reversed for respondents whose mothers were either

vocationally educated or received no education beyond high school (Figure 3c). Lastly, the perceived influence of grandparents on respondents' decision-making increased the positive association for the belief in hard work and produced a more negative association for the belief in having a supportive family.

Discussion

In this paper we investigated the relationship between attributions for academic success and educational attainment. Our first research question addressed the prevalence of different kinds of attributions for success amongst young Australians. Consistent with Cooper (2001), we found that self-attributions for academic success were widespread and increasing amongst Australian youth during the final years of school, whereas most extrinsic-relational attributions were less common and decreased during this period. One exception to this was a new item - *'having a supportive family'* - added in this current study. The popularity of this belief is noteworthy given that it was negatively correlated with both outcome measures. Accounting for a similar finding in the New Zealand context, McClure et al. (2011) cites the 'Tall Poppy' culture in Australia and New Zealand (whereby successful individuals are the likeliest to attract social disapproval) as one reason why young people may be hesitant to attribute their success to internal traits alone.

Our second question concerned the relationship of these attributions to young Australians' educational attainment. Beliefs crediting academic success to unstable and controllable internal factors, such as hard work and a positive attitude to schoolwork, positively predicted both outcomes. Previous research shows that such beliefs - which share much in common with a 'mastery' orientation in goal theory - can enhance academic development by reinforcing students' internal locus of control and intrinsic motivation (Chan and Moore, 2006; Hodis et. al. 2015; Marsh, 1984). Beliefs linking success to having rich or highly educated parents, having supportive family, and obeying teachers were negatively associated with educational attainment. While the latter two of these beliefs may be closely associated with other intrinsic attributions, they still stand apart from such attributions in terms of their effects on academic outcomes. Ultimately, these are all social or relational causes over which respondents have little control, or in the case of obeying teachers, which entail relinquishing of autonomy. These findings are consistent with our expectations that such attributions would generally impede academic development by reinforcing students' external locus of control and extrinsic motivations (Ryan and Deci, 2000). By contrast, respondents who attributed success to competing with their peers displayed higher

educational attainment. To the extent that this belief implies a ‘performance’ orientation, whereby individuals seek favorable performance appraisals, the results suggest that such individuals would not benefit as much as those with ‘mastery’-type attributions. However, as with intrinsic and extrinsic-relational attributions more generally, there is no reason why students’ tendencies toward mastery and performance cannot complement one another at times. Students may view peer competition as a more proximate, controllable cause, one located in their immediate networks and which reinforces both intrinsic (i.e. enjoyment) and extrinsic (i.e. peer approval) motivations. This finding adds to a growing body of literature indicating the importance of peer relationships for academic motivation and achievement (Martin and Dowson, 2009).

As per research question 3, our analysis identified several relationships between young people’s attributional styles and educational outcomes that varied according to other influences on academic habitus formation. When they attributed success to effort, female students experienced higher odds of receiving a competitive entrance rank than males with comparable beliefs. Given that tertiary entrance ranks are based on students’ grades, such findings have implications for attempts to remedy entrenched gender differences in particular subjects. For instance, teachers praising students’ effort in STEM subjects might help address the lower levels of self-confidence and achievement widely reported for female students in areas such as mathematics (Burgner and Hewstone, 1993; OECD, 2015). At the same time, employing a similar approach may be less likely to close the gap for male students in subjects where they tend to lag behind females, such as reading (OECD, 2015). The relationship between geographic region and educational attainment was similarly moderated by this belief in hard work. In addition to this, our earlier finding of a potential benefit for students who attribute success to peer competition was also contingent on region: that is, the positive role of such beliefs only applied to students in urban areas. Such differing effects likely factor into the lower tertiary participation of rural youth (Lamb and McKenzie, 2001).

Parent and family ties also moderated the role of attributional beliefs in important ways. While students who attributed success to obeying teachers (i.e. external regulation) generally displayed poorer academic outcomes, this was less apparent for respondents with a vocationally educated mother. These students may perceive external regulation of their academic behavior in a way that does not impede their sense of agency as it does for other students. When these same respondents emphasised the importance of supportive family to their academic success, this was more negatively associated with their odds of receiving a

competitive rank than it was for other respondents. For many of these students not receiving such a rank is consistent with longer-term plans to pursue a more vocational career; a 'supportive family' may be one that values or encourages this aspiration and rejects stereotypes about the capabilities of students who choose such a path. Taken together, the findings suggest that the children of vocationally educated parents may inherit attributional styles emphasising vocational rather than academic models of merit and status - for instance, placing greater value on compliance and alternative learning pathways and 'mastery' goals. This interpretation is consistent with recent research showing that more students value university education, the likelier they are to display a self-enhancing attributional style (Dong et al. 2015). The perceived influence of grandparents on respondents' decision-making, which predicted lower educational attainment and achievement, may be indicative of less overall parental involvement in young people's academic development. In lieu of such parental support, grandparents play a key role in facilitating respondents' academic agency, enhancing the positive role of attributions to hard work and weakening the negative role of attributions to supportive family.

Conclusion

This study builds on existing research in several ways. First, it explores the role of a broader mixture of attributions than is typically examined in such research, enabling us to account for young people's beliefs about their own academic agency alongside their beliefs about influences in their social environment. Consistent with attribution theory, and background data showing Australia to be a relatively meritocratic society, this paper confirms the wide distribution and 'self-enhancing' nature of academic beliefs emphasising individual effort and de-emphasising reliance on others. Second, our confidence in this assertion stems from analysis of data from a large and diverse cohort of young people across their five years in secondary school, with rigorous controls for demographic, socioeconomic and other potentially confounding contextual factors. Yet as much as our findings show this self-enhancing attributional style to be adaptive for young people in the aggregate, we have also argued that motivational processes do not operate independently of the socio-structural influences on academic habitus formation. In this regard, a third contribution of this paper is in our attempt not only to reconcile theoretical insights about processes outlined in educational psychology and sociology, but also to test the interactions between these processes empirically. If beliefs in hard work and peer competition are indeed less beneficial for rural students than they are for urban students, and if children from vocationally educated

backgrounds inherit attributional styles that prepare them for vocational pathways of their own, we argue that such findings lend support to claims of a social inequality of motivation (Walther, 2009). Contrary to meritocratic ideals in education, which depict social mobility as contingent on merit and hard work above all else, these are examples where young people's motivational attributes, and the educational outcomes associated with these, are distributed in ways that may reproduce existing structural inequalities (Bourdieu and Passeron, 1970).

We acknowledge several limitations of this study that future research may address. To explore a wider range of internal and external attributions, and their interactions with socio-structural factors, we restricted our focus to students' attributions for success. This limits our capacity to draw direct conclusions about students' attributions for failure. Our focus on diverse attributions also meant it was difficult to replicate previous research on attributions and outcome goals. However, we are confident that our attribution measure has sufficient commonalities with such research to enable general comparisons to be drawn. As with much longitudinal research involving young people, non-response and attrition bias are issues potentially restricting the generalisability of our findings. By underrepresenting many young people at the margins of the educational system, our estimates may understate the true prevalence of extrinsic-relational attributions amongst all young people, thereby masking the full extent to which attributional styles reproduce educational inequalities. Although the sample included a representative proportion of children born overseas, a larger overall sample would have also enabled us to explore the role of attributions across different ethnic sub-groups, as has been done elsewhere (McClure et al., 2011). Finally, we encourage further research to qualitatively examine how gender, region, and family background shape young people's perceptions of academic success and its causes in ways that potentially challenge mainstream understandings of meritocracy.

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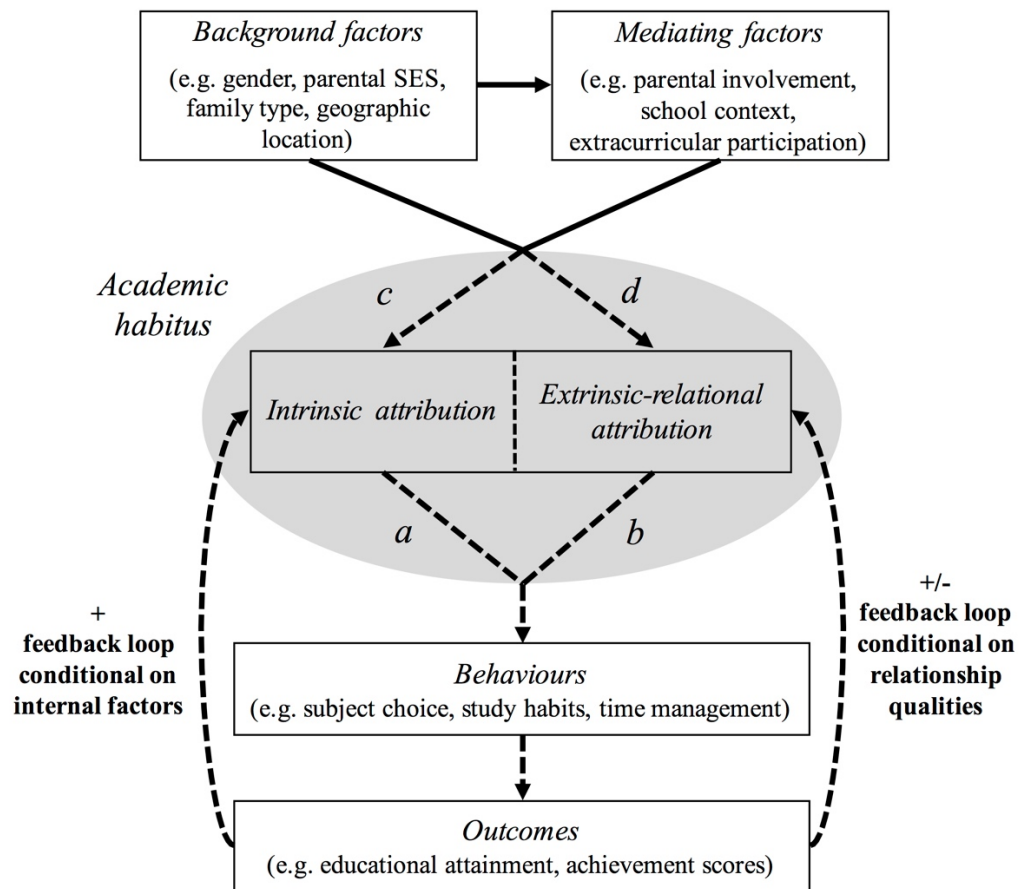
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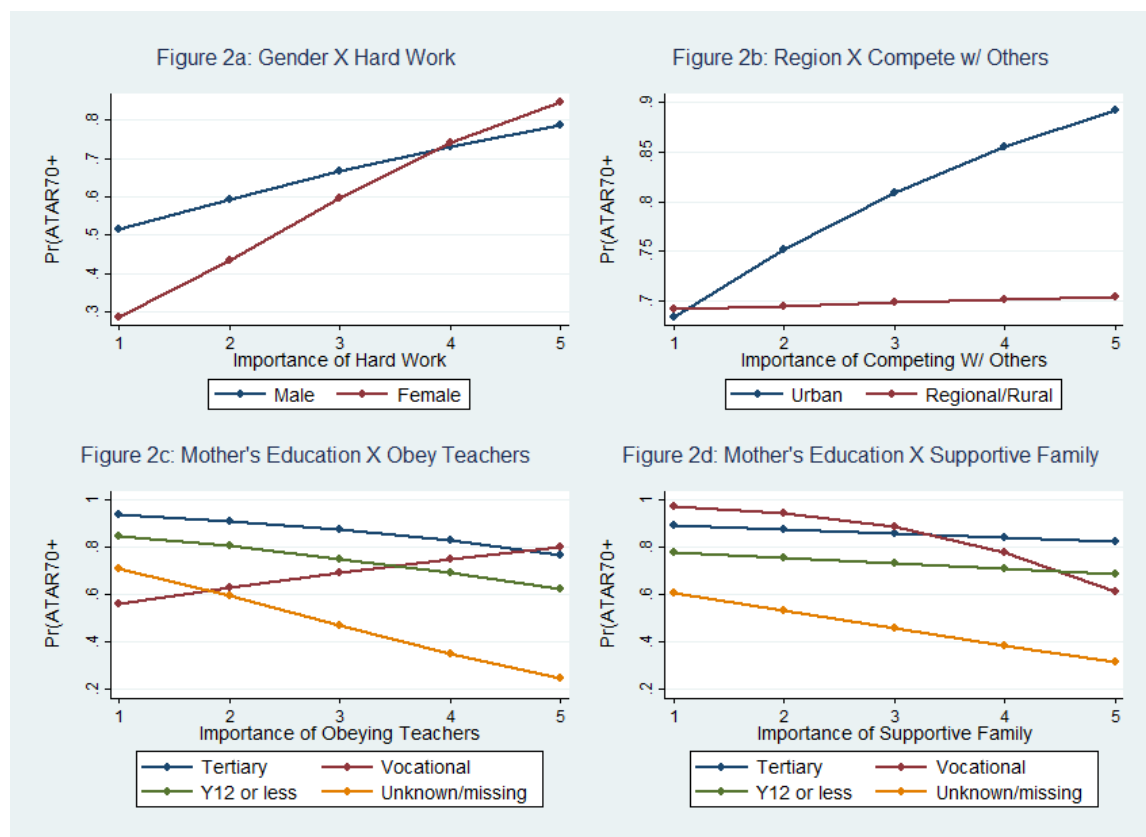
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Figure 1: Conceptual framework relating attributional styles to educational inequalities



Figures 2a-2d: Plot of predicted marginal probabilities for significant interaction terms



Figures 3a-3c: Plot of predicted marginal probabilities for significant interaction terms

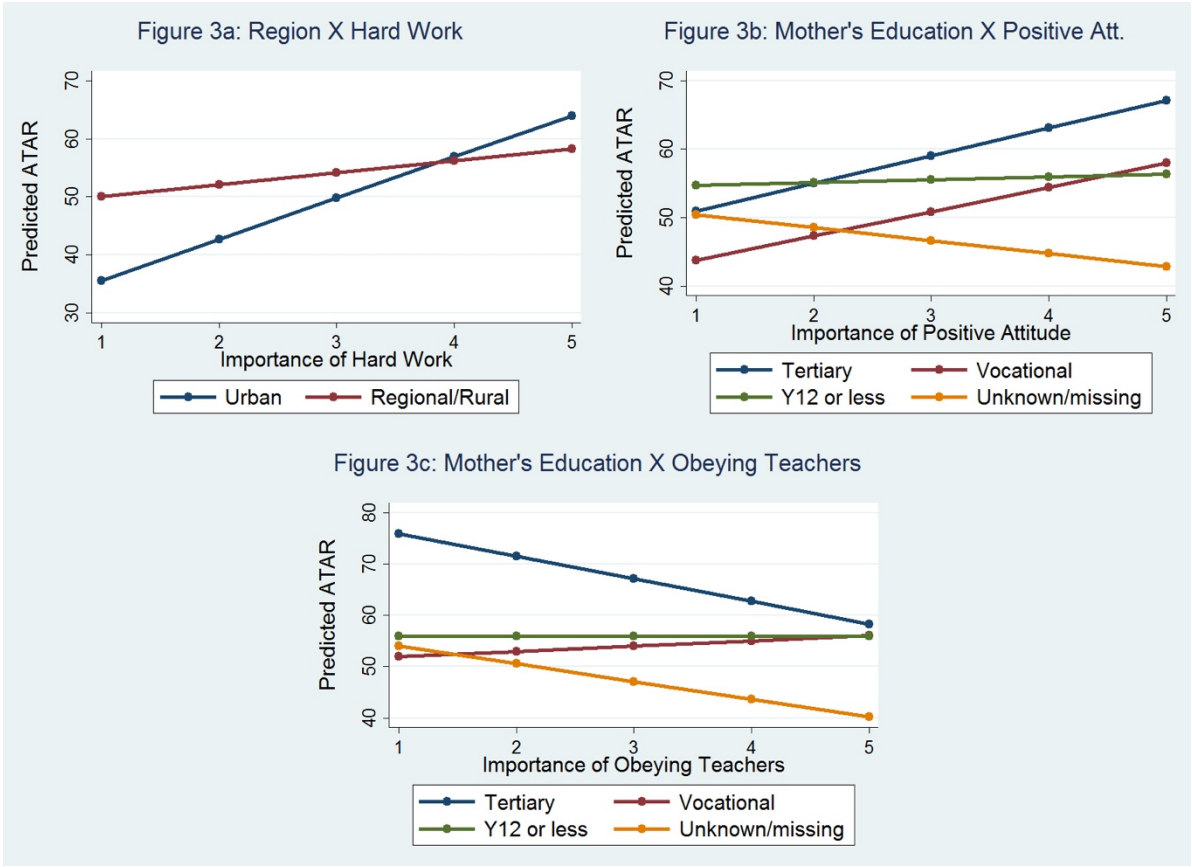


Table 1: Frequency distributions for key analytic variables

Variable	N	% / Mean (Std. Dev)
<i>All respondents</i>	2,145	--
Dependent variables		
<i>ATAR above 70</i>		
No	622	29.0%
Yes	1,523	71.0%
<i>Rank Achieved</i> (99.95=Highest; 30 or below=Lowest)	1,812	82.7 (12.6)
Background variables		
<i>Smart Scale (4-36)</i>	2,145	24.12 (7.1)
<i>Gender</i>		
Male (Ref.)	782	36.5%
Female	1,363	63.5%
<i>School Sector</i>		
State (Ref.)	919	42.9%
Independent	838	39.1%
Catholic	388	18.1%
<i>Geographic Region</i>		
Urban (Ref.)	1,476	68.8%
Non-urban	669	31.2%
<i>Parental Union Status</i>		
Stable couple (Ref.)	1,632	76.1%
Dissolved	133	6.2%
Stable lone/other	182	8.5%
Repartnered	195	9.1%
Missing	3	0.1%
<i>Mother's occupation</i>		
Managerial/ Professional (Ref.)	1,031	48.1%
Working-class	939	43.8%
NILF/Unknown/Missing	175	8.2%
<i>Father's occupation</i>		
Managerial/ Professional (Ref.)	1,187	55.3%
Working-class	933	43.5%
NILF/Unknown/Missing	25	1.2%
<i>Mother's education</i>		
Tertiary (Ref.)	943	44.0%
Vocational	327	15.2%
Year 12 or less	834	38.9%
Unknown/Missing	41	1.9%
<i>Father's education</i>		
Tertiary (Ref.)	816	38.0%
Vocational	567	26.4%
Year 12 or less	698	32.5%
Unknown/Missing	64	3.0%
Intervening variables		
<i>Extracurricular participation (0-28)</i>	2,145	6.02 (4.1)
<i>Avg. parental incentives (0-12)</i>	2,145	5.96 (2.5)
<i>Change in parental incentives (-12-9)</i>	2,145	-0.55 (2.34)
<i>Avg. father's influence (0-2)</i>	2,145	1.46 (0.5)
<i>Avg. grandparents' inf. (0-2)</i>	2,145	0.79 (0.5)

^Reference category

Table 2: Attributional belief measures

Variable	W2 Mean (Std. Dev)	W3 Mean (Std. Dev)	Change (%)
Hard work	4.39 (0.69)	4.36 (0.79)	- 0.03 (-0.6%)
Supportive family	4.26 (0.85)	4.19 (0.91)	- 0.07*** (-1.6%)
Own abilities & talents	4.22 (0.73)	4.15 (0.76)	- 0.06*** (-1.4%)
Having good habits	4.13 (0.78)	4.18 (0.80)	+ 0.05** (+1.3%)
Positive attitude	4.09 (0.81)	4.06 (0.88)	- 0.03 (-0.8%)
Quick to adopt	3.98 (0.77)	3.90 (0.81)	- 0.08*** (-2.0%)
Obey teachers	3.77 (0.85)	3.76 (0.89)	- 0.01 (-0.3%)
Popularity among pupils	2.91 (0.96)	2.72 (1.01)	- 0.19*** (-6.6%)
Compete w/ other pupils	2.86 (1.04)	2.93 (1.09)	+ 0.07** (+2.4%)
Educated parents	2.75 (0.99)	2.54 (1.03)	- 0.21*** (-7.6%)
Rich parents	1.95 (0.86)	1.94 (0.88)	- 0.1 (-0.5%)

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

Table 3: Logistic regression of odds of receiving competitive entrance rank (ATAR70+)

	(1) b	CI 95	(2) b	CI 95	(3) b	CI 95
<i>Smart Scale (4-36)</i>	1.1***	1.1, 1.1	1.1***	1.1, 1.1	1.1***	1.1, 1.1
Background Measures						
Female	1.5***	1.2, 1.8	1.4**	1.1, 1.8	0.3	0.1, 1.5
<i>School Sector</i>						
State (ref.)	--	--	--	--	--	--
Independent	2.3***	1.6, 3.2	2.2***	1.5, 3.1	2.2***	1.5, 3.1
<i>Geographic Region</i>						
Urban	--	--	--	--	--	--
Regional/Rural	0.7*	0.5, 0.9	0.7*	0.6, 1.0	1.8	0.8, 4.0
<i>Parental Union Status</i>						
Stable couple (ref.)	--	--	--	--	--	--
Dissolved	0.5**	0.4, 0.8	0.6**	0.4, 0.9	0.6*	0.4, 0.9
Repartnered	0.7*	0.5, 1.0	0.7	0.5, 1.0	0.7	0.5, 1.1
<i>Mother's Occupation</i>						
Managers/Professionals (ref.)	--	--	--	--	--	--
Working class	0.6***	0.5, 0.8	0.6***	0.4, 0.7	0.6***	0.4, 0.7
NILF/Unknown/Missing	0.4***	0.3, 0.6	0.4***	0.3, 0.6	0.4***	0.3, 0.6
<i>Father's Occupation</i>						
Managers/Professionals (ref.)	--	--	--	--	--	--
Working class	0.7***	0.5, 0.8	0.7***	0.5, 0.8	0.7***	0.5, 0.8
<i>Mother's Education</i>						
Tertiary (ref.)	--	--	--	--	--	--
Vocational	0.9	0.6, 1.2	0.9	0.6, 1.2	1.2	0.1, 15.8
Year 12 or less	0.8	0.7, 1.1	0.8	0.6, 1.1	0.6	0.1, 3.1
<i>Father's Education</i>						
Tertiary (ref.)	--	--	--	--	--	--
Vocational	0.8	0.6, 1.2	0.8	0.6, 1.1	0.8	0.6, 1.2
Year 12 or less	1.0	0.8, 1.3	1.0	0.8, 1.3	1.0	0.8, 1.3
Intervening Measures						
Avg. Grandparents' Influence	0.6***	0.4, 0.7	0.5***	0.4, 0.7	1.8	0.6, 5.3
Attributional Beliefs						
Hard work	--	--	1.7***	1.3, 2.0	1.4*	1.0, 1.8
Compete with other pupils	--	--	1.2**	1.1, 1.4	1.4**	1.2, 1.6
Positive attitude	--	--	1.5**	1.2, 1.8	1.4**	1.1, 1.8
Obey teachers	--	--	0.8*	0.7, 1.0	0.7*	0.5, 0.9
Supportive family	--	--	0.8**	0.7, 0.9	1.1	0.8, 1.5
Positive attitude – difference	--	--	0.9	0.8, 1.0	0.9	0.8, 1.0
Obey teachers - difference	--	--	1.1	1.0, 1.2	1.1	1.0, 1.2
Interaction Terms						
Female X Hard work	--	--	--	--	1.4*	1.0, 2.0
Regional/Rural X Competing with others	--	--	--	--	0.7*	0.6, 1.0
Mother: Vocational X Obey teachers	--	--	--	--	2.0**	1.3, 3.1
Mother: Vocational X Supportive family	--	--	--	--	0.5**	0.3, 0.8
Grandparents' Inf. X Supportive family	--	--	--	--	0.8*	0.6, 1.0
No. of obs.	2145		2145		2145	
Pseudo R2	0.19		0.22		0.23	

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

Table 4: OLS Regression of tertiary entrance ranking attained (0-100)

	(1)		(2)		(3)	
	b	se	b	se	b	se
<i>Smart Scale (4-36)</i>	1.4***	0.1	1.3***	0.1	1.3***	0.1
Background Measures						
Female	1.5	1.2	0.8	1.2	0.8	1.2
<i>School Sector</i>						
State (ref.)	--	--	--	--	--	--
Independent	8.2***	1.3	7.6***	1.3	7.7***	1.3
Catholic	2.5	1.8	1.8	1.8	1.7	1.8
<i>Geographic Region</i>						
Urban	--	--	--	--	--	--
Regional/Rural	-1.0	1.4	-0.8	1.3	22.7**	8.1
<i>Mother's Occupation</i>						
Managerial/Professional	--	--	--	--	--	--
Working-class	-3.5**	1.1	-3.8***	1.1	-3.6**	1.1
NILF/Unknown/Missing	-7.8***	2.1	-7.9***	2.0	-7.5***	2.1
<i>Father's Occupation</i>						
Managerial/Professional	--	--	--	--	--	--
Working-class	-5.0***	1.1	-4.7***	1.1	-4.9***	1.1
<i>Mother's Education</i>						
Tertiary	--	--	--	--	--	--
Vocational	-2.1	1.6	-2.5	1.5	-2.2	1.5
Y12 or less	-1.7	1.2	-1.5	1.2	-1.3	1.1
<i>Father's Education</i>						
Tertiary	--	--	--	--	--	--
Vocational	-2.1	1.6	-2.5	1.5	-2.2	1.5
Y12 or less	-1.7	1.2	-1.5	1.2	-1.3	1.1
Intervening Measures						
Parental involvement scale	-1.2***	0.2	-1.3***	0.2	-1.2***	0.2
Avg. Grandparents' Inf.	-4.4***	1.1	-3.8***	1.1	-11.8	8.4
Attributional Beliefs						
Hard work			5.7***	1.0	3.7*	1.7
Compete with other pupils			2.8***	0.6	2.9***	0.6
Positive attitude			2.4**	0.9	4.0**	1.3
Obey teachers			-1.6*	0.7	-4.4***	0.9
Rich parents			-3.0***	0.7	-1.9	1.0
Supportive family			-1.4	0.8	0.7	1.1
Obey teachers – difference			0.9	0.5	0.9	0.5
Interaction Terms						
Regional/Rural X Hard work					-5.3**	1.8
Mother: Y12 or less X Positive attitude					-3.6*	1.5
Mother: Vocational X Obey teachers					5.4*	2.1
Mother: Y12 or less X Obey teachers					4.4**	1.4
Grandparents' Inf. X Hard work					4.5**	1.6
Grandparents' Inf. X Supportive family					-2.9*	1.3
Constant	34.6***	3.0	14.2*	5.6	15.4	9.5
No. of obs.	1812		1812		1812	
Adj. R2	0.26		0.30		0.31	

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

Appendix Table A:

Sample Representativeness and Attrition According to Student Background Measures

	Target Population (at Wave 1)		Wave 1 (2006)		Non-response		Final sample (2015)	
	n	%	n	%	n	%	n	%
Smart Scale (4-36)		N/A	7,031	22.2	4,886	21.3	2,145	24.1
<i>Gender</i>								
Male	29,439	51%	2,989	42.7%	2,207	45.4%	782	36.5%
Female	27,764	49%	4,014	57.3%	2,651	54.6%	1,363	63.5%
<i>School Sector</i>								
State	36,560	64%	3,569	50.8%	2,650	54.2%	919	42.9%
Independent	10,687	19%	2,153	30.6%	1,315	26.9%	838	39.1%
Catholic	9,956	17%	1,309	18.6%	921	18.9%	388	18.1%
<i>Geographic Region</i>								
Major Cities	31,907	57%	4,476	63.6%	3,000	61.4%	1,476	68.8%
Inner Regional	13,582	24%	1,405	20.0%	996	20.4%	409	19.1%
Outer Regional	9,015	16%	904	12.9%	692	14.2%	212	9.9%
Remote/Very Remote	1,908	3%	246	3.5%	198	4.1%	48	2.2%
<i>Country of birth</i>								
Australian-born	48,770	86%	6,236	89%	4,278	88%	1,958	91%
Overseas-born	4,916	9%	729	10%	547	11%	182	9%
Not stated	2,954	5%	66	1%	61	1%	5	0%
Total	57,203	100%	7,031	100%	4,886	100%	2,145	100%

Appendix Table B – Factor Loadings for Attributional Belief Measures

Variable	Factor 1 (Intrinsic)	Factor 2 (Extrinsic-Relational)
Hard work	0.7896	-0.1351
Own abilities & talents	0.5826	0.1558
Positive attitude	0.8074	-0.0590
Quick to adopt	0.6090	0.1882
Having good habits	0.7234	0.0438
Compete w/ other pupils	0.1654	0.6139
Obey teachers	0.6799	0.0142
Popularity among pupils	0.0270	0.7469
Supportive family	0.6143	0.0427
Educated parents	-0.1175	0.8220
Rich parents	0.0616	0.6848
<i>Proportion of variance</i>	0.3173	0.2078
<i>Factor correlation</i>		0.1417