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Student and Staff Attitudes and School Performance

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Abstract

This report assesses the extent to which student and staff opinions towards school—specifically, Victoria's Attitudes to School Survey (ATSS) administered to students and its School Staff Survey (SSS)—can improve predictions of government school performance reflected in students Australian Tertiary Admissions Ranks (ATARs), beyond predictions based on students' Year-9 reading and numeracy NAPLAN scores, their demographic characteristics and their socioeconomic status (SES). As the number of questions in the two surveys is very large, we first reduce their dimensionality by combining sets of similar questions into broader categories, and calculate average student answers within schools. (We are not able to identify student attitude responses individually.) We then add these variables to our school-level prediction regressions. While the added explanatory power of these variables in predicting school success rates is limited, we find that for all four success indicators, the student survey variables add more explanatory power than the staff survey variables. Statistically significant coefficients appear sporadically for student motivation, connectedness to peers, a stimulating learning environment, class behaviour, and, surprisingly, student distress. However, these do not necessarily indicate causal effects: our results may reflect, wholly or in part, the more positive attitudes to school of successful students and their teachers, collinearity between observed variables, possible confounding factors, and the subjective nature of survey responses. Finally, we emphasize that ATAR values are only one imperfect measure of school performance. About half the students in a cohort do not go on to university, and for such students other measures of school performance are relevant. The predictive power of these surveys is of secondary importance to their intrinsic value in providing information on student and teacher attitudes as direct indicators of what is happening in schools. Engagement and well-being are significant positive outcomes in themselves.

JEL classification: I21

Keywords: Student and staff attitudes, access to higher education, standardized tests, longitudinal analysis, NAPLAN, ATAR, VCE, Victoria, Australia

Introduction

This report assesses the extent to which student and staff opinions towards school explain school-level performance reflected in school-level success rates in achieving different Australian Tertiary Admissions Rank (ATAR) levels, among government schools in Victoria, beyond predictions developed in Houng and Justman (2014) based on students' Year-9 reading and numeracy NAPLAN scores, demographic characteristics and socioeconomic status (SES). Student and teacher attitudes are important in their own right as direct indicators of how well a school is functioning, and extensive evidence attests to the importance of affective factors reflected in these surveys. Here, however, we focus on their power to predict scholastic achievement as reflected in ATAR. Previous evidence of a statistical link between student and teacher survey responses on school climate questionnaires and students' scholastic achievement is scant and inconsistent (Marks, 2007).[1]

Specifically, we ask in regard to government schools in Victoria, whether there is evidence of a significant statistical relation between student responses to the Attitudes to School Survey (ATSS) and educators' responses to the School Staff Survey (SSS), and school-level ATAR success rates in Year 12, after controlling for students' Year 9 test scores in numeracy and reading, and their basic demographic characteristics and socio-economic status (SES). In previous work (Houng and Justman, 2014) we found that predictions based on student intake explained a large share of the variance in school-level performance. In this paper we ask whether incorporating data from the students' Attitudes to School Survey and the teachers' School Staff Surveys can add to this explained variance, and enhance our understanding of how schools function.

To this purpose, we analyse longitudinal data linking three sources of information on students in government schools: individual performance in Year 9 standardized National Assessment Program—Literacy and Numeracy (NAPLAN) test scores in Numeracy and Reading in 2008; year-level questionnaires on student attitudes administered to the same students in 2009-2011, and questionnaires on teacher attitudes administered to school staff, at the same schools, in those years; and these students' Year 12 ATAR outcomes in 2011, or lack thereof. We follow our previous analysis (Houng and Justman, 2014) in using these NAPLAN scores, along with students' social and demographic covariates, to construct individual predictions of achieving any ATAR in Year 12, of achieving an ATAR of 50 or better, of achieving an ATAR of 70 or better, and of achieving an ATAR of 90 better. We then average these predictions over all students in each school to obtain school-level predicted success rates, and regress actual success rates on these predicted rates, on school-level

[1] As Marks (2007) has noted with regard to school-leaving: "Few school-level variables have been found to have significant, much less substantial, policy-relevant effects on school leaving, and there is little consistency across studies."

variables, and on a set of variables distilled from the student and teacher surveys across some 250 government schools in Victoria.

As the number of questions in the two surveys is very large we reduce their dimensionality by combining sets of similar questions into broader categories before incorporating them in our regressions. While the added explanatory power of these variables in predicting school success rates is limited, especially for high achievement levels, we find that for all four success indicators, the student survey variables add more explanatory power than the staff survey variables. We find statistically significant coefficients (in different contexts) for student motivation, connectedness to peers, a stimulating learning environment, class behaviour, and surprisingly some measure of student distress.

Several caveats are in order here. First, we emphasize that ATAR values are only one imperfect measure of school performance. About half the students in a cohort will not go on to university, and for these other students other measures of school performance are relevant; these require other data sources and could be the subject of further investigation. Moreover, engagement with the school and a sense of well-being are significant positive outcomes in themselves. Second, our data on student attitudes are only identified by school and year-level and cannot be linked to individual students. It is possible that there are individual links between student attitudes and scholastic achievement, which could be revealed through analysis of individually linked data. Finally, we emphasize that great care should be taken in making causal interpretations of statistical links between student and teacher attitudes and student achievement. The chief concern is simultaneity bias. While it is plausible that positive attitudes towards school contribute to student achievement it is also plausible that successful students and their teachers have more positive attitudes to school. In addition, there may be confounding factors which are not in our data, and there is substantial collinearity between the explanatory variables we use that makes it difficult to separate their individual effects. Moreover, it must be kept in mind that surveys elicit subjective responses, and different responders will have different reference scales.

The paper continues as follows. Section 2 presents in some detail the extensive data used in this paper, Section 3 presents the results of our statistical analysis, and Section 4 concludes.

Related research

Previous Australian studies of the impact of student and teacher attitudes used the School Life Questionnaire (SLQ) developed by the Australian Council of Educational Research (ACER), and the Longitudinal Survey of Australian Youth (LSAY), also administered by ACER, which includes many of the same questions. Earlier studies using the SLQ found only small associations of school life scales with student background status, and little association with achievement test scores (Marks, 1998). Marks (1998), using the 1995 Year 9 LSAY cohort, investigated the relationship between attitudes to school life and self-perceived achievement in year 10, and leaving school early. He found a positive association between self-perceived achievement and general satisfaction, and a negative association between a sense of achievement and students leaving school in Year 10. Analysing the same data from the Year 9 LSAY 1995 cohort, Khoo and Ainley (2005) show how attitudes to school and intentions to complete Year 12 relate to actually doing so. They found that 87% of students who planned to proceed to Year 12, did so, and that 79% of students who planned to leave school before Year 12, did so. The correlations between attitudes to school and educational intentions were moderate, around 0.37.

Libbey's (2004) summary of research measuring students' attitudes to school, surveys the variety of methods researchers have adopted for describing student relationships to school. Common terms in the literature include: school connectedness, school engagement, school attachment, and school climate. The specific themes identified by Libbey as being common to the numerous studies on student relationships to school are: academic engagement, belonging, discipline and fairness, "likes school", student voice, extracurricular activities, safety, and teacher support. Libbey attributes importance to the study of student relationships to school because of their association with academic performance and health behaviours.

Using a very different approach, Dobbie and Fryer (2011) collect information on "the inner-workings of 35 charter schools" in New York, based on features of successful schools suggested most often in the literature, with an emphasis on school policies rather than student and staff attitudes. They find clear effects for frequent teacher feedback, the use of data to guide instruction, high-dosage tutoring, increased instructional time, and high expectations. Information from these areas explain 50% of the variance in school outcomes after accounting for year, grade and a vector of demographic controls. While direct application of their approach in Victoria is likely to suffer from a lack of sufficient variation in explanatory variables, their findings indicates the value of applying their approach within an experimental framework.

The study population

Our base population comprises all 67,867 Year-9 students aged 14 to 16 in Victoria in 2008,[2] for whom we have NAPLAN scores from numeracy and reading tests administered in May 2008 (Table 1). The Victorian Curriculum and Assessment Authority (VCAA), which administers the Victoria Certificate of Education (VCE), linked this data to this cohort's Year-12 VCE outcomes, determined by teacher assessments and VCE exams taken in October-November 2011 (Houng and Justman 2014). The Victorian Tertiary Admissions Centre (VTAC) then calculates ATAR values from the VCE outcomes. From this base population, we exclude students who attended non-government schools in either Year 9 or Year 12, as we do not have survey data for these schools. We also exclude special schools, schools without a Year 12, and a small number of other schools without ATAR values. Finally we link these schools to the ATSS and SSS files and omit schools without a match. We refer to the remaining population as our study population. It comprises 31,877 students in 259 schools.

Table 1. The study population

		Students	Campuses	Schools
1	NAPLAN Year 9	67,867	667	
2	Omitted from match with administrative data	807	12	
		67,060	655	606
3	Omitting non-government schools & students who switched govt schools	31,832	266	236
		35,228	389	370
4	Omitting special schools (sequentially)	758	71	71
5	Omitting schools without ATAR values	57	6	6
		34,413	313	293
6	Omitted from match with myschool data	1,358	17	19
		33,055	296	274
7	Omitting schools without Year 12	1,368	17	14
		31,944	279	260
8	Omitting schools unmatched with ATS data	67	1	1
	Total: the study population	31,877	278	259

[2] We omitted 356 students of other ages in Year 9. Students with missing scores are included in our analysis, with missing values indicated for each test separately and for both tests. For further detail see Houng and Justman (2014).

Descriptive statistics at the student level for this data set are presented in Table 2 along with values for the full 2008 cohort. The SES categories are determined by parents' education and occupation categories, as described in Appendix A. These statistics highlight the relative weakness of the student population in government schools in terms of both socio-economic background and prior scores, compared to the general population.

Table 2. Student-level statistics

	Full cohort		*Study population*	
Demographics				
Number of students	67,867		31,877 (47.0%)	
% male	51.3		53.0	
% aged 14 / 15 / 16	20.2 / 74.4 / 5.4		19.6 / 73.6 / 6.9	
% language background other than English (LBOTE)	25.2		26.8	
% Aborigine and Torres Straits Islanders (ATSI)	1.1		1.5	
NAPLAN Scores				
Mean Numeracy Score (standard deviation)	0.0	(1.0)	-0.17	(0.9)
Mean Reading Score (standard deviation)	0.0	(1.0)	-0.18	(0.9)
% missing numeracy score	9.1		10.6	
% missing reading score	9.3		11.2	
% missing both scores	6.7		14.1	
Parents' education, %	*Mother*	*Father*	*Mother*	*Father*
Not stated / unknown, %	13.7	28.2	8.5	30.4
9 years or less	7.4	5.7	10.0	7.4
10 years	10.2	7.0	13.7	8.6
11 years	11.3	6.4	13.0	6.9
12 years	10.5	7.6	10.4	6.8
Certificate I-IV	19.2	21.5	21.3	22.6
Diploma/ Advanced Diploma	11.3	8.3	10.7	6.9
Bachelor's degree or more	16.3	15.3	12.5	10.4
Parent's occupation, %	*Mother*	*Father*	*Mother*	*Father*
Senior manager or professional	11.4	12.5	8.0	7.9
Other business manager	15.8	17.9	13.9	14.6
Tradesmen / sales	18.2	17.4	19.0	18.7
Machine operator / hospitality worker	18.3	16.5	23.4	20.4
Has not worked in past 12 months	23.8	8.4	30.8	11.1
Not stated	12.4	27.3	4.9	27.4
SES category	*Number*	*Share*	*Number*	*Share*
1 (lowest)	17,922	26.4	11,853	37.2
2	16,177	23.8	8,582	26.9
3	17,760	26.2	6,204	19.5
4 (highest)	16,008	24.6	5,238	16.4

Table 3: ATAR outcomes of the Year-9 cohort

	Full cohort	*Study population*
Received an ATAR	63.0%	50.2%
Achieved an ATAR of 50 or more	45.5%	33.0%
Achieved an ATAR of 70 or more	27.9%	18.5%
Achieved an ATAR of 90 or more	9.1%	5.6%
Mean ATAR for students with an ATAR $\geq$ 50	75.4%	61.7%

Table 3 presents success rates in achieving different levels of ATAR. Of 54.5% of students counted here as not having achieved an ATAR of 50 or better, over two thirds are students in the 2008 Year-9 cohort who are absent from our Year-12 VCE data, whom we count as not having achieved an ATAR. For the large majority of these this is a correct assumption—they are students who dropped out from school or decided not to take the VCE exams. However, it also includes students leaving Victoria between Year-9 and Year-12, about half of whom are likely to have achieved an ATAR of 50 or better elsewhere; and students held back a year or skipping a year between Year-9 and Year-12, many of whom will have taken VCEs earlier or later. Yet other students, a small number, opt for an equivalent degree, the International Baccalaureate Diploma (IBD). In Appendix B, we gauge the number of these different types of missing students and show that they amount to about 10% of the full cohort, consistent with the success rates in Table 3.[3] Success rates for the study population, attending government schools in both Years 9 and 12, are substantially lower, reflecting the weaker student intake of government schools in terms of both prior achievement and SES, as well as the exclusion of students who switched from government to non-government schools.

School level statistics are presented in Table 5, including the number of students in the year level at each school, percentage of students in each of the 4 SES categories, percentage LBOTE and percentage ATSI, average age, percentage male, mean standardized Numeracy and standardized Reading scores, percentage missing these NAPLAN scores, mean ATAR, percentage with any ATAR and with ATARs over 50, 70 and 90.

[3] In Appendix B, we assign plausible success rates to each group and show that this yields overall success rates close to the target rates. VCAA tabulations of success rates use an age-based methodology: the ratio of successful 19-year olds to the estimated population of 17 year-olds two years earlier. Our numbers, though defined differently, are consistent with theirs.

Table 4. School-level statistics

	Mean	Std Dev.	Min	Max	N
SES 1 (%)	37.6	14.7	0.0	74.5	259
SES 2 (%)	28.1	9.7	0.0	72.7	259
SES 3 (%)	20.1	9.7	3.8	100.0	259
SES 4 (%)	14.2	13.6	0.0	64.0	259
LBOTE (%)	22.0	23.7	0.0	93.1	259
ATSI (%)	2.0	3.0	0.0	21.1	259
Age	14.9	0.1	14.3	15.3	259
Male (%)	53.4	13.1	0.0	100.0	259
Std. Numeracy	-0.2	0.4	-1.0	2.3	259
Std. Reading	-0.2	0.3	-0.7	1.6	259
Missing Numeracy (%)	11.3	10.1	0.0	100	259
Missing Reading (%)	12.3	10.9	0.0	100	259
ATAR	58.2	10.0	20.9	95.4	245
% students achieving an ATAR	46.2	21.3	0.0	96.9	259
ATAR > 50 (%)	29.8	19.4	0.0	96.6	259
ATAR > 70 (%)	15.9	14.9	0.0	94.2	259
ATAR > 90 (%)	4.0	8.4	0.0	81.1	259
Students	797.7	469.9	64	2422	249
Teachers (FTE)	62.9	32.6	11.0	172.2	249
Student / Teacher Ratio	12.0	2.1	4.6	15.5	249
Attendance rate (year 1 – 10)	90.6	3.8	60.0	99.0	247
ICSEA / 1000	1.0	0.0	0.9	1.2	250
Students in Year Level (#)	123.1	77.4	4.0	325.0	259

Note: All variables refer to school-level values. Thus "ATAR > 50 (%)" is the percent of students in the school achieving an ATAR over 50. In the best-performing school in this dimension 96.6% of students achieved an ATAR over 50; in the worst performing school none did.

Survey data

The Attitudes to School Survey (ATSS) collected by the Victorian Department of Education and Training, surveys students from Years 5 to 12 for their views on many aspects of school, including their wellbeing, teaching, learning, and school in general. An objective of the ATSS is to assist schools with planning, developing curriculum and supporting students. The School Staff Survey (SSS) similarly surveys teaching and non-teaching staff for their views on aspects of their school that make a difference to student outcomes.

Attitudes to School Survey (ATSS)

We defined the ATSS data sample as students in Year 10 in 2009, Year 11 in 2010 and Year 12 in 2011.[4] The questionnaire contains 52 questions, 11 of which had response values ranging from 1 to 7 ("not at all" to "all the time") and the remainder had response values from 1 to 5 ("strongly disagree" to "strongly agree"). Appendix C provides descriptive statistics on each question. The questions are grouped in the data in 11 categories:

- Student Morale
- Less Student Distress
- Teacher Effectiveness
- Teacher Empathy
- Stimulating Learning
- School Connectedness
- Student Motivation
- Learning Confidence
- Connectedness with Peers
- Class Behaviour
- Student Safety

Table 5: Missing responses from the student survey

	%
Student Morale	2.9
Less Student Distress	3.7
Teacher Effectiveness	2.9
Teacher Empathy	4.2
Stimulating Learning	3.8
School Connectedness	3.9
Student Motivation	4.5
Learning Confidence	3.1
Connectedness Peers	1.9
Class Behaviour	2.5
Student Safety	3.3

School and campus numbers and participation in Program for Students with Disabilities (PSD) are provided along with self-reported Aboriginal or Torres Strait Islander (ATSI) status, and gender. The responses were recoded from scales of 1-5 and scales of 1-7 to scales of 0 to 100, and subsequently

[4] About 4.2% of these students had missing or multiple year levels and were excluded from the sample.

averaged at the school level and over the three years. Questions that were framed negatively or described negative feelings (e.g. “I feel depressed at school”) were recoded so that higher values indicate positive attitudes (e.g., replacing "student distress" with "less student distress"). As Table 5 shows, response rates are high throughout.

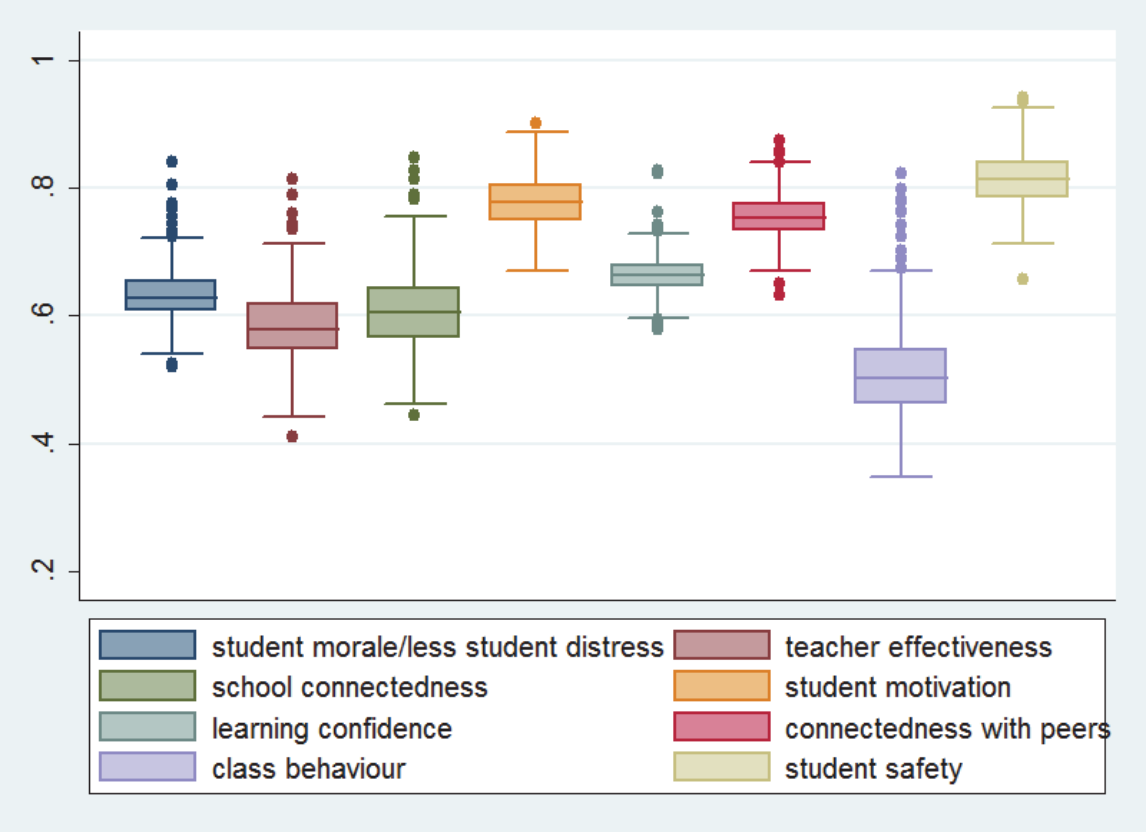
Correlations between some of the 11 categories are very high, and we use this to reduce the original list to eight categories. We combine Student Morale and Less Student Distress (correlation 0.86) and refer to the combined category as "Student Morale"; and we combine Teacher Effectiveness, Teacher Empathy and Stimulating Learning into one category, "Teacher Effectiveness".[5] Correlations between the eight new categories are presented in Table 6, and box plots in Figure 1.

Table 6: Correlations between student survey categories

	1	2	3	4	5	6	7	8
Student Morale	1.00	0.77	0.84	0.49	0.76	0.64	0.60	0.53
Teacher Effectiveness	0.77	1.00	0.83	0.51	0.70	0.45	0.56	0.45
School Connectedness	0.84	0.83	1.00	0.62	0.77	0.59	0.56	0.51
Student Motivation	0.49	0.51	0.62	1.00	0.72	0.57	0.33	0.48
Learning Confidence	0.76	0.70	0.77	0.72	1.00	0.66	0.47	0.47
Connectedness Peers	0.64	0.45	0.59	0.57	0.66	1.00	0.47	0.73
Class Behaviour	0.60	0.56	0.56	0.33	0.47	0.47	1.00	0.61
Student Safety	0.53	0.45	0.51	0.48	0.47	0.73	0.61	1.00

[5] The correlation between Student Morale and Less Student Distress is 0.86; between Teacher Effectiveness and Teacher Empathy 0.97; between Teacher Effectiveness and Stimulating Learning 0.93; and between Teacher Empathy and Stimulating Learning 0.92. We also applied factor analysis to try and further reduce the number of explanatory variables, but the results did not prove useful.

Figure 1. Student Survey Boxplots



Note: The whiskers extend beyond the 25th and 75th percentiles (first and third quartiles) by 1.5 times the difference between the 25th and 75th percentiles.

School Staff Survey (SSS)

The 2009 and 2010 staff survey contained 95 questions, sorted into 20 categories. In 2011 the survey was extended to include 129 questions, in 26 categories. Appendix D provides descriptive statistics on individual questions. Many categories remained the same between 2009/2010 and 2011, as shown in the first two columns of Table 7, with similar categories paired in the same rows. In the third column, similarly themed categories are collected into broader categories of staff wellbeing, school climate, team practices, teaching and learning, and student behaviour.

Table 7: Categories of staff survey questions

2009/2010	2011	Main Categories
Individual Morale	Individual Morale	1.Staff Morale
Individual Distress	Individual Distress	
School Morale	School Morale	
School Distress	School Distress	
Supportive Leadership	Supportive Leadership	2.Workplace
	Leadership Team	Environment
Professional Interaction	Professional Interaction	
Participative Decision-Making	Empowerment	
Goal Congruence	Ownership	
Appraisal and Recognition	Appraisal and Recognition	
Professional Growth	Employee Development	
Role Clarity	Role Clarity	
Learning Environment	Quality Teaching	3.Learning Environment
	Parent Partnerships	
	Teacher Confidence	
	Metacognition	
	Engaging Practice	
Respect for Students	Respect for Students	
Student Motivation	Student Motivation	4.Student Behaviour
Student Misbehaviour	Student Behaviour (School)	
Classroom Misbehaviour	Student Behaviour (Time)	
	Student Behaviour (Classroom)	
Curriculum Coordination	Curriculum Processes	5.Curriculum Processes
Effective Discipline Policy	Student Management	6.Student Management
Excessive Work Demands	Work Demands	7.Work Demands

We use the 2011 list of categories as our starting point, using the 2009-10 categories to group Supportive Leadership and Leadership Team under Supportive Leadership; grouping the five categories corresponding to Learning Environment under Learning Environment; and grouping the three Student Behaviour categories under Student Behaviour. The eighteen categories this yields, and the share of missing values for each, are shown in Table 8. A category is treated as missing if one of its constituent questions has a missing response.

Table 8. Missing responses from the staff survey

	%
Individual Morale	0.1
Individual Distress	0.1
School Morale	0.9
School Distress	0.9
Role Clarity	0.8
Professional Interaction	0.9
Appraisal and Recognition	0.9
Student Motivation	24.7
Empowerment	0.9
Ownership	0.7
Employee Development	0.9
Excessive Work Demands	0.9
Student Management	15.7
Curriculum Processes	24.6
Respect for Students	15.4
Learning Environment	24.9
Student Behaviour	25.0
Supportive Leadership	1.2

Note: A category is "missing" if one of its constituent questions is missing an answer. Categories with high levels of missing values include questions that were not relevant for non-teaching staff.

Correlations between some of the 18 categories are very high, and again we use this to reduce the original list to seven categories, combining Individual Morale, Less Individual Distress, School Morale and Less School Distress into one category, "Staff Morale".[6] We combined seven related categories describing the workplace environment into one category, "Workplace Environment". Correlations between the seven categories range from 0.81 to 0.92 (Table 9). We also combined Student Behaviour and Student Motivation (correlation 0.92); and Respect for Students with Learning Environment (correlation 0.86).

[6] The correlation between Individual Morale and Less Individual Distress is 0.93; between Individual Morale and School Morale 0.91; between Individual Morale and Less School Distress 0.93; between Less Individual Distress and School Morale 0.83; between Less Individual Distress and Less School Distress 0.92; and between School Morale and Less School Distress 0.89.

Table 9. Correlations between categories describing the workplace environment

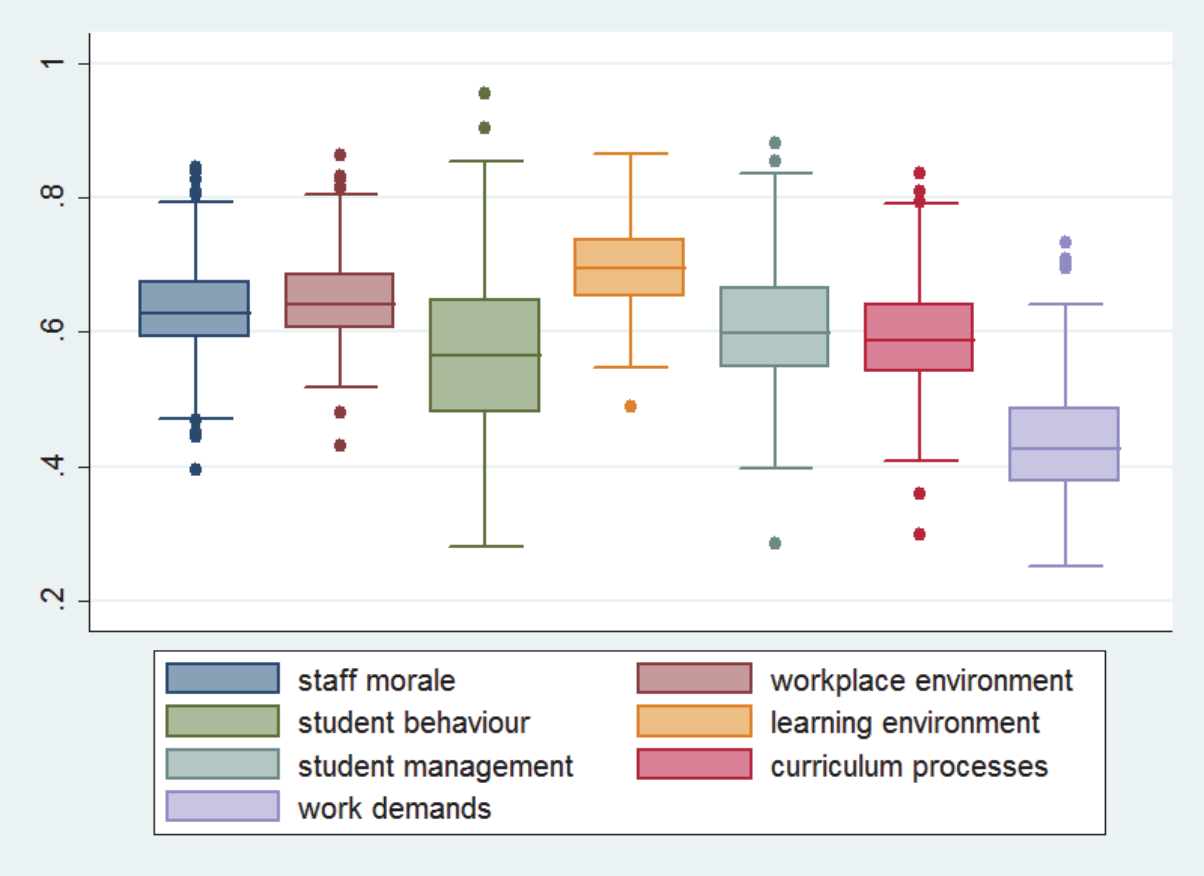
	1	2	3	4	5	6	7
1. Supportive Leadership	1.00	0.92	0.87	0.87	0.86	0.83	0.88
2. Empowerment	0.92	1.00	0.84	0.82	0.81	0.81	0.83
3. Ownership	0.87	0.84	1.00	0.87	0.86	0.84	0.89
4. Professional Interaction	0.87	0.82	0.87	1.00	0.83	0.82	0.87
5. Appreciation Recognition	0.86	0.81	0.86	0.83	1.00	0.85	0.85
6. Employee Development	0.83	0.81	0.84	0.82	0.85	1.00	0.82
7. Role Clarity	0.88	0.83	0.89	0.87	0.85	0.82	1.00

Correlations between the seven new categories from the Staff Survey are presented in Table 10, and box plots are presented in Figure 2. Table 11 presents "cross" correlations between student and staff survey categories.

Table 10. Correlations between staff survey categories

	Staff morale	Work-place	Student behavr	Learning environ	Student mgmt	Curriclm procs	Work demand
Staff Morale	1.00	0.91	0.64	0.83	0.78	0.72	0.75
Workplace Environment	0.91	1.00	0.50	0.81	0.81	0.80	0.68
Student Behaviour	0.64	0.50	1.00	0.77	0.63	0.50	0.35
Learning Environment	0.83	0.81	0.77	1.00	0.77	0.72	0.51
Student Management	0.78	0.81	0.63	0.77	1.00	0.73	0.50
Curriculum Processes	0.72	0.80	0.50	0.72	0.73	1.00	0.47
Work Demands	0.75	0.68	0.35	0.51	0.50	0.47	1.00

Figure 2. School Staff Survey Boxplots



Note: The whiskers extend beyond the 25th and 75th percentiles (the first and third quartiles) by 1.5 times the difference between the 25th and 75th percentiles.

Table 11. Correlations between student and staff survey categories

	Staff Morale	Workpl Environ	Student Behavr	Learning Environ	Student Mgmt	Curriclm Procs	Work Demand
Student Morale	0.39	0.35	0.30	0.39	0.33	0.24	0.37
Teacher Effectiveness	0.41	0.41	0.31	0.46	0.37	0.30	0.30
School Connectedness	0.39	0.35	0.39	0.46	0.35	0.27	0.24
Student Motivation	0.16	0.13	0.31	0.20	0.22	0.17	0.01
Learning Confidence	0.29	0.26	0.29	0.33	0.30	0.23	0.18
Connectedness Peers	0.26	0.23	0.29	0.27	0.23	0.15	0.17
Class Behaviour	0.42	0.35	0.57	0.53	0.41	0.31	0.25
Student Safety	0.28	0.23	0.37	0.33	0.26	0.23	0.14

Note: Rows are the eight student survey categories; columns are the seven staff survey categories.

Regression analysis

In this section we consider whether these fifteen variables—eight from the students' Attitudes to School Survey, seven from teachers' School Staff Survey—are correlated with schools' value-added with regard to four ATAR success rates: achieving any ATAR, achieving an ATAR of 50 or better; achieving an ATAR of 70 or better; and achieving an ATAR of 90 better. Specifically, we regress each of these school-level success rates across government schools in Victoria on expected success rates derived from individual predictions conditioned on Year-9 NAPLAN scores, demographic variables and SES;[7] on a set of school-level indicators (student population, student-teacher ratio, male share, ATSI share, mean age, average attendance rate, average ICSEA); on a set of geographic indicators; and on the fifteen survey-based variables.

This is done in five stages. We first estimate our baseline regression, regressing actual success rates only on predicted rates. Specification I adds the school-level variables. Specification II regresses success rates on the predicted success rate, school-level variables and the student survey variables. Specification III regresses success rates on the predicted success rate, school-level variables and the staff survey variables. Specification IV regresses success rates on the predicted success rate, school-level variables and student and staff survey variables. Appendix E presents complete regression outputs for each of the five specifications and four outcome variables.

Table 12. The baseline regressions

	Any ATAR	ATAR 50	ATAR 70	ATAR 90
Prediction	1.389***	1.252***	1.150***	1.161***
	(0.057)	(0.034)	(0.027)	(0.021)
Constant	-20.517***	-8.674***	-2.993***	-1.099***
	(2.821)	(1.154)	(0.548)	(0.175)
adj. R-sq	0.699	0.839	0.876	0.920
N	259	259	259	259

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

The baseline regressions are presented in Table 12, each column corresponding to a different outcome variable. Thus in the rightmost column, the percent of students in the school achieving an ATAR is regressed on the predicted share derived from our student-level regressions and a constant,

[7] This is the approach used in Houng and Justman (2014).

over 259 schools. The estimated coefficient of the predicted share is 1.389, this is the regression slope; the estimated constant is -20.517; and the adjusted R^2, indicating goodness-of-fit, is 0.699. The goodness-of-fit for the other outcome variables is considerably higher. The slopes are all significantly greater than 1.00, indicating that, on average, schools with better students do better than predicted, while schools with weaker students do worse than predicted. This may indicate positive peer effects or positive classroom/school effects.

Table 13 compares the results of the five regressions we estimate with regard to goodness of fit, as measured by adjusted R^2 values, comparing the full specification with all survey variables (marked "Spec IV") to the baseline specification presented in Table 12; the bottom row shows the difference between the two. The largest increase in goodness of fit is for Any ATAR, an increase of .071 overall (the difference between .770 and .699). Of this, the school level variables add .039 (the difference between Spec I and the baseline); and the survey variables add the rest, .032. We find more modest increases for ATAR50 and ATAR 70 while for ATAR90, school level variables and survey variables add hardly anything to predicted success rates conditioned on individual characteristics. Comparing Specs II and III we find that for all four outcome indicators Spec II is greater, indicating that the student survey variables add more explanatory power than the staff survey variables.

Table 13. Goodness-of-fit across specifications for each success indicator

	Any ATAR	ATAR 50	ATAR 70	ATAR 90
Baseline specification	0.699	0.839	0.876	0.920
Spec I (base + school variables)	0.738	0.853	0.889	0.920
Spec II (spec I + student survey)	0.763	0.858	0.897	0.922
Spec III (spec I + staff survey)	0.745	0.853	0.895	0.921
Spec IV (spec I + both surveys)	0.770	0.859	0.903	0.922
Change: IV - I	0.032	0.006	0.014	0.002
Change: IV – Base	0.071	0.020	0.027	0.002

The complete regression outputs in Appendix E show negative effects for the student-teacher ratio for ATAR > 70; negative effects for all outcomes except ATAR > 90 for male ratio; and a positive effect for the SES index, ICSEA. Among the student survey variables we find a positive effect for "connectedness to peers" and surprising negative effects for student safety (for lower achievement levels) and for student morale (for ATAR90), or equivalently a positive effect for student distress. (All

variables are coded so that positive values have a positive connotation.)[8] With regard to staff survey responses, we found a significant positive coefficient for staff morale and a significant negative coefficient for work demands (indicating that greater demands lead to higher success rates.)

Regression analysis for low SES students

We repeated the analysis for students in the lowest SES quartile and obtained generally similar results. These are presented in Table 14 (the baseline regression) and Table 15 (goodness of fit). There are few differences. Goodness-of-fit is generally somewhat lower for all specifications indicating that the effect of unobservables is greater for these students than for students from a stronger socio-economic background.

Table 14. The baseline regression, low SES students

	Any ATAR	ATAR 50	ATAR 70	ATAR 90
Predictions	1.314***	1.264***	1.255***	1.269***
	(0.068)	(0.048)	(0.053)	(0.031)
Constant	-11.536***	-4.974***	-1.663*	-0.452*
	(2.659)	(1.145)	(0.737)	(0.183)
Adj. R-sq	0.591	0.733	0.689	0.871
N	256	256	256	256

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

Table 15. Goodness-of-fit across specifications, low SES students

	Any ATAR	ATAR 50	ATAR 70	ATAR 90
Baseline specification	0.591	0.733	0.689	0.871
Spec I (base + school variables)	0.623	0.750	0.721	0.878
Spec II (spec I + student survey)	0.641	0.762	0.730	0.879
Spec III (spec I + staff survey)	0.625	0.756	0.727	0.882
Spec IV (spec I + both surveys)	0.648	0.770	0.734	0.884
Change: IV – Spec I	0.025	0.020	0.013	0.006
Change IV - Baseline	0.057	0.037	0.045	0.013

[8] We cannot rule out the possibility that these surprising findings result from multi-collinearity.

Concluding remarks

This report assesses the extent to which student and staff opinions towards school—specifically, the Attitudes to School Survey (ATSS) administered to students and the School Staff Survey (SSS) administered to their educators—improves predictions of government school performance as reflected in students' Australian Tertiary Admissions Ranks (ATARs), beyond predictions based on students' Year-9 reading and numeracy NAPLAN scores, demographic characteristics and socio-economic status (SES). We reduce the very large number of questions in the two surveys to fifteen broader categories—eg, student morale, school connectedness, student motivation—based on correlations between them, before incorporating them in our regressions.

While the added explanatory power of these variables in predicting school success rates is limited, we find that for all four success indicators, the student survey variables add more explanatory power than the staff survey variables. We find statistically significant coefficients (in different contexts) for student motivation, connectedness to peers, a stimulating learning environment, class behaviour, and, surprisingly, student distress. It must be stressed that these do not necessarily indicate causal effects. There is the possibility of simultaneity bias inasmuch as successful students and their teachers generally have more positive attitudes to school and there may be confounding factors which are not in our data; there is collinearity between explanatory variables; and survey responses reflect different individual reference scales.

In presenting these findings, we emphasize that information on student and teacher attitudes is of intrinsic value as a direct indicator of students' engagement with their school and their sense of well-being, which are significant positive outcomes in themselves. ATAR values are only one, imperfect measure of school performance. About half the students in a cohort do not go on to university, and for such students other measures of school performance are relevant. Finally, we note for future reference that our focus on differences between schools was dictated by our inability to link survey responses to student level data on scholastic outcomes and background variables. In Victoria, as in many other school systems, most of the variance in student outcomes occurs within schools. If future school surveys allow survey responses to be linked to individual student data, this could contribute substantially to understanding what drives school outcomes in a much broader context. Possibly, individually identified data followed over time might allow us to draw causal inferences from dynamic patterns of change in attitudes and outcomes.

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Appendix A. Definitions of socio-economic variables

We define five categories of parental education from separate indicators of parents' education:

1. Least educated: neither parent above year 10
2. Partial HS-school: at least one parent year 11 or certificate
3. Both missing: both not stated or unknown
4. Full HS: at least one parent Year 12 or diploma
5. Higher education: at least one parent with bachelor degree or more

Similarly, we define a single, joint indicator of parental occupation, with five exclusive categories, from data on father's and mother's occupation types, classified as: senior manager or professional; other business manager; tradesman or sales; machine operator or hospitality worker; unemployed; and not stated or unknown. We combine them into a single parental indicator as follows:

1. "Both unemployed or father's occupation unknown": Both parents are unemployed, or the father's occupation is unknown and the mother is not a manager or professional. When only the father's occupation is unknown we interpret this as generally indicating an absent father.
2. "One parent not working": The father is unemployed and the mother is not a manager or professional, or the mother is unemployed or has unknown occupation and the father is employed but not as a manager or professional.
3. "Both employed": Father and mother both working but neither is a manager or professional
4. "Both unknown": Father's and mother's occupation category unknown; we interpret this as generally indicating that they are self-employed and do not fall comfortably in any category.
5. "Manager": Father or mother is a manager or professional

The definition of each category is set out in Table A1:

Table A1. Definition of occupation types

	Father's occupation					
Mother's occupation	Senior manager or professional	Other business manager	Trade or sales	Machine operator or hospitality	Unemployed	Not stated or unknown
Senior manager or professional	5	5	5	5	5	5
Other business manager	5	3	3	3	2	1
Trade or sales	5	3	3	3	2	1
Machine operator or hospitality	5	3	3	3	2	1
Unemployed	5	2	2	2	1	1
Not stated or unknown	5	2	2	2	2	4

Finally, we define four levels of family socio-economic status (SES) based on these five categories of parental education and five categories of parental occupation, as follows:

(1) (lowest) Both education and occupation categories are in the lower range

(2) Both education and occupation are mid to low range and equivalents

(3) Both education and occupation are mid-range or one is high and one is low

(4) (highest) Both high range categories or one high and one mid-range

We set out the specific frequencies of each combination of family occupation and education in Table A2, and the definition of family SES levels in Table A3.

Table A2. Cross Tabulation of Occupation and Education

	Family education categories					
Family occupation categories	Less	Some high school	Both missing	Full high school	Bachelor degree	Total
Father missing	2,811	3,031	573	1,824	506	8,745
One not working	947	2,392	275	1,757	542	5,913
Both working	937	5,209	411	3,614	1,370	11,541
Both missing	47	100	1,290	77	47	1,561
Manager	26	270	68	701	3,052	4,117
Total	4,768	11,002	2,617	7,973	5,517	31,877

Table A3. Definition of family SES levels

	Family occupation				
Family education	***Lowest***	***2***	***3***	***4***	***Highest***
Lowest	1	1	2	2	2
2	1	1	2	2	3
3	1	1	3	3	4
4	1	2	3	3	4
Highest	2	3	4	4	4

Appendix B: Students in the Year-9 cohort missing from the Year-12 data.

As noted in Section 2, there are three categories of students in our Year-9 cohort who do not appear in the Year-12 data and are therefore counted as not having achieved an ATAR but who may have achieved an ATAR of 50 or better elsewhere or at a different time: those leaving Victoria between Year-9 and Year-12; those held back a year or skipping a year between Year-9 and Year-12; and those achieving the equivalent International Baccalaureate Diploma (IBD). We first estimate the size of each group.

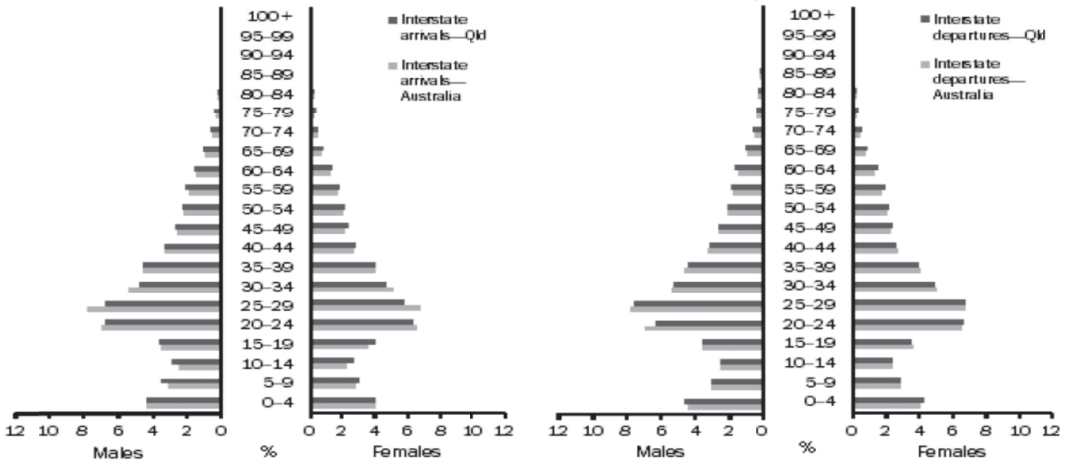
Students leaving Victoria between Year 9 and Year 12. Total annual departures from Victoria in 2009 amounted to just over 60,000; in Australia as a whole, just under 4% of internal migrants were between the ages of 15-19 (Australian Bureau of Statistics, 2009, *Migration Australia*, cat. no. 3412.0, http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3412.02009-10?OpenDocument viewed 6/11/2013; see tables B1 and B2 below). Assuming this applies to Victoria and distributes evenly among the five years, there were just under 500 departures per cohort each year, or 1500 departures between Year 9 and Year 12, about 2.2% of our cohort. If their success rates are similar to the general population, we are understating the share of ATAR50 by 1.1 percentage points, the share of ATAR70 by 0.7 percentage points, and the share of ATAR90 by 0.2 percentage points.

Table B1. Interstate migration flows, 2009-10

	DEPARTURES FROM:								
	NSW	*Vic.*	*Qld*	*SA*	*WA*	*Tas.*	*NT*	*ACT*	*Total arrivals*(b)
Arrivals to:									
NSW	. .	20 088	35 355	4 989	7 525	2 118	2 969	9 938	82 982
Vic.	22 686	. .	17 594	6 544	8 109	3 185	2 451	2 527	63 096
Qld	42 044	18 605	. .	5 823	8 295	3 193	5 208	3 237	86 405
SA	4 628	5 552	4 548	. .	2 458	634	2 257	624	20 701
WA	8 297	8 422	8 696	2 849	. .	1 443	2 605	879	33 191
Tas.	2 405	2 731	3 341	691	1 660	. .	419	260	11 507
NT	3 320	2 783	4 482	2 007	2 284	315	. .	471	15 662
ACT	10 142	2 360	2 813	762	898	297	595	. .	17 867
Total departures(b)	93 522	60 541	76 829	23 665	31 229	11 185	16 504	17 936	331 411
Net	**–10 540**	**2 555**	**9 576**	**–2 964**	**1 962**	**322**	**–842**	**–69**	. .

Source: Australian Bureau of Statistics, 2009, *Migration Australia*, cat. no. 3412.0, Table 5.3

Table B2. Interstate movers for Queensland and Australia, by age and sex, 2009-10



Source: Australian Bureau of Statistics, 2009, *Migration Australia*, cat. no. 3412.0, Table 5.8

Students held back a year or skipping a year between Year-9 and Year-12. NAPLAN data from 2008 to 2011 indicates that on average roughly 0.8% of students in Victoria government schools repeat Year-9 annually (Table B3). The share of students repeating years 10 or 11 should be smaller; we assume it is 0.4% in each year, or 1.6% in total, and that the share of repeaters in private school is no larger.

Table B3. Students repeating Year-9 in Victoria government schools

Year	Number of students in cohort	Students repeating Year-9	Share
2009	40,794	335	0.82%
2010	39,962	309	0.77%
2011	39,848	373	0.94%
2012	39,486	344	0.87%
total	160,090	1,361	0.85%

Source: Victoria DEECD NAPLAN data, authors' tabulation

The fraction of students with an ATAR of 50 or higher among repeaters is likely to be lower than in the general population, which suggests that adding repeaters who achieve an ATAR in later years

would increase our average indicators of success by no more than 0.8, 0.48 and 0.24 percentage points, respectively. We do not have data on the share of students skipping a year between years 9 and 12. Their share in the population at these ages is likely to be significantly smaller but their success rates are no doubt higher. We assume their impact on our success rates is no larger than that of repeaters, implying a total impact of at most 1.6%, 1.0% and 0.5% on success rates.

Students earning an International Baccalaureate Diploma (IBD)/ The IBD is an alternative system of high school matriculation. Australia's University Admission Centre (UAC) publishes an equivalence scale equating IB Diploma scores to UAC ranks on the ATAR scale. About five hundred students earn an IB Diploma in Victoria annually, about 0.9% of the cohort. Almost all of them achieve a ranking equivalent to an ATAR of 70 or better, and we assume that a third of these achieve an ATAR-equivalent of 90 or better (this is the ratio of ATAR90 to ATAR70 in the population). This implies Increases in our success rates of 0.9%, 0.9% and 0.3% respectively.

In sum, this implies that we are understating the share of ATAR50 by 1.1 + 1.6 + 0.9 = 3.6%; the share of ATAR70 by no more than 0.7 + 1.0 + 0.9 = 2.6%; and the share of ATAR90 by no more than 0.2 + 0.5 + 0.3 = 1.0%. When these are added to the observed frequencies in Table 3, the total frequencies are 49.1%, 30.5% and 10.1%, close to the target shares of 50%, 30% and 10%.

Appendix C. Student Survey Responses

Note for all tables in Appendix C: The questions have been rescaled from 0 to 1. Questions with 7 values (0 to 6) take on the values: : 0 = 0, 1 = 1/6, 2 = 1/6, 3 = 2/6, 4 = 3/6, 5 = 4/6, 6 = 5/6, 7 = 6/6; questions with 5 values (0 to 4) take on the values: 0 = 0, 1 = 1/4, 2 = 2/4, 3 = 3/4, 4 = 4/4. Each table provides mean scores by year; the overall mean (Mean) and standard deviation (SD), and the total number of observations (N).

The scores of all negatively phrased questions and their associated factors are reversed so that the higher the score the more positive the outcome, making the interpretation of survey results directly comparable for all factors.

Wellbeing

Student Morale: The extent to which students feel positive at school

	2009	2010	2011	Mean	SD	N
I feel positive at school	0.63	0.64	0.67	0.65	0.24	75,452
I feel cheerful at school	0.64	0.64	0.66	0.65	0.24	75,047
I feel relaxed at school	0.56	0.56	0.56	0.56	0.26	75,054
I feel happy at school	0.66	0.66	0.68	0.66	0.24	75,193
I feel energised at school	0.55	0.52	0.53	0.53	0.26	74,609
Total	0.61	0.60	0.62	0.61	0.20	75,537

Less Student Distress: The extent to which students feel negative at school

	2009	2010	2011	Mean	SD	N
I feel tense at school	0.63	0.62	0.60	0.62	0.26	75,054
I feel negative at school	0.65	0.66	0.68	0.66	0.26	74,972
I feel frustrated at school	0.57	0.57	0.58	0.57	0.28	75,190
I feel depressed at school	0.75	0.75	0.77	0.76	0.27	75,051
I feel uneasy at school	0.68	0.69	0.71	0.69	0.26	74,610
I feel stressed at school	0.59	0.55	0.50	0.55	0.29	75,309
Total	0.65	0.64	0.64	0.64	0.21	75,540

Teaching and Learning

Teacher Effectiveness: The extent to which teachers deliver their teaching in a planned and energetic manner

	2009	2010	2011	Mean	SD	N
My teachers are easy to understand	0.57	0.61	0.67	0.61	0.25	75,405
My teachers put a lot of energy into teaching our class	0.56	0.60	0.66	0.60	0.26	75,242
My teachers explain how we can get more information	0.56	0.60	0.67	0.60	0.26	74,601
This school is preparing students well for their future	0.64	0.65	0.69	0.66	0.26	74,908
My teachers are well prepared	0.57	0.61	0.66	0.61	0.25	74,947
Total	0.58	0.61	0.67	0.62	0.20	75,512

Teacher Empathy: The extent to which teachers listen and understand student needs, and assist with student learning

	2009	2010	2011	Mean	SD	N
My teachers listen to what I have to say	0.57	0.62	0.69	0.62	0.27	74,950
My teachers really want to help me learn	0.61	0.66	0.73	0.66	0.26	74,896
My teachers provide help and support when it is needed	0.60	0.65	0.72	0.65	0.26	74,698
My teachers are good at helping students with problems	0.55	0.59	0.65	0.59	0.26	74,887
My teachers explain things to me clearly	0.56	0.60	0.65	0.60	0.24	75,056
My teachers help me to do my best	0.58	0.62	0.68	0.62	0.25	74,992
My teachers understand how I learn	0.51	0.53	0.58	0.53	0.28	75,228
Total	0.57	0.61	0.67	0.61	0.21	75,506

Stimulating Learning: The extent to which teachers make learning interesting, enjoyable and inspiring

	2009	2010	2011	Mean	SD	N
My teachers make the work we do in class interesting	0.45	0.50	0.55	0.50	0.26	74,817
My teachers make learning interesting	0.48	0.52	0.57	0.52	0.26	74,336
My teachers are inspiring to listen to	0.42	0.47	0.52	0.47	0.27	74,888
My teachers make school work enjoyable	0.46	0.50	0.55	0.50	0.26	74,913
Total	0.45	0.50	0.55	0.50	0.23	75,504

School Connectedness: The extent to which students feel they belong and enjoy attending school

	2009	2010	2011	Mean	SD	N
I feel good about being a student at this school	0.61	0.64	0.68	0.64	0.27	74,345
I like school this year	0.61	0.61	0.64	0.62	0.29	75,215
I am happy to be at this school	0.62	0.64	0.68	0.65	0.28	75,123
I feel I belong at this school	0.59	0.62	0.67	0.62	0.28	74,792
I look forward to going to school	0.49	0.50	0.53	0.51	0.30	74,910
Total	0.58	0.60	0.64	0.61	0.23	75,553

Student Motivation: The extent to which students are motivated to achieve and learn

	2009	2010	2011	Mean	SD	N
Doing well in school is very important to me	0.80	0.81	0.83	0.81	0.24	74,003
Continuing or completing my education is important to me	0.83	0.84	0.87	0.85	0.24	74,824
I try very hard in school	0.69	0.69	0.71	0.70	0.25	74,541
I am keen to do very well at my school	0.76	0.78	0.80	0.78	0.25	75,198
Total	0.77	0.78	0.80	0.78	0.21	75,551

Learning Confidence: The extent to which students have a positive perception of their ability as a student

	2009	2010	2011	Mean	SD	N
I am good at my school work	0.65	0.66	0.67	0.66	0.24	74,431
I find it easy to learn new things	0.63	0.64	0.65	0.64	0.24	75,308
I am a very good student	0.67	0.68	0.71	0.69	0.24	75,230
I think I am generally successful at school	0.67	0.67	0.69	0.68	0.24	74,721
Total	0.65	0.66	0.68	0.66	0.19	75,554

Student Relationships

Connectedness to Peers: The extent to which students feel socially connected and get along with their peers

	2009	2010	2011	Mean	SD	N
I get on well with other students at my school	0.76	0.77	0.79	0.77	0.22	75,303
I am liked by others at my school	0.73	0.73	0.74	0.73	0.22	74,980
I get on really well with most of my classmates	0.74	0.75	0.78	0.76	0.23	75,223
My friends at school really care about me	0.75	0.75	0.77	0.75	0.24	74,904
Total	0.74	0.75	0.77	0.75	0.19	75,501

Classroom Behaviour*: The extent to which other students are not disruptive in class

	2009	2010	2011	Mean	SD	N
It's often hard to learn in class, because some students are really disruptive	0.44	0.48	0.52	0.48	0.31	74,405
It's often hard to listen to the teacher in class, because other students are misbehaving	0.47	0.52	0.57	0.51	0.31	75,166
The behaviour of some students in class makes it hard for me to do my work	0.49	0.53	0.58	0.53	0.31	75,143
Total	0.47	0.51	0.56	0.51	0.28	75,546

Student Safety*: The extent to which students feel they are safe from bullying and harassment

	2009	2010	2011	Mean	SD	N
I have been bullied recently at school	0.80	0.83	0.86	0.83	0.29	74,966
I have been teased in an unpleasant way recently at my school	0.77	0.81	0.84	0.80	0.29	74,892
Students are mean to me at this school	0.78	0.81	0.84	0.80	0.28	74,596
I have been deliberately hit, kicked or threatened by another student recently	0.81	0.84	0.88	0.84	0.29	75,139
Other students often spread rumours about me at my school	0.78	0.80	0.83	0.80	0.30	75,124
Total	0.79	0.82	0.85	0.81	0.24	75,503

* The scores of all negatively phrased questions and their associated factors are reversed so that the higher the score the more positive the outcome, making the interpretation of survey results directly comparable for all factors.

Appendix D. Staff Survey Responses

Note for all tables in Appendix D: The questions have been rescaled from 0 to 1. Questions with 7 values (0 to 6) take on the values: : 0 = 0, 1 = 1/6, 2 = 1/6, 3 = 2/6, 4 = 3/6, 5 = 4/6, 6 = 5/6, 7 = 6/6; questions with 5 values (0 to 4) take on the values: 0 = 0, 1 = 1/4, 2 = 2/4, 3 = 3/4, 4 = 4/4. Each table provides mean scores by year; the overall mean (Mean) and standard deviation (SD), and the total number of observations (N).

The scores of all negatively phrased questions and their associated factors are reversed so that the higher the score the more positive the outcome, making the interpretation of survey results directly comparable for all factors.

Individual Morale

	2009	2010	2011	Mean	SD	N
Feeling positive at school	0.67	0.67	0.67	0.67	0.23	48,961
Feeling enthusiastic at school	0.66	0.66	0.66	0.66	0.24	48,956
Feeling proud at school	0.64	0.64	0.64	0.64	0.25	48,951
Feeling cheerful at school	0.68	0.68	0.68	0.68	0.23	48,947
Feeling energised at school	0.59	0.60	0.65	0.61	0.25	48,939
Total	0.65	0.65	0.66	0.65	0.22	48,964

Individual Distress

	2009	2010	2011	Mean	SD	N
Feeling tense at school	0.60	0.60	0.63	0.61	0.27	48,952
Feeling anxious at school	0.66	0.66	0.69	0.67	0.28	48,948
Feeling negative at school	0.68	0.68	0.56	0.64	0.28	48,948
Feeling uneasy at school	0.73	0.72	0.73	0.73	0.27	48,936
Feeling depressed at school	0.77	0.77	0.79	0.77	0.27	48,944
Total	0.69	0.69	0.68	0.68	0.24	48,961

School Morale

	2009	2010	2011	Mean	SD	N
There is a good team spirit in this school	0.63	0.63	0.62	0.63	0.28	48,849
There is a lot of energy in this school	0.61	0.61	0.62	0.61	0.26	48,833
The morale in this school is high	0.54	0.54	0.55	0.55	0.29	48,719
Staff go about their work with enthusiasm	0.62	0.62	0.63	0.62	0.24	48,708
Staff take pride in this school	0.68	0.68	0.68	0.68	0.25	48,595
Total	0.62	0.62	0.62	0.62	0.22	48,879

School Distress

	2009	2010	2011	Mean	SD	N
Staff in this school experience a lot of stress	0.42	0.42	0.44	0.43	0.30	48,850
Staff in this school are frustrated with their job	0.51	0.51	0.53	0.52	0.30	48,752
Staff in this school feel anxious about their work	0.53	0.53	0.56	0.54	0.28	48,693
Staff in this school feel depressed about their job	0.64	0.64	0.66	0.64	0.29	48,595
There is a lot of tension in this school	0.59	0.59	0.59	0.59	0.31	48,588
Total	0.54	0.54	0.56	0.54	0.25	48,865

Supportive Leadership

	2009	2010	2011	Mean	SD	N
Staff are able to approach the school's leaders to discuss concerns and grievances	0.73	0.72	0.70	0.72	0.29	48,881
The school's leaders don't really know the problems faced by staff	0.57	0.57	0.42	0.53	0.33	48,832
There is support from the leaders in this school	0.67	0.67	0.66	0.67	0.29	48,760
There is good communication between staff and the leaders in this school	0.60	0.60	0.59	0.60	0.30	48,706
The leaders in this school can be relied upon when things get tough	0.67	0.67	0.66	0.67	0.30	48,594
Total	0.65	0.65	0.61	0.64	0.24	48,891

Role Clarity

	2009	2010	2011	Mean	SD	N
I am always clear about what others at school expect of me	0.67	0.66	0.65	0.66	0.27	48,877
My work objectives are always well defined	0.66	0.66	0.63	0.65	0.26	48,842
I always know how much authority I have in this school	0.65	0.65	0.64	0.65	0.28	48,766
I am clear about my professional responsibilities	0.79	0.79	0.77	0.78	0.23	48,611
	0.69	0.69	0.67	0.68	0.22	48,889

Appreciation and Recognition

	2009	2010	2011	Mean	SD	N
I am encouraged in my work by praise, thanks or other recognition	0.60	0.59	0.58	0.59	0.30	48,867
I have the opportunity to discuss and receive feedback on my work performance	0.64	0.64	0.63	0.64	0.29	48,842
I am regularly given feedback on how I am performing my role	0.46	0.46	0.46	0.46	0.30	48,846
There is a structure and process that provides feedback on my work performance	0.59	0.58	0.57	0.58	0.30	48,719
I am happy with the quality of feedback I receive on my work performance	0.57	0.57	0.54	0.56	0.30	48,608
Staff receive recognition for good work	0.62	0.62	0.61	0.62	0.29	48,587
	0.58	0.58	0.56	0.57	0.25	48,882

Student Motivation

	2009	2010	2011	Mean	SD	N
Students at this school are really motivated to learn	0.50	0.51	0.53	0.51	0.26	37,244
Students are always keen to do well at this school	0.50	0.51	0.53	0.51	0.26	37,237
Students at this school spend most of their time on task	0.53	0.53	0.57	0.54	0.27	37,234
Doing well is important to the students at this school	0.57	0.58	0.59	0.58	0.26	37,157
Students at this school put a lot of effort into their work	0.51	0.51	0.53	0.52	0.26	37,139
	0.52	0.53	0.55	0.53	0.24	37,266

Empowerment / Participative Decision-Making

	2009	2010	2011	Mean	SD	N
There are forums in this school where I can express my views and opinions	0.63	0.61	0.60	0.62	0.30	48,863
I am happy with the decision-making processes used in this school	0.56	0.56	0.55	0.56	0.30	48,843
Staff are frequently asked to participate in the decisions concerning administrative policies and procedures in this school	0.55	0.53	0.53	0.54	0.30	48,690
There is opportunity for staff to participate in school policy and decision making	0.62	0.61	0.61	0.61	0.28	48,597
	0.59	0.58	0.57	0.58	0.26	48,877

Ownership / Goal Congruence

	2009	2010	2011	Mean	SD	N
The staff are committed to the school's goals and values	0.66	0.66	0.66	0.66	0.24	48,856
The goals of this school are not easily understood	0.66	0.66	0.68	0.66	0.28	48,768
The school has a clearly stated set of objectives and goals	0.70	0.71	0.72	0.71	0.25	48,711
My personal goals are in agreement with the goals of this school	0.70	0.70	0.70	0.70	0.25	48,701
	0.68	0.68	0.69	0.68	0.20	48,869

Excessive Work Demands

	2009	2010	2011	Mean	SD	N
There is too much expected of staff in this school	0.43	0.43	0.44	0.44	0.32	48,861
Staff are overloaded with work in this school	0.41	0.41	0.43	0.42	0.30	48,832
There is no time for staff to relax in this school	0.44	0.44	0.45	0.44	0.32	48,729
There is constant pressure for staff to keep working	0.37	0.37	0.38	0.37	0.30	48,595
	0.41	0.41	0.43	0.42	0.26	48,876

Learning Environment

	2009	2010	2011	Mean	SD	N
Staff at this school have created an environment that promotes excellence in the school's teaching and learning practices	0.63	0.63	0.65	0.64	0.25	37,241
Staff at this school have created an environment that maximises the learning outcomes for students	0.65	0.66	0.67	0.66	0.23	37,234
Staff at this school always focus on improving the quality of the school's teaching and learning practices	0.70	0.70	0.70	0.70	0.24	41,170
Staff at this school always challenge each other to improve the quality of the school's teaching and learning practices	0.61	0.61	0.62	0.61	0.25	37,134
Total	0.65	0.65	0.68	0.66	0.21	41,181

Student Misbehaviour

	2009	2010	2011	Mean	SD	N
The behaviour of students in this school is poor	0.58	0.58	0.61	0.59	0.31	41,366
Students who do not want to learn are a problem in this school	0.35	0.35	0.59	0.43	0.34	41,306
Students are generally well-behaved in this school	0.63	0.63	0.66	0.64	0.28	41,095
Total	0.52	0.52	0.62	0.55	0.23	41,392

Classroom Misbehaviour

	2009	2010	2011	Mean	SD	N
Classroom Misbehaviour	0.79	0.79		0.79	0.20	26,410

Respect for Students / Student Orientation

	2009	2010	2011	Mean	SD	N
Students are treated as responsible people in this school	0.68	0.67	0.69	0.68	0.24	41,365
This school promotes the concept of students being individuals	0.68	0.68		0.68	0.24	27,099
Students in this school are encouraged to experience success	0.78	0.78	0.79	0.78	0.22	41,198
Total	0.71	0.71		0.71	0.19	27,183

Professional Interaction

	2009	2010	2011	Mean	SD	N
I feel accepted by other staff in this school	0.80	0.80		0.80	0.23	34,674
I have the opportunity to be involved in cooperative work with other members of staff	0.70	0.69	0.72	0.70	0.26	48,855
There is good communication between groups in this school	0.54	0.54	0.53	0.54	0.27	48,844
Staff in this school can rely on their colleagues for support and assistance when needed	0.76	0.76	0.76	0.76	0.24	48,731
Staff frequently discuss and share teaching methods and strategies with each other	0.67	0.67	0.69	0.67	0.25	48,683
There is good communication between staff in this school	0.64	0.64	0.62	0.64	0.26	48,601
I receive support from my colleagues	0.77	0.77	0.76	0.76	0.23	48,590
Total	0.70	0.70		0.70	0.19	34,679

Employee Development / Professional Growth

	2009	2010	2011	Mean	SD	N
I am encouraged to pursue further professional development	0.71	0.69	0.68	0.70	0.30	48,887
Others in this school take an active interest in my career development and professional growth	0.52	0.52	0.50	0.52	0.31	48,851
The professional development planning in this school takes into account my individual needs and interests	0.57	0.56	0.56	0.57	0.31	48,753
There are opportunities in this school for developing new skills	0.68	0.67	0.67	0.67	0.27	48,717
It is not difficult to gain access to inservice courses	0.62	0.61		0.61	0.30	34,398
Total	0.62	0.61		0.62	0.24	34,685

Student Decision-Making

	2009	2010	2011	Mean	SD	N
Students in this school have opportunities to be involved in decision-making	0.61	0.61		0.61	0.26	26,958
There are forums in this school where students can express their views and opinions	0.65	0.65		0.65	0.26	26,965
I am happy with the way that students are involved in the decision-making processes used in this school	0.60	0.60		0.60	0.26	26,919
Students are frequently asked to participate in the decisions concerning policies and procedures in this school	0.51	0.52		0.52	0.27	26,910
There is opportunity for students to participate in school policy and decision making	0.56	0.56		0.56	0.27	26,906
Total	0.59	0.59		0.59	0.23	26,975

Curriculum Processes

	2009	2010	2011	Mean	SD	N
There is sufficient contact between different sections of the school in curriculum planning	0.50	0.50		0.50	0.29	27,165
There is effective coordination of the curriculum in this school	0.56	0.56	0.59	0.56	0.29	37,364
The curriculum in this school is well planned	0.59	0.59	0.62	0.60	0.28	37,309
There are structures and processes in this school which enable staff to be involved in curriculum planning	0.67	0.66	0.68	0.67	0.26	37,186
Total	0.58	0.58		0.58	0.24	27,178

Student Management

	2009	2010	2011	Mean	SD	N
There is an agreed philosophy on discipline in the school	0.62	0.62	0.62	0.62	0.30	41,386
My own expectations about discipline are the same as most other staff at this school	0.64	0.64		0.64	0.26	27,166
The rules and sanctions relating to discipline in this school are well understood by both staff and students	0.61	0.61	0.61	0.61	0.29	41,278
The rules and sanctions relating to discipline are not enforced in a consistent fashion in this school	0.53	0.53		0.53	0.33	26,976
Total	0.60	0.60		0.61	0.26	41,396

Appendix E: Detailed regression results

With school-level variables				
	Any ATAR	ATAR 50	ATAR 70	ATAR 90
Prediction	1.232***	1.204***	1.136***	1.222***
	(0.101)	(0.067)	(0.064)	(0.034)
Student Teacher Ratio	-0.541	-0.608	-0.820*	0.102
	(0.599)	(0.422)	(0.362)	(0.123)
Students (#)	0.062	0.044	0.023	-0.006
	(0.038)	(0.027)	(0.023)	(0.008)
Male (%)	-0.148*	-0.123**	-0.118***	0.036**
	(0.058)	(0.041)	(0.034)	(0.011)
ATSI (%)	-15.762	1.390	-8.289	-0.606
	(19.980)	(13.999)	(11.954)	(4.040)
Mean Age	0.895	0.524	-0.718	-0.252
	(1.046)	(0.711)	(0.586)	(0.190)
Attendance	-0.304	-0.097	-0.015	-0.002
	(0.272)	(0.186)	(0.157)	(0.053)
ICSEA	0.048	0.043*	0.047**	0.011*
	(0.025)	(0.018)	(0.015)	(0.005)
Eastern Metropolitan	-0.297	1.034	1.225	-0.822
	(3.472)	(2.448)	(2.094)	(0.706)
Gippsland	-6.966	-2.888	-0.685	-0.169
	(4.149)	(2.927)	(2.505)	(0.846)
Grampians	-4.055	2.423	2.586	-0.284
	(4.099)	(2.893)	(2.475)	(0.836)
Hume	-0.108	0.427	0.975	-1.318
	(3.985)	(2.811)	(2.405)	(0.812)
Loddon Mallee	-6.429	-1.367	2.120	-0.972
	(4.201)	(2.960)	(2.525)	(0.851)
Northern Metropolitan	-0.005	0.227	0.684	-0.870
	(3.627)	(2.562)	(2.190)	(0.740)
Southern Metropolitan	-3.549	-1.049	0.644	0.274
	(3.582)	(2.529)	(2.171)	(0.735)
Western Metropolitan	-4.862	-0.485	2.755	0.095
	(3.765)	(2.655)	(2.274)	(0.767)
Constant	-15.814	-26.786	-32.925	-13.633*
	(28.744)	(20.373)	(17.047)	(5.553)
adj. R-sq	0.623	0.750	0.721	0.878
N	243	243	243	243

Barwon South Western omitted

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

With student survey data	Any ATAR	ATAR 50	ATAR 70	ATAR 90
Prediction	1.268***	1.255***	1.168***	1.206***
	(0.104)	(0.070)	(0.070)	(0.037)
Student Teacher Ratio	-0.392	-0.392	-0.874*	0.044
	(0.630)	(0.446)	(0.386)	(0.133)
Student (#)	0.061	0.052	0.030	-0.006
	(0.038)	(0.027)	(0.023)	(0.008)
Male (%)	-0.179**	-0.142***	-0.144***	0.040***
	(0.059)	(0.041)	(0.035)	(0.012)
ATSI (%)	-0.201	-0.031	-0.089	0.009
	(0.203)	(0.143)	(0.123)	(0.042)
Mean Age	0.986	0.738	-0.875	-0.308
	(1.037)	(0.711)	(0.591)	(0.194)
Attendance	-0.298	-0.194	0.004	0.009
	(0.275)	(0.190)	(0.162)	(0.055)
ICSEA	0.059*	0.052**	0.048**	0.008
	(0.026)	(0.018)	(0.016)	(0.005)
Student Morale	-26.462	51.522	12.812	-23.763*
	(47.125)	(33.607)	(29.237)	(10.011)
Teacher Effectiveness	45.115	20.276	-6.807	-2.192
	(32.411)	(22.970)	(19.814)	(6.744)
School Connectedness	-21.877	-47.842	-7.078	1.691
	(35.868)	(25.586)	(22.171)	(7.554)
Student Motivation	-18.646	-24.954	-63.093**	-8.853
	(38.503)	(26.902)	(23.196)	(7.896)
Learning Confidence	16.458	3.956	46.854	28.052*
	(54.895)	(38.829)	(33.505)	(11.411)
Connectedness Peers	111.768*	86.275**	25.524	3.589
	(45.200)	(32.070)	(27.609)	(9.332)
Class Behaviour	4.690	11.482	12.129	3.962
	(17.866)	(12.772)	(11.193)	(3.886)
Student Safety	-125.103***	-77.197***	-34.790	2.947
	(32.446)	(22.949)	(19.799)	(6.764)
Constant	-7.574	-38.799	-14.657	-14.795
	(37.448)	(26.238)	(22.358)	(7.528)
Administrative Regions	Y	Y	Y	Y
Adjusted R-squared	0.641	0.762	0.730	0.879
N	243	243	243	243

Survey responses scaled from 0 to 1 (see note to Appendix C).

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

With staff survey data				
	Any ATAR	ATAR 50	ATAR 70	ATAR 90
Prediction	1.198***	1.144***	1.118***	1.176***
	(0.115)	(0.077)	(0.075)	(0.038)
Student Teacher Ratio	-0.734	-0.787	-0.897*	0.139
	(0.638)	(0.445)	(0.383)	(0.129)
Student (#)	0.041	0.030	0.018	-0.003
	(0.040)	(0.028)	(0.024)	(0.008)
Male (%)	-0.160**	-0.138**	-0.129***	0.035**
	(0.060)	(0.041)	(0.035)	(0.012)
ATSI (%)	-12.558	1.840	-9.873	-1.933
	(20.070)	(13.942)	(11.932)	(4.008)
Mean Age	0.927	0.453	-0.663	-0.261
	(1.068)	(0.714)	(0.586)	(0.188)
Attendance	-0.447	-0.274	-0.098	-0.006
	(0.297)	(0.205)	(0.176)	(0.059)
ICSEA	0.054	0.040*	0.043**	0.007
	(0.028)	(0.019)	(0.017)	(0.006)
Staff Morale	65.970	68.018*	65.082*	-0.398
	(44.418)	(31.024)	(26.649)	(8.962)
Workplace Environment	-58.353	-78.831*	-64.218*	-17.882
	(48.597)	(33.943)	(29.106)	(9.779)
Student Behaviour	-3.588	-1.376	-15.085	-1.964
	(18.921)	(13.005)	(11.090)	(3.645)
Learning Environment	-52.413	-18.033	14.887	21.153**
	(34.261)	(23.756)	(20.381)	(6.892)
Student Management	22.247	17.763	12.152	4.279
	(18.672)	(13.051)	(11.190)	(3.761)
Curriculum Processes	29.734	22.819	10.126	-0.878
	(18.610)	(13.036)	(11.146)	(3.734)
Work Demands	-29.682	-29.366*	-23.990*	-0.531
	(19.106)	(13.429)	(11.500)	(3.836)
Constant	13.189	7.494	-23.691	-13.389
	(38.126)	(26.672)	(22.824)	(7.674)
Administrative Regions	Y	Y	Y	Y
Adjusted R-squared	0.625	0.756	0.727	0.882
N	243	243	243	243

Survey responses scaled from 0 to 1 (see note to Appendix D).

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

With student and staff surveys				
	Any ATAR	ATAR 50	ATAR 70	ATAR 90
Prediction	1.204***	1.182***	1.147***	1.170***
	(0.115)	(0.077)	(0.078)	(0.040)
Student Teacher Ratio	-0.384	-0.486	-0.927*	0.065
	(0.658)	(0.462)	(0.403)	(0.137)
Student (#)	0.046	0.040	0.025	-0.004
	(0.040)	(0.028)	(0.024)	(0.008)
Male (%)	-0.187**	-0.155***	-0.149***	0.040**
	(0.060)	(0.042)	(0.036)	(0.012)
ATSI (%)	-18.653	-3.253	-10.381	-0.547
	(20.253)	(14.116)	(12.274)	(4.145)
Mean Age	0.880	0.625	-0.777	-0.305
	(1.055)	(0.714)	(0.596)	(0.192)
Attendance	-0.495	-0.386	-0.101	0.010
	(0.294)	(0.205)	(0.178)	(0.060)
ICSEA	0.064*	0.049*	0.043*	0.005
	(0.027)	(0.019)	(0.017)	(0.006)
Student Morale	-27.382	58.629	25.566	-24.231*
	(49.422)	(34.772)	(30.448)	(10.350)
Teacher Effectiveness	55.593	26.291	-9.764	-1.996
	(33.111)	(23.270)	(20.269)	(6.841)
School Connectedness	-15.640	-46.840	-12.165	0.249
	(36.301)	(25.631)	(22.407)	(7.567)
Student Motivation	-26.887	-28.509	-56.115*	-4.892
	(39.173)	(27.328)	(23.818)	(8.058)
Learning Confidence	1.261	-7.194	34.313	24.910*
	(55.332)	(38.868)	(33.879)	(11.419)
Connectedness Peers	127.907**	93.460**	28.646	4.530
	(46.011)	(32.402)	(28.179)	(9.429)
Class Behaviour	1.447	5.102	5.761	1.975
	(18.613)	(13.102)	(11.507)	(3.951)
Student Safety	-133.899***	-81.218***	-34.865	3.105
	(32.700)	(22.949)	(19.993)	(6.770)

Continued on next page

With student and staff surveys (continued)	Any ATAR	ATAR 50	ATAR 70	ATAR 90
Staff Morale	56.803	59.057	55.031*	0.384
	(43.436)	(30.473)	(26.594)	(8.989)
Workplace Environment	-67.968	-70.524*	-47.394	-19.662
	(48.538)	(34.040)	(29.653)	(10.022)
Student Behaviour	7.433	6.613	-6.787	-2.660
	(19.359)	(13.398)	(11.578)	(3.817)
Learning Environment	-60.642	-24.733	8.161	22.442**
	(34.819)	(24.279)	(21.131)	(7.177)
Student Management	22.682	12.999	7.570	4.429
	(18.453)	(12.948)	(11.277)	(3.808)
Curriculum Processes	41.727*	30.468*	12.081	-1.626
	(18.472)	(12.987)	(11.288)	(3.805)
Work Demands	-21.182	-28.398*	-23.785*	1.025
	(19.109)	(13.458)	(11.687)	(3.921)
Constant	29.844	-1.934	-4.871	-16.040
	(44.092)	(30.921)	(26.944)	(9.137)
Administrative Regions	Y	Y	Y	Y
Adjusted R-squared	0.648	0.770	0.734	0.884
N	243	243	243	243

Survey responses scaled from 0 to 1 (see note to Appendix C).

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