Do schools influence student engagement in the high school years?

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About the research

Do schools influence student engagement in the high school years?

Sinan Gemici and Tham Lu, NCVER

The link between young people's engagement with school and their longer-term education and labour market outcomes is well established. The key policy question is the extent to which student engagement can be influenced by the manner in which schools are organised and run. This report uses data from the Longitudinal Surveys of Australian Youth (LSAY) to examine a wide range of school characteristics and their impact on students' emotional and cognitive engagement with school at age 15 years.

Key messages

- At age 15 years, students' emotional and cognitive engagement with school is overwhelmingly driven by individual background characteristics.

- Important individual predictors of higher engagement levels include having the intention to complete Year 12, performing strong academically, having a high self-concept of ability, being foreign-born, coming from a high socioeconomic status background, speaking a language other than English at home, working only relatively few hours outside school, and coming from a traditional nuclear family. A distinct gender gap exists, with male students showing significantly lower cognitive engagement levels than their female peers.

- Once individual background factors are controlled for, school attributes have very little impact on the engagement levels of 15-year-olds. By school attributes we mean school sector and demographics, resourcing, competition and academic orientation, school leadership and teacher quality, and the overall school climate. These school characteristics account for 4.3% of students' emotional engagement and 7.5% of their cognitive engagement.

- Some school characteristics that positively influence student engagement include non-metropolitan school location, a perception of high teacher quality, and the high average academic achievement of the student body. Yet, while these characteristics are statistically significant, their effect is small and not necessarily practically meaningful.

- Schools matter even less for 15-year-olds who are at risk of early school leaving. For these at-risk students, school characteristics account for 1.4% and 4.4% of emotional and cognitive engagement, respectively.

- Overall, the results from this study paint a sobering picture about the ability of school attributes to raise the engagement levels of 15-year-olds. It seems that by this age 'the die has been cast'.

- It is premature to conclude, however, that school characteristics have no bearing on student engagement in general. It is very possible that the impact of school factors on students' engagement levels occurs at a younger age.

Rod Camm
Managing Director, NCVER

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Executive summary

The link between young people's engagement with school and their longer-term educational and occupational outcomes is well established. Students who are engaged with their schooling perform better academically, have higher rates of school completion and end up in better jobs.

The key policy question then becomes the extent to which student engagement can be strengthened by the way in which schools are set up and run. It is possible that school characteristics, such as a school's demographic makeup, control over resources, or the quality of teachers and principals, can influence the degree to which students feel engaged with school. Likewise, student engagement might be affected by parental and peer influences. For instance, students may change the way they think about school as a result of parental pressure or their peers' educational and occupational aspirations.

This report focuses on the extent to which school characteristics can influence the emotional and cognitive engagement of high school students, over and above their characteristics. It does so using data from the 2009 cohort of the Longitudinal Surveys of Australian Youth (LSAY Y09), which contains information on numerous student and school attributes, as well as proxy variables for students' emotional and cognitive engagement at age 15 years.

The results show that, at age 15 years, school characteristics have only a minimal impact on students' emotional and cognitive engagement with school. Once students' individual background characteristics are taken into consideration, the characteristics of the schools they attend account for 4.3% of their emotional engagement and 7.5% of their cognitive engagement.

It seems that students' emotional and cognitive engagement is overwhelmingly driven by individual background factors. Students who intend to complete Year 12 and those who are foreign-born are more emotionally and cognitively engaged at age 15 years, while students with low self-concept of ability have low levels of cognitive and emotional engagement. Other influential individual factors include academic achievement, socioeconomic status, Indigenous status, speaking a language other than English at home, the number of work hours outside school and family structure. Male students are distinctly less cognitively engaged than females.

Some school characteristics do positively influence the engagement levels of 15-year-olds over and above their individual background characteristics. These characteristics include non-metropolitan school location, teacher quality being perceived as high, and high average academic performance of the student body. Yet it is important to note that, while these attributes are statistically significant, the size of their effect is small.

The study also examines the possibility that school characteristics play a stronger role in the engagement of students who are at risk of early school leaving. However, the additional analysis reveals that the overall amount of variance attributable to school factors is even smaller for the sub-sample of at-risk students. For at-risk students, school characteristics account for 1.4% and 4.4% of emotional and cognitive engagement, respectively. Even though a few school characteristics, such as teacher participation in school decisions, perceived teacher quality, academic performance of the student body and the academic selectivity of the school, emerge as statistically significant, their actual effects are negligible when compared with the impact of statistically significant student-level predictors.

Overall, the results paint a sobering picture about the ability of school attributes – such as school sector and demographics, resourcing, competition and academic orientation, school leadership and teacher quality, and the overall school climate – to raise the engagement levels of 15-year-olds. It seems that by this age the die has been cast. However, not all is doom and gloom. Recent research indicates that students' engagement with school is dynamic, with engagement being stronger at younger ages. It is therefore possible that school characteristics have a stronger and more practically meaningful effect on student engagement during the earlier years of schooling.

Introduction

The question of how to strengthen the connection between students and schools is of perennial interest because young people's engagement with school is directly linked to their educational outcomes. Internationally, student engagement has been associated with academic performance and early school leaving (Archambault et al. 2009; Connell, Spencer & Aber 1994; Skinner, Wellborn & Connell 1990). In the Australian context, recent evidence shows a relationship between students' engagement with school and the occupational status they achieve later in life (Abbott-Chapman et al. 2013).

Students engage with school at emotional, behavioural and cognitive levels (Fredricks, Blumenfeld & Paris 2004). Emotional engagement refers to students' affective reactions towards school, such as interest, boredom, happiness, sadness and anxiety. Behavioural engagement covers the extent to which students follow rules and adhere to classroom norms, participate in extracurricular activities, and exhibit behaviours such as skipping school or 'getting into trouble'. Cognitive engagement refers to students' psychological investment in learning and their uptake of different learning strategies.

From a policy perspective, the key question is the extent to which student engagement can be strengthened by the way in which schools are set up and run. It is possible that school characteristics, such as a school's demographic makeup, control over resources, or the quality of teachers and principals, can influence the degree to which students feel engaged with school. Likewise, student engagement might be affected by parental and peer influences. For instance, students may change the way they think about school as a result of parental pressure or their peers' educational and occupational aspirations.

In Australia, the question of which school factors influence student engagement has not been sufficiently addressed. Moreover, the few domestic studies that have linked school characteristics to student engagement (for example, Fullarton 2002) have examined behavioural rather than emotional or cognitive aspects.

The present report focuses on the extent to which school characteristics can influence the emotional and cognitive engagement of high school students, over and above individual background factors. It does so by using data from the 2009 cohort of the Longitudinal Surveys of Australian Youth (LSAY Y09), which contains information on numerous student and school attributes, as well as proxy variables for students' emotional and cognitive engagement at age 15 years. Behavioural engagement is excluded from this study because the 2009 LSAY cohort does not provide suitable measures of students' behavioural engagement with school.

The study begins with a brief overview of the concept of student engagement with school. It then determines the influence of different school factors on the emotional and cognitive engagement of 15-year-olds, over and above their individual background characteristics. The final section of the report explores the effect of the same school characteristics on a sub-sample of students who are at risk of early school leaving.

Overview of student engagement

Definitions of student engagement

The concept of student engagement has been defined in a variety of ways. Finn (1989) originally defined student engagement as a two-dimensional construct. The first dimension refers to students' feelings of belonging and their acceptance of school values. The second dimension considers the initiative shown by students in the classroom, along with their involvement in extracurricular activities and school governance. Other researchers have proposed models of student engagement that comprise academic, behavioural, cognitive and psychological elements (see Appleton, Christenson & Furlong 2008). This report uses a model by Fredricks, Blumenfeld and Paris (2004), whereby student engagement consists of emotional, behavioural and cognitive dimensions, which are briefly outlined in turn.

Emotional engagement

Emotional engagement refers to students' affective reactions toward school. Differences may exist in the level or degree of engagement, which can range from simply liking school, through to developing a definite sense of belonging. The notion of students' emotional engagement with school is closely related to their attitude towards school and their motivation in school (Fredricks, Blumenfeld & Paris 2004).

Behavioural engagement

Behavioural engagement is based on the idea of participation, which can denote a student's involvement in academic activities or participation in social or extracurricular activities. The behavioural dimension includes complying with rules (for example, not skipping school or otherwise getting into trouble), doing schoolwork and participating in school governance (Fredricks, Blumenfeld & Paris 2004).

Cognitive engagement

Cognitive engagement refers to students' psychological investment in learning and their use of learning strategies. Psychological investment entails a willingness to engage in learning activities and to enhance one's knowledge and skills. Learning strategies can range from using a surface-level strategy, such as memorisation for short-term retention of information, to applying more sophisticated strategies, such as monitoring, evaluating or task planning, to master the material and promote a deeper understanding and expertise (Fredricks, Blumenfeld & Paris 2004).

The focus of the present study is on *emotional* and *cognitive* engagement, given that prior research has explored the effects of behavioural engagement, as outlined in the next section. Also, the 2009 cohort of the Longitudinal Surveys of Australian Youth does not provide suitable items for measuring students' behavioural engagement with school.

Measurement of student engagement

The most common approach for measuring student engagement is via self-report questionnaires. Questionnaire items geared toward measuring *emotional* engagement usually ask students about liking school and being happy, or feeling lonely, bored, sad, frustrated and angry (Skinner & Belmont 1990; Willms 2003; Archambault et al. 2009).

Items measuring *behavioural* engagement seek to capture student behaviour at the classroom and school levels. For example, Willms (2003) and Archambault et al. (2009) measured behavioural engagement with respect to students' school conduct, such as missing school or skipping classes. Kindermann (1993) focused on students' participation at the classroom level, including learning effort and staying on task, while Lamote et al. (2013) used students' attitude toward homework as an indicator of behavioural engagement.

Items measuring *cognitive* engagement focus mostly on students' psychological investment in learning or their use of particular learning strategies. For example, Archambault et al. (2009) asked Canadian high school students how much time and effort they were willing to invest in studying specific subjects, whereas Ablard and Lipschultz (1998) focused on assessing students' learning strategies, such as memorisation, task planning and self-monitoring.

Existing research on student engagement and outcomes

Studies from Australia and abroad have firmly established that student engagement matters with respect to educational and occupational outcomes. Stronger engagement levels with school have been linked to higher academic achievement, improved rates of attendance and school completion, and better job status later in life. Table 1 summarises existing research on the link between student engagement and educational/occupational outcomes.

Existing research on drivers of student engagement

The individual student background characteristics driving engagement with school are well understood. Female gender, high parental education, coming from a non-English speaking background and having high levels of intrinsic motivation, along with a positive self-concept of ability, are all important individual drivers of student engagement with school (Fullarton 2002; Marks 1998; Willms 2003).

Knowledge about relevant factors at the school level is more elusive. Australian studies in particular are few and far between. Marks (1998) found that about 6% of the variation in students' self-esteem and their satisfaction with school could be attributed to differences between schools. Fullarton (2002) used data from LSAY's 1998 cohort to explore the effect of individual and school-level factors on students' behavioural engagement. Behavioural engagement was measured via students' participation in extracurricular activities such as sports, music, theatre, dance and community work. The study found that almost 9% of the variation in students' engagement levels could be attributed to between-school differences. Schools with high levels of engagement were able to moderate the negative effects of socioeconomic status and Indigenous status. Parents' educational level and student perceptions of school and class climate had the strongest influences on the level of engagement for male students. The engagement levels of female students were strongly influenced by their attendance at a coeducational school, their socioeconomic background and self-concept of ability, and their overall perception of the school climate.

Table 1   Research summary on the link between student engagement and outcomes

Author	Definition/measure	Data	Key findings	Country of study
Skinner, Wellborn & Connell (1990)	Combined measure of emotional engagement (e.g. being happy, being bored) and behavioural engagement (e.g. participation, staying on task)	Grade 3 to 6 students, suburban and rural, mainly white and middle class	Engagement was positively associated with achievement.	United States
Connell, Spencer & Aber (1994)	Combined measure of emotional engagement (e.g. being happy, being bored) and behavioural engagement (e.g. paying attention, doing schoolwork)	African-American early adolescents	Engagement was associated with attendance, achievement tests, and grades.	United States
Marks et al. (2000)	Participation in extracurricular activities as a measure of school engagement	1995 cohort of LSAY	Participation in extracurricular activities in Year 10 is associated with higher levels of participation in Year 12.	Australia
Archambault et al. (2009)	Combined measure of emotional engagement (e.g. liking school, interest in school work), behavioural engagement (e.g. school attendance, discipline) and cognitive engagement (e.g. willingness to learn)	Grades 7 to 9 students from 69 high schools in Quebec	Student engagement accounts for 12% of the variation in early school leaving. Behavioural engagement had the largest impact on early school leaving.	Canada
Abbott-Chapman et al. (2013)	Custom school engagement index based on school enjoyment and boredom questionnaire items	1985 cohort of the Australian Schools Health and Fitness Survey (ASHFS)	School engagement has a pervasive and long-term influence on educational and occupational outcomes in adulthood.	Australia
Lamote et al. (2013)	Relationship with teachers as an indicator of emotional engagement and attitude towards homework as an indicator of behavioural engagement	Data of students being tracked from Year 7 to Year 12 were drawn from the Flemish LOSO project.	Student group containing unstable and low level of engagement have a significantly higher probability of dropping out.	Belgium

Note: Studies are listed in chronological order.

Willms (2003) used data from 43 countries (including Australia) that participated in the 2000 Programme for International Student Assessment (PISA) to investigate how emotional and behavioural engagement was associated with the characteristics of students and schools. With respect to influential school characteristics, he found that students were more likely to be engaged if they attended schools with a higher average socioeconomic status, a strong disciplinary climate, good student–teacher relations and a strong focus on students' academic success.

Table 2 summarises existing research on individual and school-level drivers of student engagement.

Table 2   Research summary on drivers of student engagement

Author	Definition/measure	Data	Key findings	Country of study
Finn & Voelkl (1993)	Emotional engagement (sense of belonging, student–teacher relations) and behavioural engagement (attendance, preparation, misbehaviour)	Nationally representative random sample of Grade 8 students	Students in smaller schools had higher behavioural and emotional engagement.	United States
Kindermann (1993)	Behavioural engagement (e.g. effort, staying on task)	Grade 4 and 5 students, suburban and rural, mainly white and middle class	Students tended to affiliate with peers who had a similar level of behavioural engagement. Students who were affiliated with high-engagement peer groups increased their level of behavioural engagement over the school year.	United States
Skinner & Belmont (1993)	Emotional engagement (e.g. interest, happiness, anxiety, anger) and behavioural engagement (e.g. effort, attention, persistence) in the classroom	Grade 3 to 5 students, suburban and rural, mainly white and middle class	Teacher involvement was linked to emotional engagement. Classroom structure was correlated with behavioural engagement.	United States
Voelkl (1997)	Identification with school measured via sense of school belonging and utility value	Grade 8 – white and African American students across the state of Tennessee	Student participation and academic achievement were significant predictors of feelings of identification.	United States
Marks (1998)	Student engagement (e.g. general school satisfaction and self-esteem)	LSAY Y95	Around 6% of the variation in a combined measure of general satisfaction and self-esteem is attributed to between-school differences. The combined measure of general satisfaction and self-esteem positively influences self-perceived achievement in Year 10.	Australia
Fullarton (2002)	Student engagement measured as students' participation in extracurricular activities (e.g. sport, music, band or orchestra, debating, drama, theatre, dance or school play, community and support work at school	LSAY Y98	Between-school differences account for almost 9% of the variation in students' engagement levels. High engagement at the school level can moderate the negative effects of socioeconomic disadvantage and Indigenous status.	Australia
Willms (2003)	Combined measure of emotional engagement (e.g. liking school, sense of belonging, want to go to school) and behavioural engagement (e.g. skipping class, school attendance, late arrival for school)	PISA 2000	A moderate association between student engagement and literacy scores. Students attending schools where there is a concentration of students from low socioeconomic families are more likely to be disengaged.	International assessment of student engagement

Note: Studies are listed in chronological order.

Overall, this brief synthesis of prior research reveals a need to better understand the particular school characteristics that influence student engagement in Australia. The few existing Australian studies are somewhat dated, incorporate a relatively small number of school-level characteristics and focus more on students' behavioural rather than emotional and cognitive engagement with school. The present study uses the latest available data from the 2009 cohort of LSAY to address these issues.

Method

Data and sample

This study used data from the 2009 base year cohort of the Longitudinal Surveys of Australian Youth. LSAY tracks a nationally representative sample of 15-year-olds over a period of approximately ten years to capture young people's transition from school to tertiary education and work. The base year of LSAY Y09 is linked with the 2009 Programme for International Student Assessment (PISA; OECD 2012), which provides a rich set of individual and school-level measures. A total of 14 251 students participated in the 2009 base year. An important advantage of using base-year data is that complications arising from attrition bias can be avoided.

In addition to student-level data, the 2009 PISA[1] school questionnaire collected information from school administrators on a variety of factors that may influence school performance. School-level data were collected on a representative sample of 353 Australian schools in the 2009 base year.

Measures for emotional and cognitive engagement

Emotional engagement

Emotional engagement refers to students' affective reactions in the classroom, such as interest, boredom, happiness, sadness and anxiety. A single measure of emotional engagement with school was created by factor-analysing 12 items from the LSAY Y09 student questionnaire that were directly relevant to identifying emotional engagement (see table 3). These 12 items measure students' affective reactions toward school according to the definition of emotional engagement by Fredricks, Blumenfeld and Paris (2004). Items were measured on a four-level Likert-type scale ranging from *strongly agree* (1) to *strongly disagree* (4). The original scale was recoded from *strongly disagree* (1) to *strongly agree* (4) such that a higher factor score reflects a higher level of emotional engagement. The 12 items were combined into a single latent factor of students' emotional engagement with school. Further details on the emotional engagement measure are provided in appendix A.

Table 3   Items used for creating the emotional engagement measure

Item description	Original item name
My school is a place where I feel happy	ST63N05
My school is a place where I like learning	ST63N08
My school is a place where I get enjoyment from being there	ST63N09
My school is a place where I really like to go each day	ST63N17
My school is a place where I find that learning is a lot of fun	ST63N24
My school is a place where I feel safe and secure	ST63N28
My school is a place where the work we do is interesting	ST63N01
My school is a place where I like to ask questions in class	ST63N11
My school is a place where I like to do extra work	ST63N15
My school is a place where I enjoy what I do in class	ST63N18
My school is a place where I always try to do my best	ST63N19
My school is a place where I get excited about the work that we do	ST63N23

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[1] For simplicity, the combined data from PISA and LSAY are summarised as 'LSAY' throughout the remainder of this report.

Cognitive engagement

Cognitive engagement is defined in terms of students' psychological investment in learning and their use of learning strategies. The closest proxy for cognitive engagement in LSAY Y09 is a meta-cognition measure for reading literacy, referred to as 'understanding and remembering'. Even though meta-cognitive measures are domain-dependent, this measure had to be chosen because the 2009 PISA study focused on reading literacy. The original measure was created from six Likert-type items, ranging on a six-level scale from *not useful at all* (1) to *very useful* (6), as outlined in table 4.

Table 4   Items used for creating the 'understanding and remembering' meta-cognition scale

Base question: How do you rate the usefulness of the following strategies for understanding and memorising text?		
Item	Item description	Original item name
A	I concentrate on the parts of the text that are easy to understand	ST41Q01
B	I quickly read through the text twice	ST41Q02
C	After reading the text, I discuss its content with other people	ST41Q03
D	I underline important parts of the text	ST41Q04
E	I summarise the text in my own words	ST41Q05
F	I read the text aloud to another person	ST41Q06

A panel of reading experts predetermined a preferred ordering of the strategies according to their effectiveness. The preferred ordering strategy was agreed to be CDE>ABF, whereby the letters represent the items (going from A to F) as they appear in the scale. Based on this ordering, 3 x 3 = 9 pairwise rules were created (C>A, C>B, C>F, D>A, D>B, D>F, E>A, E>B, E>F). Students were then asked to rate the usefulness of each strategy, and for each student a score was computed, based on the level of agreement between the student ordering and the predetermined expert-preferred ordering. The final score assigned to each student was a number between 0 to 1, representing the consistency between the student ordering and the expert ordering. For instance, if the responses of a student on this task agreed on 6 of the 9 pairwise rules, the student received a score of 6/9 = 0.67.

The resulting 'understanding and remembering' meta-cognition measure was used as the proxy for cognitive engagement in the present study. Further details on the 'understanding and remembering' meta-cognition scale can be found in the 2009 PISA technical report (OECD 2012).

Descriptive statistics for the emotional and cognitive engagement measures are provided in table 5.

Table 5   Descriptive statistics for outcome variables (unweighted)

Outcome	Categories	n	%	Mean	SD
Emotional engagement	Continuous (standardised)	-	-	0	1
	Missing	1 297	9.10	-	-
Cognitive engagement	Continuous (standardised)	-	-	0	1
	Missing	606	4.25	-	-

Note: Missing data were addressed using multiple imputation (Rubin 1987). Further details are provided in the sub-section on missing data below.

Predictors of emotional and cognitive engagement

Multi-level modelling was used to separate the effect of student-level predictors (that is, those attributable to individual student characteristics) from that of school-level predictors (that is, those attributable to school characteristics). Details on multi-level modelling are provided in appendix B.

Student-level predictors

The relevant individual characteristics examined in this study are categorised into demographic and academic factors, students' aspirations for completing Year 12 and their peers' educational goals for university. An additional aspect included in the analysis is the extent to which students work during the school year, given that working while at school has been found to influence educational outcomes (Anlezark & Lim 2011). Descriptive statistics on student-level predictors are provided in table 6.

School-level predictors

While the literature suggests that individual background factors have the strongest impact on student engagement, it is likely that particular characteristics of schools and the wider school environment influence students' emotional and cognitive engagement. For this study, relevant school-level characteristics are divided into five broad categories: school sector and demographics; resourcing; competition and academic orientation; principal leadership and teacher quality; and indicators of the overall school climate. The descriptive statistics on school-level predictors are given in table 7. A detailed description of school-level predictors is provided in the PISA 2009 technical report (OECD 2012).

Missing data

Nine predictors and both outcome variables were affected by missing data, as outlined in table 8. Multiple imputation (Rubin 1987) was used to address missing data. In multiple imputation, each imputed dataset is analysed separately before parameter estimates and standard errors are pooled using Rubin's guidelines. For this study, RealcomImpute (Goldstein 2011) software was used in combination with Stata to impute ten complete datasets. More information about multiple imputation can be found in Enders (2010) or Gemici, Bednarz and Lim (2012).

Table 6   Descriptive statistics for student-level predictors (unweighted)

Predictor	Categories	n	%	Mean	SD
Demographics					
Gender	Female	7 231	50.74	-	-
	Male	7 020	49.26	-	-
Indigenous status	Not Indigenous	13 108	91.98	-	-
	Indigenous	1 143	8.02	-	-
Immigration background	Australian-born	11 183	78.47	-	-
	Second-generation	1 429	10.03	-	-
	Foreign-born	1 343	9.42	-	-
	Missing	296	2.08	-	-
Home language	English	12 756	89.51	-	-
	Not English	1 124	7.89	-	-
	Missing	371	2.60	-	-
Family structure	Nuclear family	10 973	77.00	-	-
	Not nuclear family	2 999	21.04	-	-
	Missing	279	1.96	-	-
SES	Continuous (standardised)	-	-	0	1
	Missing	318	2.23	-	-
Academic					
Academic achievement	Continuous (standardised)	-	-	0	1
Self-concept of ability	Positive	6 536	45.86	-	-
	Average	5 689	39.92	-	-
	Poor	730	5.12	-	-
	Missing	1 296	9.09	-	-
Working while at school					
Hours worked	Not working	6 817	47.84	-	-
	1−14 hours per week	3 479	24.41	-	-
	15−25 hours per week	1 102	7.73	-	-
	Missing	2 853	20.02	-	-
Aspirations					
Year 12 plans (self)	Do not intend to complete Year 12	1 788	12.55	-	-
	Intend to complete Year 12	10 684	74.97	-	-
	Missing	1 779	12.48	-	-
Peers' higher education aspirations	Do not aspire to go to university	5 772	40.50	-	-
	Aspire to go to university	3 298	23.14	-	-
	Missing	5 181	36.36	-	-

Note: Missing data were addressed using multiple imputation (Rubin 1987). Further details are provided in the previous sub-section on missing data.

Table 7   Descriptive statistics for school-level predictors (unweighted)

Predictor	Categories	n	%	Mean	SD
Sector and demographics					
Sector	Government	217	61.47	-	-
	Catholic	73	20.68	-	-
	Independent	63	17.85	-	-
Location	Metropolitan	241	68.27	-	-
	Not metropolitan	112	31.73	-	-
Size	Continuous	-	-	923	425
SES	Continuous (standardised)	-	-	0	1
Academic achievement	Continuous (standardised)	-	-	0	1
Gender mix	Co-ed	302	85.55	-	-
	All boys	21	5.95	-	-
	All girls	30	8.50	-	-
Per cent LBOTE[1] students at school	Up to 10%	251	71.10	-	-
	10−40%	73	20.68	-	-
	More than 40%	29	8.22	-	-
Resourcing					
Student−teacher ratio	Continuous	-	-	13.5	2.11
Responsibility for resources	Continuous (standardised)	-	-	0	1
Responsibility for the curriculum	Continuous (standardised)	-	-	0	1
Degree of teacher shortage	Continuous (standardised)	-	-	0	1
Quality of educational resources	Continuous (standardised)	-	-	0	1
Competition and academic orientation					
Schooling options available to students	Two or more other schools	302	85.55	-	-
	One other school	29	8.22	-	-
	No other school	22	6.23	-	-
Academic school selectivity	No selection criteria considered	77	21.81	-	-
	Selection criteria sometimes considered	180	50.99	-	-
	At least one selection criterion always considered	96	27.20	-	-
Academic pressure from parents on school	Little or no pressure from parents	257	72.80	-	-
	Strong pressure from parents	96	27.20	-	-
School leadership and teacher quality					
School leadership	Continuous (standardised)	-	-	0	1
Perceived teacher quality	Continuous (standardised)	-	-	0	1
Teacher participation in school decisions	Continuous (standardised)	-	-	0	1
School climate					
Disciplinary climate	Continuous (standardised)	-	-	0	1
Negative impact of teacher behaviour on school climate	Continuous (standardised)	-	-	0	1
Negative impact of student behaviour on school climate	Continuous (standardised)	-	-	0	1
Level of extracurricular activities offered at school	Continuous (standardised)	-	-	0	1

Note: 1 LBOTE = language background other than English; SES = socioeconomic status.

Missing data were addressed using multiple imputation (Rubin 1987). Further details are provided in the previous sub-section on missing data.

Table 8   Predictor and outcome variables with missing values

Variable	n	% of sample
Student-level predictors		
Immigration background	296	2.08
Home language	371	2.6
Family structure	279	1.96
SES	318	2.23
Self-concept of ability	1 296	9.09
Hours worked	2 853	20.02
Year 12 plans (self)	1 779	12.48
Peers' higher education aspirations	5 181	36.36
School-level predictors		
Student−teacher ratio	5	1.42
Outcomes		
Emotional engagement	1 297	9.1
Cognitive engagement	606	4.25

Note: The total sample size was n = 14 251.

Results

Separating the impact of student and school characteristics on engagement

A so-called 'null model' (that is, a random intercept model without any predictors) allows for separating the variation in emotional and cognitive engagement outcomes that can be attributed to schools from the variation that can be attributed to individual student characteristics.

Results from the null model (appendix C) indicate that 95.7% and 92.5% of the variation across emotional and cognitive engagement, respectively, can be attributed to individual student background characteristics (figure 1). This suggests that school characteristics generally matter very little with respect to influencing the engagement of 15-year-olds over and above individual characteristics. It is possible, however, that for students at the margins who are at risk of dropping out the otherwise modest influence of school factors could be important in tipping the balance.

Figure 1   Per cent variation accounted for by student versus school-level characteristics
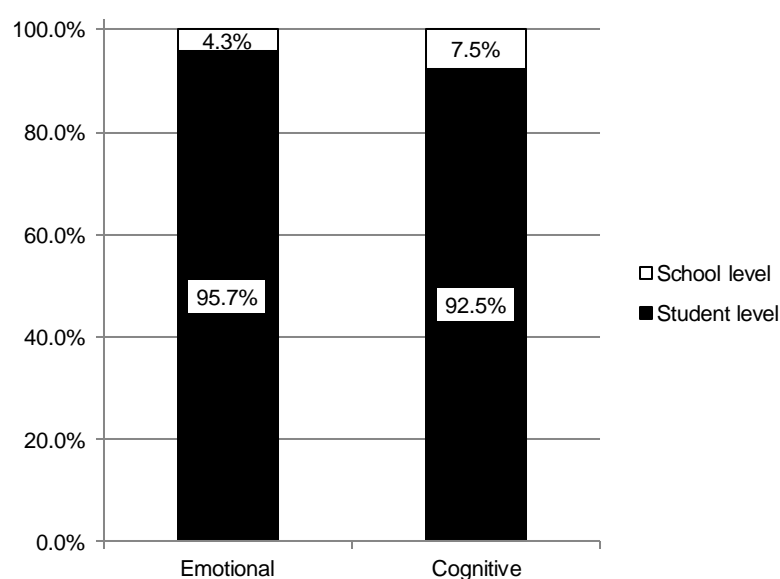
Student-level results

Demographic characteristics

A negative effect on emotional engagement was found for family structure, indicating that students from non-traditional family structures (for example, single-parent families) are less emotionally engaged with their school when compared with students from nuclear families. The strongest positive effect on emotional engagement is ascertained for students' home language. That is, students who speak languages other than English at home show higher levels of emotional engagement with school. Socioeconomic status (SES) and immigration background are also strong predictors of emotional engagement. Overall, results suggest that higher-SES students have higher levels of emotional engagement with school, along with foreign-born students and students who speak languages other

than English at home. Notably, the analysis also showed higher levels of emotional engagement for Indigenous students.

Gender, immigration background and the weekly number of hours worked are student background characteristics that play an important role in relation to cognitive engagement. Males show lower levels of cognitive engagement than females. Similar to emotional engagement, cognitive engagement is positively affected by students who migrated with their parents to Australia. Interestingly, students who worked fewer than 15 hours per week during the school term were found to be more cognitively engaged than those not working. The result suggests that working in a job with fewer than 15 hours per week makes it more likely that students are able to understand the learning material better by relating it to their own experiences at the workplaces, or to enhance their knowledge more effectively by understanding how the information they learn at school can equate with what happens in real life. Moreover, part-time work may allow students to more highly appreciate the knowledge and skills learned at school. It is important to note, however, that part-time work while at school is beneficial only in moderation, and that working lengthy hours (more than 15 hours a week) has a pronounced negative impact on academic performance (Anlezark & Lim 2011).

Academic achievement, self-concept of ability and student aspirations

The direct association between academic achievement and engagement with school is evident. In addition to objective achievement scores, students' self-concept of ability and their intentions of completing Year 12 strongly influence both emotional and cognitive engagement. Students who consider themselves low and medium achievers are significantly less engaged when compared with those whose self-concept of ability is positive. The impact of students' beliefs about their own ability is particularly strong with respect to emotional engagement.

The link between students' intentions of completing Year 12 and their engagement with school is not surprising and is in accordance with Ajzen's (1985) prominent theory of planned behaviour. Far more interesting is the examination of peer influences. Students surrounded by university-bound peers display higher levels of emotional engagement with school. Attending a school where peers have a similar educational aspirations profile appears to create a sense of belonging, as students can shape and share their own educational ambitions with those of friends and class mates.

Tables 9 and 10 present the results for student-level predictors of emotional and cognitive engagement, respectively. The statistically significant predictors are shaded.

Table 9   Results for student-level emotional engagement (n = 14 251)

Predictor	Categories	Coeff.	SE	t	p
Demographics					
Gender	Male	-0.030	0.018	-1.72	0.085
	Female (reference category)				
Indigenous status	Indigenous	0.089	0.034	2.57	0.011
	Not indigenous (reference category)				
Immigration background	Second-generation	0.011	0.029	0.39	0.699
	Foreign-born	0.129	0.031	4.09	<0.000
	Australian-born (reference category)				
Home language	Not English	0.218	0.035	6.24	<0.000
	English (reference category)				
Family structure	Not nuclear family	-0.063	0.021	-3.04	0.002
	Nuclear family (reference category)				
SES	Continuous (std)	0.073	0.015	4.96	<0.000
Academic					
Academic achievement	Continuous (std)	0.000	0.000	-0.61	0.541
Self-concept of ability	Average	-0.439	0.018	-23.75	<0.000
	Poor	-0.806	0.040	-20.12	<0.000
	Positive (reference category)				
Working while at school					
Hours worked	1–14 hours per week	0.001	0.020	0.07	0.945
	15–25 hours per week	-0.048	0.029	-1.67	0.096
	Not working (reference category)				
Aspirations					
Year 12 plans (self)	Intend to complete Year 12	0.365	0.026	14.28	<0.000
	Do not intend to complete Year 12 or unsure (reference category)				
Peers' higher education aspirations	Aspire to go to university	0.162	0.019	8.35	<0.000
	Do not aspire to go to university (reference category)				

Table 10   Results for student-level cognitive engagement (n = 14 251)

Predictor	Categories	Coeff.	SE	t	p
Demographics					
Gender	Male	-0.250	0.018	-14.24	<0.000
	Female (reference category)				
Indigenous status	Indigenous	0.024	0.032	0.75	0.451
	Not indigenous (reference category)				
Immigration background	Second-generation	0.028	0.028	0.98	0.326
	Foreign-born	0.074	0.031	2.43	0.015
	Australian-born (reference category)				
Home language	Not English	-0.003	0.035	-0.07	0.942
	English (reference category)				
Family structure	Not nuclear family	0.004	0.020	0.19	0.847
	Nuclear family (reference category)				
SES	Continuous (std)	0.020	0.013	1.55	0.120
Academic					
Academic achievement	Continuous (std)	0.003	0.000	31.53	<0.000
Self-concept of ability	Average	-0.095	0.018	-5.16	<0.000
	Poor	-0.251	0.037	-6.87	<0.000
	Positive (reference category)				

Predictor	Categories	Coeff.	SE	t	p
Working while at school					
Hours worked	1–14 hours per week	0.053	0.018	2.99	0.003
	15–25 hours per week	-0.027	0.029	-0.94	0.349
	Not working (reference category)				
Aspirations					
Year 12 plans (self)	Intend to complete Year 12	0.091	0.025	3.61	<0.000
	Do not intend to complete Year 12 or unsure (reference category)				
Peers' higher education aspirations	Aspire to go to university	0.002	0.019	0.11	0.913
	Do not aspire to go to university (reference category)				

School-level results

Although the null model (see figure 1) illustrates the very modest effect that schools have on the engagement levels of 15-year-olds, a few school characteristics do have some impact. Tables 11 and 12 present the results for school-level predictors of emotional and cognitive engagement respectively. The statistically significant predictors are shaded.

School location is a significant predictor of emotional engagement: students attending schools in non-metropolitan areas demonstrate an emotional engagement advantage over their peers in metropolitan schools. Cognitive engagement, on the other hand, is influenced by the average academic performance of a school's student body, with students in higher-performing schools yielding higher cognitive engagement scores.

One factor that affects *both* engagement outcomes is the perceived quality of teachers at a given school. In LSAY Y09, quality is measured by the extent to which teachers make use of structuring and scaffolding strategies during their lessons. Scaffolding strategies incorporate individualised support to students, whereby a more knowledgeable peer provides supports (or scaffolds) to help the student accomplish learning tasks that they could not otherwise accomplish given their current ability.[2]

Schools in which teachers regularly implement structuring and scaffolding strategies are more likely to get their students engaged with school. The application of these structuring and scaffolding strategies is potentially reflective of teachers' active interest in their students' academic performance, which in turn may motivate students to become more involved in their school work.

Overall, it is important to note that the actual size of the effects for the statistically significant school-level predictors is very small relative to those of the student-level predictors. Results from the analysis thus indicate that at age 15 years the impact of school factors on students' engagement levels is rather marginal. It may be premature to conclude, however, that school characteristics have no bearing on student engagement in general. It is possible that the impact of school factors on students' engagement levels occurs at a younger age. Further research is needed to test this hypothesis.

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[2] Details on scaffolding teaching strategies in general are provided in Hartman (2002) and Reiser (2004). Details on structuring and scaffolding in PISA–LSAY can be found in OECD (2012).

Table 11 Impact of school-level characteristics on emotional engagement (n = 353)

Predictor	Categories	Coeff.	SE	t	p
Sector and demographics					
Sector	Catholic	0.009	0.036	0.24	0.810
	Independent	-0.051	0.053	-0.96	0.339
	Government (reference category)				
Location	Not metropolitan	0.090	0.028	3.20	0.001
	Metropolitan (reference category)				
Size	Continuous	0.000	0.000	0.35	0.730
SES	Continuous (std)	0.022	0.022	0.99	0.320
Academic achievement	Continuous (std)	-0.008	0.020	-0.43	0.668
Gender mix	All boys	0.001	0.049	0.02	0.986
	All girls	0.031	0.044	0.69	0.488
	Co-ed (reference category)				
Per cent LBOTE students	10−40%	-0.024	0.028	-0.85	0.396
	40% or more	0.041	0.040	1.01	0.312
	Up to 10% (reference category)				
Resourcing					
Student−teacher ratio	Continuous (ratio)	-0.010	0.005	-1.89	0.059
Responsibility for resources	Continuous (std)	0.018	0.017	1.11	0.269
Responsibility for curriculum	Continuous (std)	-0.004	0.011	-0.32	0.746
Teacher shortage	Continuous (std)	0.001	0.013	0.08	0.932
Quality of educational resources	Continuous (std)	0.006	0.013	0.43	0.671
Competition and academic orientation					
Schooling options available to students	One other school	-0.029	0.043	-0.66	0.507
	No other schools	0.060	0.048	1.25	0.212
	Two or more other schools (reference category)				
Academic school selectivity (based on students' academic record and recommendations of feeder schools)	Selection criteria sometimes considered	0.006	0.028	0.21	0.832
	At least one selection criterion always considered	0.030	0.031	0.94	0.349
	No selection criteria considered (reference category)				
Academic pressure from parents	Strong pressure from parents	0.031	0.026	1.17	0.241
	Little or no pressure from parents (reference category)				
School leadership and teacher quality					
School leadership	Continuous (std)	0.012	0.012	1.02	0.307
Teacher quality	Continuous (std)	0.056	0.013	4.31	<0.000
Teacher participation in school decisions	Continuous (std)	-0.003	0.011	-0.30	0.763
School climate					
Disciplinary climate	Continuous (std)	0.023	0.016	1.46	0.144
Negative impact of teacher behaviour on school climate	Continuous (std)	-0.004	0.016	-0.23	0.816
Negative impact of student behaviour on school climate	Continuous (std)	0.008	0.019	0.40	0.688
Level of extracurricular activities	Continuous (std)	-0.006	0.011	-0.57	0.570

Table 12 Impact of school-level characteristics on cognitive engagement (n = 353)

Predictor	Categories	Coeff.	SE	t	p
Sector and demographics					
Sector	Catholic	0.057	0.031	1.82	0.069
	Independent	0.069	0.049	1.40	0.160
	Government (reference category)				
Location	Not metropolitan	-0.007	0.027	-0.25	0.804
	Metropolitan (reference category)				
Size	Continuous	0.000	0.000	1.50	0.133
SES	Continuous (std)	0.031	0.021	1.52	0.128
Academic achievement	Continuous (std)	0.137	0.019	7.22	<0.000
Gender mix	All boys	0.080	0.044	1.81	0.071
	All girls	0.036	0.040	0.91	0.365
	Co-ed (reference category)				
Percent LBOTE students	10–40%	-0.022	0.025	-0.85	0.394
	40% or more	-0.002	0.037	-0.06	0.952
	Up to 10% (reference category)				
Resourcing					
Student–teacher ratio	Continuous (ratio)	0.000	0.005	-0.05	0.963
Responsibility for resources	Continuous (std)	0.000	0.016	0.02	0.981
Responsibility for curriculum	Continuous (std)	0.009	0.010	0.89	0.373
Teacher shortage	Continuous (std)	-0.017	0.012	-1.45	0.148
Quality of educational resources	Continuous (std)	-0.001	0.012	-0.12	0.903
Competition and academic orientation					
Schooling options available to students	One other school	0.004	0.040	0.09	0.929
	No other schools	-0.045	0.044	-1.02	0.309
	Two or more other schools (reference category)				
Academic school selectivity (based on students' academic record and recommendations of feeder schools)	Selection criteria sometimes considered	-0.049	0.026	-1.86	0.062
	At least one selection criterion always considered	-0.026	0.029	-0.89	0.374
	No selection criteria considered (reference category)				
Academic pressure from parents	Strong pressure from parents	-0.009	0.024	-0.35	0.724
	Little or no pressure from parents (reference category)				
School leadership and teacher quality					
School leadership	Continuous (std)	-0.007	0.010	-0.71	0.480
Teacher quality	Continuous (std)	0.048	0.013	3.81	<0.000
Teacher participation in school decisions	Continuous (std)	0.000	0.010	-0.03	0.979
School climate					
Disciplinary climate	Continuous (std)	0.019	0.015	1.28	0.201
Negative impact of teacher behaviour on school climate	Continuous (std)	-0.024	0.015	-1.59	0.111
Negative impact of student behaviour on school climate	Continuous (std)	0.013	0.018	0.75	0.451
Level of extracurricular activities	Continuous (std)	0.003	0.011	0.27	0.783

Do schools influence student engagement in the high school years?

At-risk students and engagement with school

The analysis of the complete sample in the previous section showed that few school attributes have an impact on students' engagement levels at age 15 years. However, it is possible that school characteristics play a stronger role in the engagement of students who are at risk of early school leaving.

In the context of this study, being 'at risk' generally means having an increased chance of experiencing poor educational outcomes. At-risk youth can be grouped into three broad categories (Anlezark 2011):

- young people who are not in full-time education, full-time employment, or a full-time equivalent combination thereof

- unemployed youth, that is, young people who are actively looking for work, who are not employed and who are available to start work

- young people who do not complete their senior secondary education.

A range of factors exist that increase the likelihood of being at risk. These factors include Indigeneity, being born in Australia, living outside metropolitan areas, having low academic achievement, suffering from socioeconomic disadvantage, living in a non-nuclear family and having parents with lower educational qualifications. Undoubtedly, some young people show remarkable resilience in the face of multiple risk factors and are rewarded with extraordinary educational and/or occupational success. More often, however, risk factors are accompanied by a set of risk behaviours, which in the school context create severe impediments to learning. Among such impediments are poor student behaviour and student–teacher relationships, non-participation in extracurricular activities and, ultimately, a general dislike of school, along with the intention to drop out.

To examine the relationship between school characteristics and the engagement levels of at-risk students it is necessary to first identify those who fall into the at-risk category. One approach is the indirect classification of at-risk status via socio-demographic background variables (see Anlezark 2011). The present study takes a more direct approach by considering students' intentions to complete Year 12. In LSAY Y09, 659 (4.62%) students aged 15 years stated that they had no intention of completing Year 12, and 1129 (7.92%) students indicated that they were unsure of whether they would complete. These two groups were combined to form a sub-sample of 1788 at-risk students for multi-level regression analysis.[3] Combining the two groups was based on the rationale that lacking a clear intent to complete Year 12 is qualitatively different from planning to complete.

The previous analysis of the complete student sample showed that school attributes accounted for only 4.3% and 7.5% of the variation in emotional and cognitive engagement respectively (see previous figure 1). Results from the null model in figure 2 reveal that school factors play an even smaller role for the particular sub-group of at-risk students.

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[3] In the process of creating the sub-sample, a total of 1779 (12.48%) students were excluded because their intention to complete Year 12 was missing.

Figure 2   Per cent variation accounted for by student versus school-level characteristics for at-risk students only
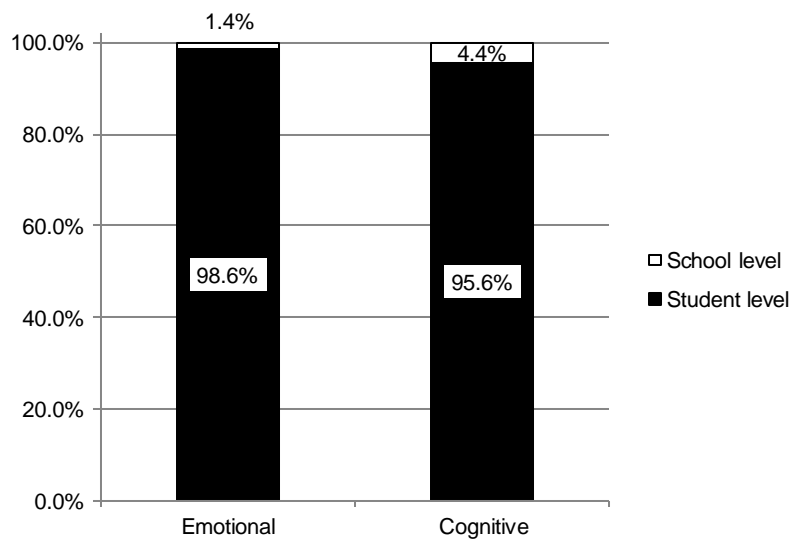
At-risk students who planned not to complete Year 12 have low levels of cognitive and emotional engagement as a result of low academic achievement and a low self-concept of ability. Moreover, males show significantly lower levels of cognitive engagement compared with their female counterparts, whereas being foreign-born increases the level of cognitive engagement among at-risk students. For brevity, tables 13 and 14 list results only for the statistically significant predictors of the at-risk sample for student-level emotional and cognitive engagement, respectively. Complete student-level results are provided in appendix D.

Tables 15 and 16 list the school-level results for the at-risk sample by engagement type. Again, only the results for statistically significant predictors are shown here. The complete results for school-level predictors are provided in appendix E.

Table 13   Statistically significant student-level predictors of emotional engagement (at-risk sample, n = 1788)

Predictor	Categories	Coeff.	SE	t	p
Academic					
Academic achievement	Continuous (std)	-0.002	0.000	-4.82	<0.000
Self-concept of ability	Average	-0.377	0.058	-6.55	<0.000
	Poor	-0.938	0.080	-11.70	<0.000
	Positive (reference category)				

Table 14 Statistically significant student-level predictors of cognitive engagement (at-risk sample, n = 1788)

Predictor	Categories	Coeff.	SE	t	p
Demographics					
Gender	Male	-0.262	0.050	-5.20	<0.000
	Female (reference category)				
Immigration background	Second-generation	0.060	0.114	0.53	0.599
	Foreign-born	0.251	0.120	2.09	0.037
	Australian-born (reference category)				
Academic					
Academic achievement	Continuous (std)	0.003	0.000	11.29	<0.000
Self-concept of ability	Average	-0.112	0.057	-1.98	0.048
	Poor	-0.310	0.078	-3.99	<0.000
	Positive (reference category)				

Table 15 Statistically significant school-level predictors of emotional engagement (at-risk sample, n = 319)

Predictor	Categories	Coeff.	SE	t	p
Sector and demographics					
Academic achievement	Continuous (std)	-0.097	0.049	-1.98	0.047
Competition and academic orientation					
Academic school selectivity (based on students' academic record and recommendations of feeder schools)	Selection criteria sometimes considered	-0.127	0.064	-1.98	0.048
	At least one selection criterion always considered	-0.133	0.071	-1.87	0.062
	No selection criteria considered (reference category)				
School leadership and teacher quality					
Teacher participation in school decisions	Continuous (std)	0.051	0.026	1.97	0.049

Table 16 Statistically significant school-level predictors of cognitive engagement (at-risk sample, n = 319)

Predictor	Categories	Coeff.	SE	t	p
School leadership and teacher quality					
Teacher quality	Continuous (std)	0.073	0.032	2.26	0.024

At-risk students who attend schools with high average academic performance appear to have a significantly weaker emotional engagement with school. Perhaps potential non-completers may feel isolated among a majority of academically high-achieving peers at their school. Schools that sometimes select students based on their academic records and the recommendations of feeder schools have a lower effect on at-risk students' emotional engagement compared with non-selective schools. It could be that non-selective schools have a greater concentration of students with low academic performance or low aspirations. Therefore, at-risk students attending such schools may develop a greater sense of belonging if their friends also have low educational aspirations.

A positive effect on at-risk students' emotional engagement was found for teachers' participation in school governance. In the PISA schools survey, teacher participation refers to aspects such as establishing policies relating to student assessment and disciplinary procedures, selecting students for admission to the school, influencing the choice of textbooks, shaping the curriculum and deciding

which courses are offered. The impact of perceived teacher quality, as measured via teachers' use of structuring and scaffolding strategies in the classroom, further improved at-risk students' cognitive engagement with school.

Overall, the separate analysis of at-risk students yields sobering results. The overall amount of variance attributable to school factors is marginal. Even though a few school characteristics emerge as statistically significant, their actual effects are again very small when compared with the impact of statistically significant student-level predictors.

Discussion and conclusion

The link between student engagement and young people's educational and occupational outcomes is well established (Abbott-Chapman et al. 2013; Archambault et al. 2009; Marks et al. 2000). The association between engagement and outcomes is also present in the LSAY sample.[4] Table 17 shows that LSAY respondents who were highly engaged with school in Year 9 fared considerably better at age 25 years when compared with their disengaged counterparts in terms of Year 12 completion, labour force status, occupational status and general life satisfaction. (Note that table 17 shows the presence of an *association*, not necessarily a causal relationship.) Furthermore, table 18 demonstrates clear gender differences among highly disengaged students. Disengaged females exhibit higher rates of Year 12 completion and general life satisfaction compared with their male counterparts, who show higher rates of full-time work by age 25 years.

Table 17 Longer-term outcomes at age 25 years by emotional engagement in school in Year 9

Long-term outcomes	Disengaged students[1]	Highly engaged students[2]
Year 12 completion	70.6	90.5
Working hours[3]		
Full-time	68.5	74.2
Part-time	17.3	14.8
Not working (unemployed or not in the labour force)	13.8	9.7
High-prestige occupation[4]	16.2	33.8
Life satisfaction[5]	40.6	55.1

Note: 1 Disengaged students were those whose scores fell into the lowest quartile of the emotional engagement distribution.
2 Highly engaged students were those from the top quartile of the emotional engagement distribution.
3 Percentages do not sum to 100 due to missing working hours.
4 High-prestige occupations denote those from the top quartile of the AUSEI06 range.
5 Students who were more satisfied with life at age 25 years are those whose life satisfaction scores were above the average.

Source: LSAY Y98 cohort, weighted data.

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[4] An ancillary descriptive analysis was undertaken to investigate how LSAY respondents who were disengaged from school in Year 9 fared about a decade later in terms of Year 12 completion, labour market outcomes and general life satisfaction. The descriptive analysis required the use of the 1998 base year cohort of LSAY (LSAY Y98), whose respondents completed the final survey wave in 2009 (modal age of 25). Due to the effects of attrition, only 3548 respondents (25.5%) of the initial sample were still in the survey by 2009. Note that the actual number of respondents in the final 2009 wave of LSAY Y98 is 3596. Forty-eight respondents had missing values on both 'gender' and emotional engagement and were thus excluded from the analysis. Appropriate LSAY weights were used in order to mitigate the potential impact of attrition bias on results. Details on the calculation and use of LSAY weights can be found in Lim (2011). Also, given that items about students' use of learning strategies were not available in LSAY Y98, the analysis of this section only considers the impact of *emotional* engagement. General information on the LSAY Y98 cohort are provided in NCVER (2009).

Table 18 Longer-term outcomes at age 25 years of disengaged students[1] by gender

Long-term outcomes	Disengaged males	Disengaged females
Year 12 completion	66.4	76.8
Working hours[2]		
Full-time	74.0	60.4
Part-time	14.8	21.1
Not working (unemployed or not in the labour force)	11.0	17.8
High-prestige occupation[3]	12.1	22.1
Life satisfaction[4]	39.6	42.0

Note: 1 Disengaged students were those whose scores fell into the lowest quartile of the emotional engagement distribution.
2 Percentages do not sum to 100 due to missing working hours.
3 High-prestige occupations denote those from the top quartile of the AUSEI06 range.
4 Students who were more satisfied with life at age 25 are those whose life satisfaction scores were above the average.
Source: LSAY Y98 cohort, weighted data.

Against this backdrop, the key policy question is whether student engagement can be increased by the way in which schools are set up and run. This study used relevant LSAY data to answer this question for high school students in Australia.

The results indicate that school characteristics contribute very little to the variation in student engagement at age 15 years. Instead, students' emotional and cognitive engagement is overwhelmingly driven by individual background factors. Students with the intention to complete Year 12 and those who are foreign-born are more emotionally and cognitively engaged at age 15 years, while students with low self-concept of ability have low levels of cognitive and emotional engagement. Other influential individual factors include academic achievement, socioeconomic status, Indigenous status, speaking a language other than English at home, the number of work hours outside school and family structure. Male students are distinctly less cognitively engaged than females.

With respect to schools, some characteristics positively influence the engagement levels of 15-year-olds over and above their individual background characteristics. Such characteristics include non-metropolitan school location, highly perceived teacher quality and high average academic performance of the student body. Yet it is important to note that, while these attributes are statistically significant, the size of their effect is small. And for the engagement of students who are at risk of early school leaving, the impact of school characteristics is even smaller. While factors associated with a school's academic orientation and teacher attributes emerge as statistically significant for at-risk students, the effect is so small that it is not practically meaningful. Overall, the results paint a sobering picture about the ability of school attributes to raise the engagement levels of 15-year-olds. It seems that by this age the die has been cast.

To end on a positive note, evidence from a recent study suggests that students' emotional engagement steadily declines between Years 7 and 12 (Lamote et al. 2013). This indicates that engagement with school is dynamic, with engagement being stronger at younger ages. It is therefore possible that any meaningful effect of school characteristics on student engagement occurs during the earlier years of schooling.

References

Abbott-Chapman, J, Martin, K, Ollington, N, Venn, A, Dwyer, T & Gall, S 2013, 'The longitudinal association of childhood school engagement with adult educational and occupational achievement: findings from an Australian national study', *British Educational Research Journal*, <http://dx.doi.org/10.1002/berj.3031>.

Ablard, KE & Lipschultz, RE 1998, 'Self-regulated learning in high-achieving students: relations to advanced reasoning, achievement goals, and gender', *Journal of Educational Psychology,* vol.90, no.1, pp.94–101.

Ajzen, I 1985, From intentions to actions: a theory of planned behavior, in J Kuhl & J Beckmann (eds), *Action-control: from cognition to behavior,* Springer, Heidelberg, pp.11–39.

Anlezark, A 2011, *At risk youth: a transitory state?* NCVER, Adelaide.

Anlezark, A & Lim, P 2011, *Does combining school and work affect school and post-school outcomes?* NCVER, Adelaide.

Appleton, J, Christenson, S & Furlong, M 2008, 'Student engagement with school: critical conceptual and methodological issues of the construct', *Psychology in the Schools*, vol.45, no.5, pp.369–86.

Archambault, I, Janosz, M, Fallu, J & Pagani, L 2009, 'Student engagement and its relationship with early high school dropout', *Journal of Adolescence*, vol.32, pp.651–70.

Connell, JP, Spencer, MB & Aber, JL 1994, 'Educational risk and resilience in African-American youth: context, self, action, and outcomes in school', *Child Development*, vol.65, pp.493–506.

Enders, CK 2010, *Applied missing data analysis*, Guilford, New York.

Finn, JD 1989, 'Withdrawing from school', *Review of Educational Research,* vol.59, pp.117–42.

Finn, JD & Voelkl, KE 1993, 'School characteristics related to school engagement', *Journal of Negro Education,* vol.62, pp.249–68.

Fredricks, JA, Blumenfeld, PC & Paris, AH 2004, 'School engagement: potential of the concept, state of evidence', *Review of Educational Research*, vol.74, pp.59–109.

Fullarton, S 2002, *Student engagement with school: individual and school-level influences*, Australian Council for Educational Research, Melbourne.

Gemici, S, Bednarz, A & Lim, P 2012, 'A primer for handling missing values in the analysis of education and training data', *International Journal of Training Research*, vol.10, pp.233–50.

Goldstein, H 2011, *REALCOM-IMPUTE: multiple imputation using MLwin,* viewed 26 June 2014, <http://www.bristol.ac.uk/cmm/software/realcom/imputation.pdf>.

Hartman, H 2002, 'Scaffolding and cooperative learning' in *Human learning and instruction,* City College of City University of New York, pp.23–69.

Henderson, CR 1975, 'Best linear unbiased estimation and prediction under a selection model', *Biometrics*, vol.31, pp.423–47.

Hox, JJ 2010, *Multilevel analysis: techniques and applications*, Routledge, New York.

Kindermann, TA 1993, 'Natural peer groups as contexts for individual development: the case of children's motivation in school', *Development Psychology,* vol.29, pp.970–77.

Lamote, C, Speybroeck, S, Van Den Noortgate, W & Van Damme, J 2013, 'Different pathways towards dropout: the role of engagement in early school leaving', *Oxford Review of Education*, vol.39, no.6, pp.739–60.

Lim, P 2011, *Weighting the LSAY Program of International Student Assessment cohorts*, NCVER, Adelaide.

Marks, G 1998, *Attitudes to school life: their influences and their effects on achievement and leaving school*, Australian Council for Educational Research, Melbourne.

Marks, G, Fleming, N, Long, M & McMillan, J 2000, *Patterns of participation in year 12 and higher education in Australia: trends and issues*, Australian Council for Educational Research, Melbourne.

Muthén, LK & Muthén, BO 2011, *Mplus user guide*, Muthén & Muthén, Los Angeles.

NCVER (National Centre for Vocational Education Research) 2009, *Longitudinal Surveys of Australian Youth 1998 cohort: user guide,* NCVER, Adelaide.

OECD (Organisation for Economic Co-operation and Development) 2012, *PISA 2009 technical report,* OECD, Paris.

Reiser, BJ 2004, 'Scaffolding complex learning: the mechanisms of structuring and problematizing student work', *Journal of the Learning Sciences*, vol.13, pp.273–304.

Rubin, DB 1987, *Multiple imputation for nonresponse in surveys*, Wiley, New York.

Skinner, EA & Belmont, MJ 1993, 'Motivation in the classroom: reciprocal effect of teacher behaviour and student engagement across the school year', *Journal of Educational Psychology,* vol.85, pp.571–81.

Skinner, EA, Wellborn, JG & Connell, JP 1990, 'What it takes to do well in school and whether I've got it: the role of perceived control in children's engagement and school achievement', *Journal of Educational Psychology*, vol.82, pp.22–32.

Twisk, JWR 2006, *Applied multilevel analysis*, Cambridge University Press, Cambridge.

Voelkl, KE 1997, 'Identification with school', *American Journal of Education*, vol.105, pp.294–318.

Willms, JD 2003, *Student engagement at school: a sense of belonging and participation*, OECD, Paris.

Appendix A: Derivation of emotional engagement scores

The emotional engagement outcome measure was created through exploratory and confirmatory factor analysis using Mplus (Muthén & Muthén 2011) software. Table A1 lists the 12 items from the PISA–LSAY 2009 questionnaire that were used to create emotional engagement scores for each individual student. Eigenvalues (table A2) show that results from exploratory factor analysis formally resulted in a one-factor solution for the emotional engagement construct (RMSEA CI- = 0.056, CI+ = 0.061; CFI = 0.989). Figure A1 shows the scree plot from factor analysis. The covariance matrix is presented in table A3.

Table A1 Items used for creating the emotional engagement construct

Item description	Original item name
My school is a place where I feel happy	ST63N05
My school is a place where I like learning	ST63N08
My school is a place where I get enjoyment from being there	ST63N09
My school is a place where I really like to go each day	ST63N17
My school is a place where I find that learning is a lot of fun	ST63N24
My school is a place where I feel safe and secure	ST63N28
My school is a place where the work we do is interesting	ST63N01
My school is a place where I like to ask questions in class	ST63N11
My school is a place where I like to do extra work	ST63N15
My school is a place where I enjoy what I do in class	ST63N18
My school is a place where I always try to do my best	ST63N19
My school is a place where I get excited about the work that we do	ST63N23

Table A2 Eigenvalues for emotional engagement construct

Item number	Eigenvalue
1	7.17
2	0.92
3	0.70
4	0.65
5	0.50
6	0.45
7	0.38
8	0.34
9	0.29
10	0.23
11	0.21
12	0.16

Figure A1 Scree plot for emotional engagement measure

Do schools influence student engagement in the high school years?
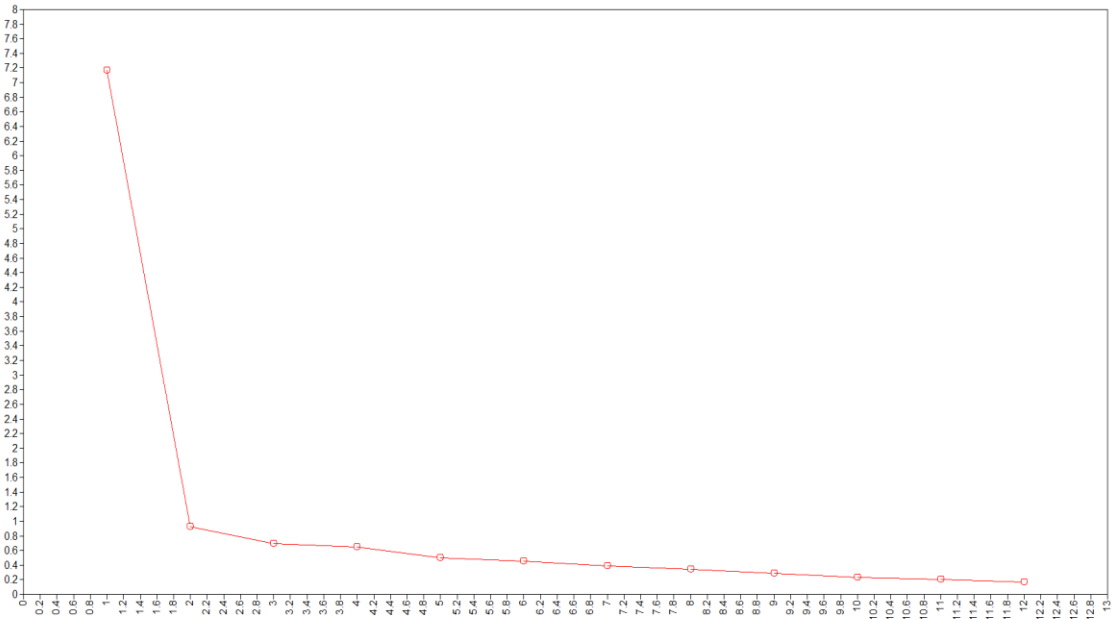
Table A3 Covariance matrix for emotional engagement measure

	ST63N05	ST63N08	ST63N09	ST63N17	ST63N24	ST63N28	ST63N01	ST63N11	ST63N15	ST63N18	ST63N19	ST63N23
ST63N05												
ST63N08	0.561											
ST63N09	0.739	0.683										
ST63N17	0.657	0.639	0.783									
ST63N24	0.581	0.711	0.707	0.661								
ST63N28	0.596	0.462	0.546	0.43	0.479							
ST63N01	0.542	0.664	0.66	0.617	0.687	0.447						
ST63N11	0.396	0.485	0.482	0.451	0.501	0.326	0.468					
ST63N15	0.454	0.556	0.553	0.517	0.576	0.374	0.538	0.392				
ST63N18	0.598	0.733	0.728	0.76	0.758	0.493	0.708	0.517	0.593			
ST63N19	0.407	0.498	0.495	0.463	0.515	0.335	0.481	0.351	0.403	0.531		
ST63N23	0.515	0.631	0.627	0.653	0.653	0.424	0.609	0.445	0.634	0.672	0.457	

Appendix B: Technical details on multi-level modelling

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

$$Y_{ij} = \beta_{0j} + \beta_{1j}X_{1j} + r_{ij}$$
$$\beta_{0j} = \gamma_{00} + u_{0j}$$
$$\beta_{1j} = \gamma_{10} + u_{1j}$$

where $r_{ij} \sim N(0, \sigma_{st}^2)$, and σ_{st}^2 is the student level variance and u_{0j} and u_{1j} are the variance components for school intercepts and school slopes respectively, such that

$$\binom{u_{0j}}{u_{1j}} \sim N\left[\binom{0}{0}, \begin{pmatrix} \sigma_{00} & \sigma_{01} \\ \sigma_{10} & \sigma_{11} \end{pmatrix}\right],$$

where σ_{00} represents the variability in school intercepts, σ_{11} is the variability in slopes and σ_{01} is the covariance between intercepts and slopes.

In the mixed-model framework, this model is written as

$$Y_{ij} = [\gamma_{00} + \gamma_{10}X_{1j}] + (u_{0j} + u_{1j}X_{1j} + r_{ij})$$

where the terms in [ ] represent fixed effects and those in ( ) represent random effects. The fixed effects are fitted and tested first, where the only random effects included are u_{0j}, and r_{ij}, that is, the random school and individual level variances. The final tests conducted are those that fit the random effects for the individual-level characteristics ($u_{1j}X_{1j}$).

Different strategies exist for adding student and school-level predictor variables to build a multi-level model (Hox 2010; Twisk 2006). In this study, random-intercept models were fitted for each outcome that contained all student and school-level predictors as fixed effects.

The interpretation of the coefficients resulting from a multilevel model is the same as for ordinary regression. However, given that school intercepts are fitted as random effects, the predicted means or probabilities for schools are based on best linear unbiased prediction (BLUP; Henderson 1975).

It should be mentioned that the longitudinal nature of LSAY normally requires the use of appropriate analysis weights in order to correct for the effects of complex sampling and attrition (see Lim 2011; OECD 2012 for further information). However, weights could not be applied in the present analysis due to the use of multiple imputation for the treatment of missing data. Specifically, Stata 11 does not allow for the use of weights when multiple imputation is combined with multi-level analysis.

For further details on multi-level modelling readers are referred to Hox (2010) or Twisk (2006).

Appendix C: Results for null models

Tables C1 and C2 provide the variance components from the initial null models across outcomes for the complete sample and the sub-sample of at-risk students. The null model is the basic variance components model with a random intercept but without any predictors. The variance partition coefficient (VPC) is calculated using $\sigma_{u0}^2/(\sigma_{u0}^2 + \sigma_e^2)$, where σ_{u0}^2 is the between-school variance and σ_e^2 is the within-school variance.

Table C1 Variance components for null models across outcomes for complete sample

Outcome	Estimate
Emotional engagement	
Between-school variance	0.043
Within-school variance	0.959
VPC	0.043
Cognitive engagement	
Between-school variance	0.076
Within-school variance	0.937
VPC	0.075

Table C2 Variance components for null models across outcomes for at-risk sample

Outcome	Estimate
Emotional engagement	
Between-school variance	0.015
Within-school variance	0.998
VPC	0.014
Cognitive engagement	
Between-school variance	0.043
Within-school variance	0.941
VPC	0.044

Appendix D: Results for student-level predictors (at-risk sample)

Tables D1 and D2 provide the complete results for student-level predictors by engagement type for the sample of at-risk students. Statistically significant predictors are shaded.

Table D1 Results for student-level emotional engagement (at-risk sample)

Predictor	Categories	Coeff.	SE	t	p
Demographics					
Gender	Male	0.035	0.050	0.70	0.485
	Female (reference category)				
Indigenous status	Indigenous	0.115	0.081	1.42	0.156
	Not Indigenous (reference category)				
Immigration background	Second-generation	-0.069	0.114	-0.61	0.545
	Foreign-born	0.112	0.121	0.93	0.353
	Australian-born (reference category)				
Home language	Not English	0.089	0.153	0.58	0.561
	English (reference category)				
Family structure	Not nuclear family	-0.038	0.053	-0.72	0.473
	Nuclear family (reference category)				
SES	Continuous (std)	0.040	0.037	1.08	0.281
Academic					
Academic achievement	Continuous (std)	-0.002	0.000	-4.82	<0.000
Self-concept of ability	Average	-0.377	0.058	-6.55	<0.000
	Poor	-0.938	0.080	-11.70	<0.000
	Positive (reference category)				
Working while at school					
Hours worked	1–14 hours per week	0.004	0.058	0.07	0.944
	15–25 hours per week	-0.132	0.073	-1.79	0.074
	Not working (reference category)				
Peer influences					
Peers' higher education aspirations	Aspire to go to university	0.129	0.080	1.61	0.113
	Do not aspire to go to university (reference category)				

Table D2 Results for student-level cognitive engagement (at-risk sample)

Predictor	Categories	Coeff.	SE	t	p
Demographics					
Gender	Male	-0.262	0.050	-5.20	<0.000
	Female (reference category)				
Indigenous status	Indigenous	-0.031	0.081	-0.39	0.698
	Not Indigenous (reference category)				
Immigration background	Second-generation	0.060	0.114	0.53	0.599
	Foreign-born	0.251	0.120	2.09	0.037
	Australian-born (reference category)				
Home language	Not English	-0.043	0.149	-0.29	0.774
	English (reference category)				
Family structure	Not nuclear family	0.023	0.053	0.44	0.663
	Nuclear family (reference category)				
SES	Continuous (std)	-0.002	0.037	-0.05	0.963
Academic					
Academic achievement	Continuous (std)	0.003	0.000	11.29	<0.000
Self-concept of ability	Average	-0.112	0.057	-1.98	0.048
	Poor	-0.310	0.078	-3.99	<0.000
	Positive (reference category)				
Working while at school					
Hours worked	1−14 hours per week	0.046	0.058	0.80	0.423
	15−25 hours per week	-0.094	0.073	-1.30	0.194
	Not working (reference category)				
Peer influences					
Peers' higher education aspirations	Aspire to go to university	-0.146	0.078	-1.87	0.066
	Do not aspire to go to university (reference category)				

Appendix E: Results for school-level predictors (at-risk sample)

Tables E1 and E2 provide the complete results for school-level predictors by engagement type for the sample of at-risk students. Statistically significant predictors are shaded.

Table E1   Results for school-level emotional engagement (at-risk sample)

Predictor	Categories	Coeff.	SE	t	p
Sector and demographics					
Sector	Catholic	0.079	0.089	0.89	0.374
	Independent	-0.056	0.142	-0.40	0.690
	Government (reference category)				
Location	Not metropolitan	0.101	0.062	1.63	0.102
	Metropolitan (reference category)				
Size	Continuous	0.000	0.000	-1.04	0.296
SES	Continuous (std)	0.091	0.057	1.62	0.106
Academic achievement	Continuous (std)	-0.097	0.049	-1.98	0.047
Gender mix	All boys	-0.076	0.129	-0.59	0.558
	All girls	-0.096	0.160	-0.60	0.546
	Co-ed (reference category)				
Per cent LBOTE students	10−40%	-0.024	0.069	-0.35	0.726
	40% or more	0.080	0.100	0.81	0.421
	Up to 10% (reference category)				
Resourcing					
Student−teacher ratio	Continuous (ratio)	0.006	0.013	0.43	0.669
Responsibility for resources	Continuous (std)	-0.065	0.048	-1.33	0.183
Responsibility for curriculum	Continuous (std)	-0.016	0.026	-0.60	0.547
Teacher shortage	Continuous (std)	0.009	0.030	0.31	0.760
Quality of educational resources	Continuous (std)	0.014	0.029	0.50	0.621
Competition and academic orientation					
Schooling options available to students	One other school	-0.064	0.084	-0.76	0.444
	No other schools	0.080	0.089	0.90	0.370
	Two or more other schools (reference category)				
Academic school selectivity (based on students' academic record and recommendations of feeder schools)	Selection criteria sometimes considered	-0.127	0.064	-1.98	0.048
	At least one selection criterion always considered	-0.133	0.071	-1.87	0.062
	No selection criteria considered (reference category)				
Academic pressure from parents	Strong pressure from parents	0.067	0.070	0.95	0.340
	Little or no pressure from parents (reference category)				
School leadership and teacher quality					
School leadership	Continuous (std)	0.003	0.026	0.12	0.901
Teacher quality	Continuous (std)	0.009	0.030	0.32	0.752
Teacher participation in school decisions	Continuous (std)	0.051	0.026	1.97	0.049

Predictor	Categories	Coeff.	SE	t	p
School climate					
Disciplinary climate	Continuous (std)	0.040	0.037	1.10	0.271
Negative impact of teacher behaviour on school climate	Continuous (std)	0.007	0.036	0.20	0.840
Negative impact of student behaviour on school climate	Continuous (std)	-0.033	0.043	-0.77	0.440
Level of extracurricular activities	Continuous (std)	-0.027	0.027	-1.00	0.315

Table E2   Results for school-level cognitive engagement (at-risk sample)

Predictor	Categories	Coeff.	SE	t	p
Sector and demographics					
Sector	Catholic	0.177	0.094	1.88	0.060
	Independent	0.253	0.149	1.70	0.090
	Government (reference category)				
Location	Not metropolitan	0.007	0.066	0.11	0.915
	Metropolitan (reference category)				
Size	Continuous	0.000	0.000	0.76	0.449
SES	Continuous (std)	0.016	0.059	0.27	0.787
Academic achievement	Continuous (std)	0.070	0.051	1.36	0.174
Gender mix	All boys	0.113	0.135	0.84	0.401
	All girls	-0.158	0.162	-0.97	0.330
	Co-ed (reference category)				
Per cent LBOTE students	10–40%	-0.120	0.073	-1.65	0.099
	40% or more	-0.037	0.105	-0.35	0.726
	Up to 10% (reference category)				
Resourcing					
Student–teacher ratio	Continuous (ratio)	0.012	0.015	0.79	0.428
Responsibility for resources	Continuous (std)	-0.042	0.051	-0.83	0.405
Responsibility for curriculum	Continuous (std)	-0.020	0.028	-0.71	0.477
Teacher shortage	Continuous (std)	-0.022	0.032	-0.68	0.498
Quality of educational resources	Continuous (std)	0.000	0.031	0.01	0.989
Competition and academic orientation					
Schooling options available to students	One other school	0.101	0.091	1.11	0.266
	No other schools	0.040	0.095	0.42	0.676
	Two or more other schools (reference category)				
Academic school selectivity (based on students' academic record and recommendations of feeder schools)	Selection criteria sometimes considered	-0.021	0.068	-0.31	0.757
	At least one selection criterion always considered	0.002	0.075	0.03	0.977
	No selection criteria considered (reference category)				
Academic pressure from parents	Strong pressure from parents	-0.125	0.073	-1.70	0.090
	Little or no pressure from parents (reference category)				
School leadership and teacher quality					
School leadership	Continuous (std)	0.026	0.028	0.93	0.354
Teacher quality	Continuous (std)	0.073	0.032	2.26	0.024
Teacher participation in school decisions	Continuous (std)	-0.010	0.027	-0.36	0.718
School climate					
Disciplinary climate	Continuous (std)	0.051	0.039	1.30	0.192
Negative impact of teacher behaviour on school climate	Continuous (std)	-0.044	0.038	-1.16	0.245
Negative impact of student behaviour on school climate	Continuous (std)	0.033	0.045	0.73	0.465
Level of extracurricular activities	Continuous (std)	-0.021	0.029	-0.72	0.469