RESEARCH NOTE

The State of Schooling: State, state-integrated and private school performance in New Zealand

THE NEW ZEALAND INITIATIVE

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School choice in New Zealand

Deciding to send your child to a state, state-integrated or private school can be a highly ideological and controversial matter. Choosing the "right" school is made even more difficult when there is no evidence on the academic contribution provided by each school type (authority). Most decisions are based on anecdotal evidence, misleading league tables, deciles and the prevailing educational ideology.

While we cannot separate the influence of ideology, we can help debunk harmful myths and shed some light on the academic effectiveness of state, state-integrated and private schools.

New Zealand has a much smaller market for – and culture of – private schooling than many other OECD countries. Only 3.6% of students attend private schools in New Zealand, compared to 6.5% in the UK, 8% in the US and 35% in Australia (41% in secondary schools). The average across OECD countries is 18%.[1]

New Zealand also has a unique faith-based education sector originating from the *Private Schools Conditional Integrated Act 1975* which integrated special character private schools into the state sector. Today, state-integrated schools play a significant role among religious communities.

Certainly, not every family *wants* to send their child to a private school, nor do they believe they *need* to. Likewise, not every family has the financial ability to pay the typical tuition fees of around $20,000 per year. Nevertheless, the option of private schooling is available.

The problem arises when parents believe they *must* pay thousands of dollars per year to get a quality education for their child. Every child in New Zealand has a right to a world-leading education, regardless of their family background. Without doubt, it is the role of the state-education sector to provide this.

Education should be the great socioeconomic equaliser in society and the Ministry of Education is striving for equal educational opportunity. However, this report shows state schools are underperforming compared with state-integrated and private schools.

Accepting the different ideological merits of different school authorities, this report provides the first empirical evidence on the effectiveness of state, state-integrated and private schools in New Zealand and tries to answer salient questions: Is it worth sending my child to a private school? Or am I better off or equally well-off choosing a state or state-integrated schools?

Box 1 provides a brief description of each school authority.[2]

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Box 1: School authorities in New Zealand

State schools

State schools, also known as public schools, are New Zealand's majority school authority and serve approximately 84.9% of students. Education is free for domestic students up to 19 years of age and fully funded by the government. However, parents are required to pay for school uniforms, stationery, exam fees and some course-related costs. State schools must teach the New Zealand Curriculum (NZC).

State-integrated schools

State-integrated schools are New Zealand's second-largest school authority, serving just over 10% of students. State-Integrated schools must teach the national curriculum but can keep their own special character (usually a philosophical or religious belief, e.g. Catholic, or use specialist education methods, e.g. Steiner and Montessori). State-integrated schools receive the same government funding for each student as state schools, but their buildings and land are privately owned. They usually charge compulsory annual "attendance dues" of about $1500 to meet property costs.

Private schools

Private schools are New Zealand's minority school authority, serving just under 5% of students. Also known as independent schools, private schools typically charge annual fees of around $20,000. Financial assistance, including scholarships, may also be provided. Private schools are governed by independent boards and must meet certain standards to be registered with the Ministry of Education. Private schools do not have to follow the NZC but must follow a learning programme of at least equal quality. International Baccalaureate (IB) and Cambridge are the most common alternatives.

Introduction and key findings

Following on from the New Zealand Initiative's previous work on school performance, this research note takes a closer look at school effectiveness across state, state-integrated, and private schools, otherwise defined as school authority (or type).

In a New Zealand first, we estimate each school's contribution to student achievement across the three school authorities after separating out the contribution of the family socioeconomic background using data from Statistics New Zealand's Integrated Data Infrastructure (IDI).[3]

Part One of our analysis compares the *average* estimated effects of attending different school authorities and the increase or decrease in the likelihood of attaining University Entrance (UE).

Part Two looks at *individual* school performance across each school authority, particularly the percentage of state, state-integrated and private schools in the top 25% (high-performing), middle 50% (average-performing), and bottom 25% (low-performing) of all secondary schools in the country.

Part Three examines the socioeconomic factors predicting which school authority a student might attend.

Part Four compares these findings with the OECD's Programme for International Assessment (PISA) results on private versus state schooling. The report concludes with our policy recommendations.

The Appendix contains a brief description of the modelling behind the analysis. Our previous technical report, *Separating School and Family: Evaluating the effects of school and family background on student performance* (2019), further explains the school performance tool.[4]

Part One: Average UE attainment across school authorities

- For the first time in New Zealand, this report shows state-integrated schools marginally outperform private schools on average. The report also reveals both state-integrated and private schools significantly outperform state schools on average.
- In practice, we estimate that the average student would increase their chance of attaining UE from 30.5% to 38.8% when attending a state-integrated school over a state school compared to 30.5% to 37.4% when attending a private school over a state school.

Part Two: Individual school performance in UE attainment across school authorities

- On individual school performance, we show students in private schools are more likely to attend a high-performing (top 25%) school compared to both state-integrated and state schools;
- 66.7% of private schools fall in the high-performing category compared to 45.2% of state-integrated schools or 15.5% of state schools.
- Conversely, there is a marginally greater chance of attending a low-performing (bottom 25%) private school compared to a state-integrated school;
- 8.3% of private schools fall in the low-performing category compared to 6.5% of state-integrated schools or 31.8% of state schools.

Part Three: Predictors of attending school authorities

- Parents' educational attainment is one of the strongest predictors of attending a private or state-integrated school once our school performance tool also separates the effects of parents' income among other major socioeconomic factors.

- After adjusting for parents' income and education, Pasifika students are more likely to attend state-integrated schools compared to Asian students who are more likely to attend private schools or Māori students who are more likely to attend state schools.

Part Four: PISA results across school authorities

- The OECD found students attending private schools in New Zealand significantly outperform students in state schools. But after accounting for student and family background characteristics, this difference disappears almost completely.

This report reveals that New Zealand's state-integrated schools are doing much better than previously thought.

Since State-integrated schools were incorporated into the state education system under the *Private Schools Conditional Integration Act 1975* private schools have generally been viewed as better academic performers. However, this report shows for the first time that students *on average* have a greater chance of attaining UE at a state-integrated school than at a private school (after separating out the contribution of family socioeconomic background).

This report also raises concerns about the quality of public schools in New Zealand. While 15.5% of state schools perform in the top 25%, we show 31.8% of state schools perform in the bottom 25% even after adjusting for the different communities they serve. In comparison, only 6.5% and 8.3% of state-integrated and private schools fall in the bottom 25%, respectively.[5] In absolute terms, New Zealand's 330 state schools include 51 high-performers; 93 state-integrated schools include 42 high-performers; and 36 private schools include 24 high-performers.[6]

Of course, UE attainment is not the only important school outcome. Yet if greater educational opportunity is the goal, these results are a serious cause for concern. To improve our education system, the Ministry of Education must learn which schools are bucking the trend and overcoming socioeconomic barriers. This report shows just that.

Part One: Average UE attainment across school authorities

Part One of our analysis compares the *average* estimated effects of attending different school authorities and the increase or decrease in the likelihood of attaining UE. Table 1 summarises the results.

Table 1: Logistic regression results

School authority	Estimated likelihood of UE attainment	Estimated marginal effects of attending a specific school authority
State	30.5%	(base group)
State-integrated	38.8%	8.3%
Private	37.4%	6.9%

Source: Author's calculations from Statistics New Zealand's Integrated Data Infrastructure.

Note: See Table 1A in the Appendix for the full unadjusted and adjusted logit regression table. Table 1 above presents the estimated marginal effects at means calculated from the logit coefficients.

State, state-integrated and private school effects

After adjusting for family background characteristics, our school performance tool estimates that the average student would increase their chance of attaining UE from 30.5% to 38.8% when attending a state-integrated school than a state school compared to 30.5% to 37.4% when attending a private school than a state school.

While it is generally recognised that students at state-integrated and private schools attain higher academic results in absolute terms due to differences in their socioeconomic background, our results show that even after adjusting for family background characteristics, these students are more likely to attain UE than students at state schools.

Unobserved factors and school-specific 'contextualised' effects

What causes these differences cannot be fully explained by our school performance tool. The extent to which the state-integrated and private school effects are due to school-authority-specific effects, or unobserved factors across families, requires further research.

However, given the significant suite of family background factors included in our analysis, we are confident there are significant real differences in academic outcomes between school authorities being driven by school-specific 'contextualised' effects rather than just unobserved factors excluded from our modelling.

We acknowledge there are challenges with unobserved variables and self-selection bias in our modelling. However, the way these influence educational attainment is likely correlated with the suite of family socioeconomic variables we include.

For example, the number of hours parents spend helping their children with homework is one unobserved variable that is likely to predict academic attainment. While this unobserved variable is excluded in our analysis, it is likely correlated with parents' educational attainment, one of the key variables in our model that predicts UE attainment. Similarly, self-selection into state-integrated or private schools is also likely correlated with variables such as ethnicity and the parents' educational attainment among other socioeconomic variables included in our model. Part Three elaborates on this.

For this reason, while the direct effects of some unobserved variables behind higher UE attainment cannot be measured, partial effects can be captured in the suite of socioeconomic variables we include.

The purpose of this research is not to estimate the effects of individual background characteristics. It is to estimate individual and average school-specific effects after controlling for differences in the family socioeconomic background. This demonstrates how our school performance tool can help the Ministry of Education find which schools are doing well and which schools need more support so that children at every school can get the best education outcomes.

International literature

This report's findings are consistent with available international research, which finds faith-based and private schools have an advantage both before and after accounting for family background

characteristics.[7] Future work from the Initiative will explore qualitative differences in state, state-integrated and private school performance in greater detail.

UE attainment

University Entrance rates is the preferred metric of school success because it accounts for qualification differences across school authority. This factor was important as private schools offer qualification alternatives to NCEA such as International Baccalaureate (IB) and Cambridge at much higher rates than state and state-integrated schools. Table 2 shows these differences.[8]

Table 2: International Baccalaureate (IB) and Cambridge across school authorities

	State	State-integrated	Private	Total
Cambridge	15 (4.5%)	<4 (<4.3%)	12 (28.6%)	27 (5.7%)
IB	<4 (<1.2%)	<4 (<4.3%)	9 (21.4%)	9 (1.9%)
NCEA	336 (71.3%)	93 (19.7%)	42 (8.9%)	471 (100%)

Source: Author's calculations from Statistics New Zealand's Integrated Data Infrastructure.
Note: The summary statistics presented in this table are not official statistics and, in every case, school counts have been randomly rounded to base 3; additionally, school counts equal to 3 or less have been supressed in compliance with rule 5.1.1 in Statistics New Zealand's *Microdata Output Guide*.

Note that in our sample of 471 secondary schools, 28.6% of private schools offer Cambridge while 21.4% offer IB. Among state-integrated schools, less than 4.3% offer either Cambridge or IB compared. Only 4.5% of state schools offer Cambridge and less than 1.2% offer IB.[9]

Box 2: Requirements prescribed by the New Zealand Qualifications Authority (NZQA) for University Entrance (UE) attainment

UE is the minimum requirement to go to a New Zealand university. To qualify, NCEA students need:

- NCEA Level 3;
- 14 credits in three approved subjects at Level 3;
- 10 literacy credits at Level 2 or above, consisting of:
    - five reading credits and five writing credits; and
- 10 numeracy credits at Level 1 or above, consisting of:
    - specified achievement standards or specified unit standards.

Cambridge students require:

- A minimum of 120 points on the New Zealand Cambridge International score table at A or AS level from any syllabus group available in New Zealand; and
- A D-grade or better in syllabuses from at least three different syllabus groups (excluding Thinking Skills).

International Baccalaureate students require:

- An IB Diploma completed with English as Language A at either Higher or Standard Level, or with English as Language B at Higher Level, with a minimum grade of 5, as satisfying the literacy requirement for UE; and
- Any mathematics subject that satisfies the literacy and numeracy requirements for UE.

Changes have been made for 2021 admission to recognise the disruption caused by Covid-19.

Source: New Zealand Qualifications Authority, "University Entrance," Website, and University of Auckland.

Individual school performance and student achievement

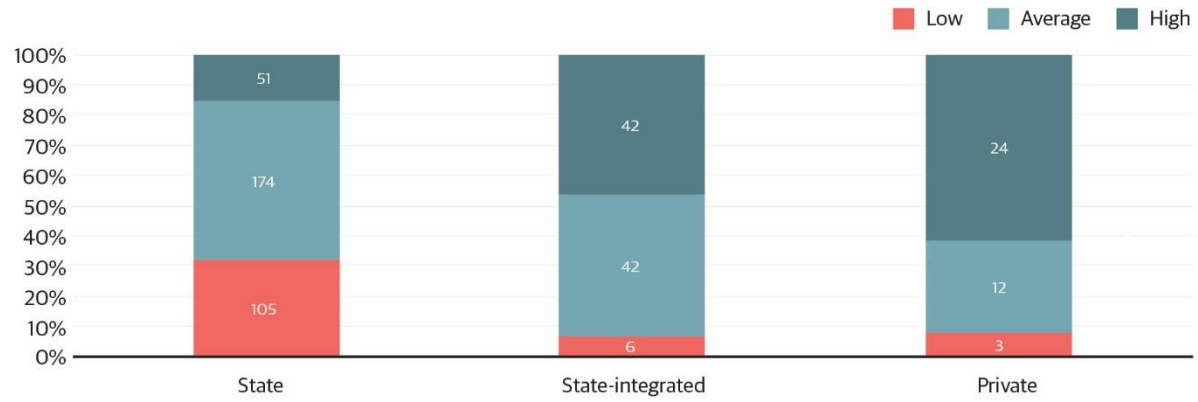
The findings discussed in this section only describe the average estimated effects for attending state, state-integrated and private schools. Part Two shows there are schools in each authority that perform above and below average.

Part Two: School performance across school authorities

This section looks at *individual* school performance across school authorities. It displays what percentage of state, state-integrated and private schools fall in the top 25% (high-performing), middle 50% (average-performing) and bottom 25% (low-performing) of all secondary schools. Figures 1 and 2, and Table 3 summarise the results.

For a brief discussion of the broader distribution of secondary school performance, see Section 6A in the Appendix or Chapter 3 *In Fairness to Our Schools: Better measures for better outcomes*.[10] And for an extensive discussion of the construction of Figure 1A in the Appendix and Figures 1 and 2, see the technical report, *Separating School and Family*.[11]

Figure 1: Distribution of school performance (proportion) – UE attainment (adjusted)

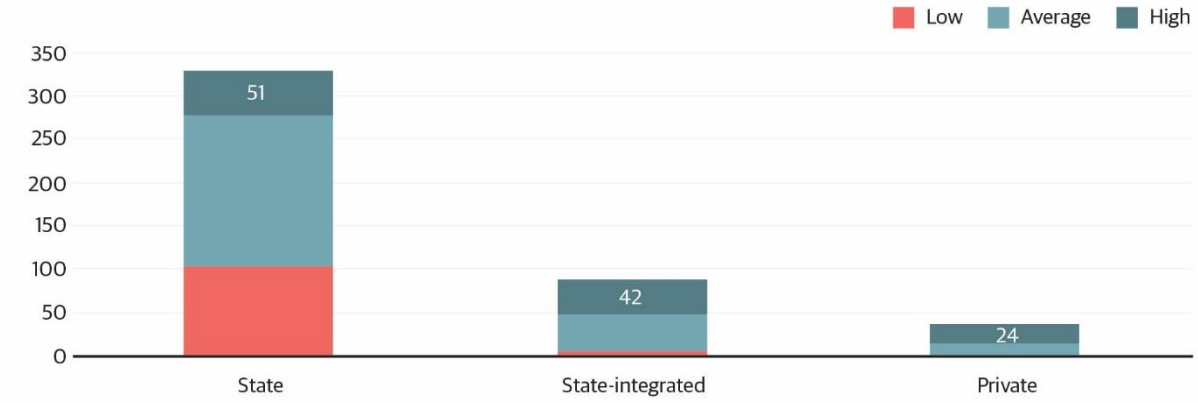


Source: Author's calculations from Statistics New Zealand's Integrated Data Infrastructure.

Figure 1 shows students have a greater chance of attending a high-performing private school compared to both a state-integrated and state school. As a national proportion, 66.7% of private schools perform in the top 25% compared to 45.2% of state-integrated or 15.5% of state schools.[12]

In absolute terms, 24 out of the 42 private schools in our study were top performers, compared to 42 out of the 93 state-integrated schools or 51 out of the 330 state schools.[13] Importantly, while there are more state schools in the top 25%, there are more than double the number of state-integrated schools as private schools and more than eight times as many state schools as private schools. Figure 2 shows these differences.

Figure 2: Distribution of school performance (absolute) – UE attainment (adjusted)



Source: Author's calculations from Statistics New Zealand's Integrated Data Infrastructure.

In practice, this means there is 21.5% greater chance for a student attending a high-performing private school than if they go to a state-integrated school. It also means they have a 29.7% greater chance of attending a high-performing state-integrated over a state school. Alternatively, there is 51.2% greater chance of attending a high-performing private school over a state school.

Importantly, our results adjust for differences in students' socioeconomic background across school authorities. Our school performance tool adjusts for family background characteristics such as parents' income, education, benefits, offence, and corrections history in addition to students' ethnicity, abuse history, disability status, and refugee status, among other variables. See Section 1A in the Appendix for the full list of factors we control for.

So, while it is common knowledge that private schools produce higher absolute academic attainment than state schools, we find that there is still a residual 'real' difference in UE attainment after adjusting for the different socioeconomic community each school serves. Moreover, this residual effect appears not only for private schools but also for state-integrated schools.

Table 3: Distribution of school performance – UE adjusted performance

Performance	State	State-integrated	Private	Total
High	51 (15.5%)	42 (45.2%)	24 (66.7%)	117
Average	174 (52.7%)	42 (45.2%)	12 (33.3%)	228
Low	105 (31.8%)	6 (6.5%)	3 (8.3%)	114
Total	330	93	36	462

Source: Author's calculations from Statistics New Zealand's Integrated Data Infrastructure.

Note: The summary statistics presented in this table are not official statistics and, in every case, school counts have been randomly rounded to base 3; additionally, school counts equal to 3 or less have been supressed in compliance with rule 5.1.1 in Statistics New Zealand's *Microdata Output Guide*.

State-integrated vs private school advantage

Interestingly, while there is a greater proportion of high-performing private schools relative to both state-integrated and state schools, there is also a greater proportion of underperforming private schools relative to state-integrated schools, at least on the margin.

Figure 1 and Table 3 show 8.3% of private schools perform in the bottom 25% compared to 6.5% of state-integrated schools (although only three private and six state-integrated schools perform in the bottom 25%).[14]

Due to this greater variation in private school performance, state-integrated schools are marginally outperforming private schools on average, as discussed in Part One.

It shows that while state-integrated and private schools both outperform state schools on average, schools of all types are bucking the trend and performing above expectations given their socioeconomic background.

While this is not to downplay the underperforming state-integrated and private schools, of concern is the number of underperforming state schools – 105 state schools out of the 330 perform in the bottom 25%.

Finally, approximately 50% of schools evaluated on UE attainment perform as predicted given the different communities they serve. In practice, this means that most schools – 174 state, 42 state-integrated and 12 private schools – perform broadly as expected.

Part Three: Predictors of attending school authorities

There many anecdotal stereotypes about which students attend state, state-integrated and private schools in New Zealand. This section sheds some light on these stereotypes and examines which socioeconomic factors predict school authority attendance. Table 4 summarises the results.

Table 4: Socioeconomic predictors of school authority attendance

	Logit coefficients		
	State	**State-Integrated**	**Private**
Female	-0.147***	0.111***	0.204***
Māori	0.541***	-0.375***	-0.987***
Pasifika	-0.581***	0.799***	-0.712***
Asian	0.028	-0.207***	0.386***
Disability	0.189***	-0.145***	-0.247***
ESOL	0.130***	0.012	-0.564***
Mother's Education			
None	0	0	0
High School Certificate	-0.419***	0.252***	0.766***
Diploma	-0.631***	0.457***	0.906***
Bachelor's Degree	-0.699***	0.456***	1.095***
Postgraduate Degree	-0.691***	0.370***	1.207***
Father's Education			
None	0	0	0
High School Certificate	-0.317***	0.230***	0.445***
Diploma	-0.463***	0.366***	0.557***
Bachelor's Degree	-0.748***	0.413***	1.156***
Postgraduate Degree	-0.735***	0.360***	1.213***
Mother's Log Income	0.028***	-0.007***	-0.070***
Father's Log Income	0.015***	-0.002	-0.042***
Mother's Benefit History	0.001***	-0.001***	-0.002***
Father's Benefit History	0.001***	-0.001***	-0.004***
Parents' Divorce	0.201***	-0.187***	-0.071*

Source: Author's calculations from Statistics New Zealand's Integrated Data Infrastructure.
Note: * p<0.05, ** p<0.01, *** p<0.001; male is the base category for female; European New Zealander is the base for ethnicity.

Table 4 shows the statistically significant logit coefficients of the family background characteristics that predict specific school authority attendance. Due to time restrictions, we did not calculate the marginal effects of each predictor variable shown in Table 4. For this reason, attention should only be given to the sign (+/-) of the coefficient rather than the magnitude.

Predictors of school authority attendance

Table 4 shows that compared to male students, female students are more likely to attend state-integrated and private schools rather than state-schools. We found the opposite for Māori students, who are more likely to attend state schools even after adjusting for parents' income and education.

For Pasifika students, the odds of attending a state-integrated school are much higher, perhaps due to the community's strong religious background. Among Asian students, the odds are best for attending private schools and worse for state-integrated schools.

Students with a disability are more likely to attend a state school. The same holds for students for whom English as their second or other language (ESOL).

Compared to the suite of family background characteristics included in the school performance tool, parents' education is the strongest predictor of which school authority a student will attend. Greater parental educational attainment also increases the likelihood of a student attending a private or state-integrated school.

On the other hand, parents' income is only a weak predictor once the tool accounts for parental education and other characteristics. The same is true for parents' welfare benefits history. Yet, students with divorced parents tend to have a greater chance of attending a state school.

Importantly, these estimated predictors are only correlations. Countless examples exist of students going to a school authority they were not predicted to attend. These results simply display the tendencies of different demographics to attend certain school types.

The combination of results from Parts One and Two indicates that certain demographics such as Māori, students with disabilities or students with parents with lower educational attainment are disproportionately represented in low-performing state schools.[15] Unfortunately, these results unsurprising given the suite of poor socioeconomic outcomes in which Māori are represented. Yet the results are promising for Pasifika students attending state-integrated schools who, like Māori, are disproportionately represented in poor socioeconomic outcomes.

Part Four: PISA results across school authorities

On the OECD's Programme for International Student Assessment (PISA) results, private schools in OECD countries also outperform state schools by about 30 points in reading scores – the equivalent of three-quarters of a year's worth of formal schooling.[16] However, in contrast to our results, these differences disappear almost completely once adjusted for socioeconomic background.[17]

The OECD attributes about 10% of the "private school advantage" to increased competition, higher levels of curriculum autonomy and greater resources. But it attributes more than 75% of this difference to socioeconomic background characteristics.[18] According to PISA:

> When public schools are given similar levels of autonomy as private schools, and when public schools attract a similar student population as private schools, the private school advantage is no longer apparent in 13 of the 16 OECD countries that showed this advantage.[19] … countries with a larger share of private schools do not perform better in PISA.[20]

New Zealand PISA data for 2018 shows that private students achieve significantly higher than state school students (on average ~50 points higher), but after accounting for the students' family background, most of the differences disappear (depending on the 'background' variables).[21]

Policy recommendation

It is noteworthy that our results differ from with PISA's. That is expected given the different methodologies and outcomes used to assess students. Obvious differences such as the family background variables used to adjust for socioeconomic variables will matter, as will the number of

students included in each analysis. Certainly, UE attainment is a different metric from evaluating students on standardised literacy and numeracy tests.

With these differences in mind, the next question is what school-specific unobserved factors (the variables not included in our school performance tool) might influence the positive effects we find for state-integrated and private schools. Additionally, what family-specific unobserved factors that are not highly correlated with our SES variables might be influencing the student outcomes we assess in this report?

More research is needed, but we could re-estimate our school authority-specific effects if PISA data were available in the IDI. While UE attainment contains some literacy and numeracy requirements, adding PISA results to our set of outcome/dependent variables would improve our analysis.

With these difference in mind, the purpose of our analysis was to uncover whether differences in UE attainment exist, before and after we adjusted for family background. In contrast to PISA's findings, we find significant positive effects to be gained from attending state-integrated or private schools.

The socioeconomic estimates published in this and previous reports, including *Separating School and Family*, provide some insight into which family background factors might contribute the most to academic attainment and which school children are likely to attend.

The next step in the Initiative's school evaluation project is to look deeper into the qualitative factors driving the differences between school authority. For example, are there any common teaching methods, extracurricular programmes or expectations connecting high-performing state, state-integrated and private schools?

We suspect that like private schools, state-integrated schools are more likely to use traditional teachings methods, have knowledge rich curriculums, and exert more classroom discipline that are linked to their special character. However, further research is required to confirm this.

Crucially, while it is unknown which school-specific factors give state-integrated and private schools an advantage, the Initiative has developed a tool that can help reveal the answer. Our tool can tell the Ministry of Education where to look further. The code for the school performance tool is freely available to the Ministry and the Minister of Education. It is up to the public to demand the Ministry refines and utilises it.

Conclusion

Our results show not only the fragile state of public schooling in New Zealand, but also the hidden academic prowess of state-integrated schools. It also confirms that private schools do have some advantage, even after adjusting for family socioeconomic background.

In an affront to equal educational opportunity, we show that the average child is 8.3% more likely to attain UE at a state-integrated schools compared to a state school or 6.9% more likely to attain UE at a private school rather than a state school.

If education is to be the great socioeconomic equaliser in our society, then it is worrying that only 15.5% of state schools are high-performing compared with 66.7% of private schools and 45.2% of state-integrated schools. With that said, this report also shows 51 of out of our 330 state schools are top performers.

While the results highlight where the Ministry of Education should look closer, it also highlights how little evidence exists about the state of schooling in New Zealand, particularly in the state sector. Putting educational ideology aside, this report shows the absence of evidence for which schools are succeeding and which are falling behind. For too long, families have had to rely on prejudiced anecdotal evidence, and misleading league tables and decile ratings to decide the 'right' school for their child.

More needs to be done and more can be done, but we must first use the right tools. Without the right information and tools, New Zealand will remain blind to serious educational problems and the successes that should be celebrated. The New Zealand Initiative has built the tool. It is now up to parents to demand its uptake and the Ministry and Minister to use it.

Appendix

Section 1A: Logit regression results

Table 1A: Logit Regression results

Unadjusted		Adjusted									
	UE		UE		UE		UE		UE		UE
	b/t		b/t		b/t		b/t		b/t		b/t
State	0	NCEA year		Girls only school	0.055***	CYF Sexual abuse	-0.343***	Mother's Education		Parents Homeownership	0.061***
	(.)	2008	0		-3.43		(-7.82)	None	0		-5.49
State-integrated	0.785***		(.)	Boys only school	-0.092***	CYF Physical Abuse	-0.225***		(.)	Parents Divorce	-0.148***
	-78.63	2009	0.155***		(-5.47)		(-5.42)	High School Certificate	0.290***		(-8.94)
Private	1.372***		-7.59	State	0	CYF Emotional Abuse	-0.043*		-18.6	Mother's Benefit History	-0.001***
	-94.19	2010	0.264***		(.)		(-2.05)	Diploma	0.610***		(-26.43)
_cons	-1.086***		-12.94	State-integrated	0.748***	CYF Neglect Abuse	-0.067*		-28.79	Father's Benefit History	-0.000***
	(-270.46)	2011	0.788***		-47.7		(-2.41)	Bachelor's Degree	0.707***		(-8.29)
			-39.27	Private	0.619***	CYF Self Harm Abuse	0.296		-33.56	Mother's Offence History	0
		2012	0.386***		-22.79		-0.34	Postgraduate Degree	0.924***		(-0.05)
			-19.37	Isolation Index	-0.025**	CYF Behavioural Abuse	-0.288***		-31.18	Father's Offence History	0.000*
		2013	0.555***		(-3.26)		(-8.41)	Father's Education			-2.42
			-28.06	Female	0.631***	Refugee	-0.016	None	0	Mother's Prison History	-0.188***
		2014	0.255***		-49.9		(-0.17)		(.)		(-3.62)
			-12.95	Maori	-0.236***	Disability	-0.449***	High School Certificate	0.299***	Father's Prison History	-0.202***
		2015	-5.258***		(-16.30)		(-13.14)		-20.21		(-6.65)
			(-49.00)	Pasifika	-0.02	ESOL	0.009	Diploma	0.519***	Constant	4.954***
		2016	-6.975***		(-0.83)		-0.31		-23.48		-119.84
			(-33.07)	Australian	0.017	Reading Recovery	-0.436	Bachelor's Degree	0.883***		
		2017	-3.904***		-0.1		(-1.03)		-38.21		
			(-13.21)	Asian	0.642***	Suspension Count	-0.592***	Postgraduate Degree	0.936***		
					-23.02		(-11.35)		-30.41		
				European	0.185***	Stand Down Count	-0.604***	Mother's Log Income	-0.017***		
					-3.91		(-33.63)		(-9.92)		
				Middle Eastern	0.582***	Expulsion	-0.785***	Father's Log Income	-0.017***		
					-4.22		(-3.81)		(-11.53)		
				Latin American	0.444*	School Transfer Count	-0.291***				
					-1.99		(-27.51)				
				Africa	0.563**	Percent of Internal Credit	-0.081***				
					-3.14		(-182.99)				
						Access to Heat at Home	-0.630***				
							(-30.92)				
						Access to Internet at Home	0.236***				
							-12.91				

Source: Author's calculations from Statistics New Zealand's Integrated Data Infrastructure.
Note: * p<0.05, ** p<0.01, *** p<0.001; state schools are the base category for both state-integrated and private schools.

Section 2A: School performance tool

Based in Statistics New Zealand's Integrated Data Infrastructure, our school performance tool is technical defined as Fixed Effects Least Squares Dummy Variable (LSDV) Ordinary Least Squares (OLS) model. Where the individual school-specific effects and the school-authority specific effects are the 'fixed effects' component of the model. The independent variables included in our analysis are listed in the tables below. For further details on our tool, see *In Fairness to Our Schools* (Chapter 2) and its corresponding full technical report, *Separating School and Family*.[22] Sections 3A to 5A in the Appendix specify the functional form of school performance tool in the context of this report.

Table 2A: Independent variables – Student socioeconomic background characteristics

X_i: Student background characteristic variables	
1.	Female (Y/N)
2.	Ethnicity
	• Māori
	• Pasifika
	• Australian
	• Asian
	• European
	• Middle Eastern
	• Latin American
	• African
3.	Number of abuse events by category identified by CYF
	• Sexual abuse
	• Physical abuse
	• Emotional abuse
	• Neglect abuse
	• Self-harm abuse
	• Behavioural abuse
4.	Refugee (Y/N)
5.	Disability (Y/N)
6.	English as a second or other language (ESOL) (Y/N)
7.	Reading recovery (Y/N)
8.	Number of suspensions
9.	Number of stand downs
10.	Expulsion (Y/N)
11.	Number of secondary schools attended
12.	Percentage of internal credits by NCEA year
	• NCEA level 1
	• NCEA level 2
	• NCEA level 3
13.	Access to the internet at home (Y/N)
14.	Access to heat at home (Y/N)

Table 3A: Independent variables – Parental background characteristics

W_i: **Parents' background characteristic variables**	
1.	Parents' home ownership (Y/N)
2.	Parents divorced (Y/N)
3.	Mother's education
	• None
	• High school certificate
	• Diploma (level 4–6)
	• Bachelor's degree (level 7)
	• Post-graduate degree (Master's/PhD)
4.	Father's education
	• None
	• High school certificate
	• Diploma (level 4–6)
	• Bachelor's degree (level 7)
	• Post-graduate degree (Master's/PhD)
5.	Mother's log income
6.	Father's log income
7.	Mother's benefit spell (weeks)
8.	Father's benefit spell (weeks)
9.	Number of mother's offences
10.	Number of father's offences
11.	Mother has interacted with New Zealand Corrections (Y/N)
12.	Father has interacted with New Zealand Corrections (Y/N)

Table 4A: Independent variables – School type

Z_i: **School type**	
1.	Girls only school (Y/N)
2.	Boys only school (Y/N)
3.	State school (Y/N)
4.	School isolation index

Table 5A: Independent variables – School authority

A_i: **School type**	
1.	State (base)
2.	State-Integrated (Y/N)
3.	Private (Y/N)

Table 6A: Dependent variable – UE attainment

Y_i: University Entrance	
1.	University Entrance Attainment (Y/N)

Section 3A: Distribution of school performance equation

Equation 1: Restricted – Unadjusted regression annotated

$$\underbrace{Y_i}_{University\ Entrance} = \underbrace{\beta_0}_{Student\ constant} + \underbrace{\beta_5 D_i}_{School\ Contextualised\ value-added} + \underbrace{\epsilon_i}_{Random\ error}$$

Equation 2: Unrestricted – Adjusted regression annotated

$$\underbrace{Y_i}_{University\ Entrance} = \underbrace{\beta_0}_{Student\ constant} + \underbrace{\beta_1 T_i}_{Time\ effects} + \underbrace{\beta_2 X_i}_{Student\ effects} + \underbrace{\beta_3 W_i}_{Parent\ effects} + \underbrace{\beta_4 Z_i}_{School\ type\ effects} + \underbrace{\beta_5 D_i}_{School\ Contextualised\ value-added} + \underbrace{\epsilon_i}_{Random\ error}$$

Section 4A: UE attainment across school authorities

Equation 3: Restricted – Unadjusted logit regression annotated

$$\underbrace{Y_i}_{University\ Entrance} = \underbrace{\beta_0}_{Constant} + \underbrace{\beta_5 A_i}_{School\ authority\ fixed\ effect} + \underbrace{\epsilon_i}_{Random\ error}$$

Equation 4: Unrestricted – Adjusted logit regression annotated

$$\underbrace{Y_i}_{University\ Entrance} = \underbrace{\beta_0}_{Constant} + \underbrace{\beta_1 T_i}_{Time\ effects} + \underbrace{\beta_2 X_i}_{Student\ effects} + \underbrace{\beta_3 W_i}_{Parent\ effects} + \underbrace{\beta_4 Z_i}_{School\ type\ effects} + \underbrace{\beta_5 A_i}_{School\ authority\ fixed\ effects} + \underbrace{\epsilon_i}_{Random\ error}$$

Section 5A: Predictors of attending school authorities

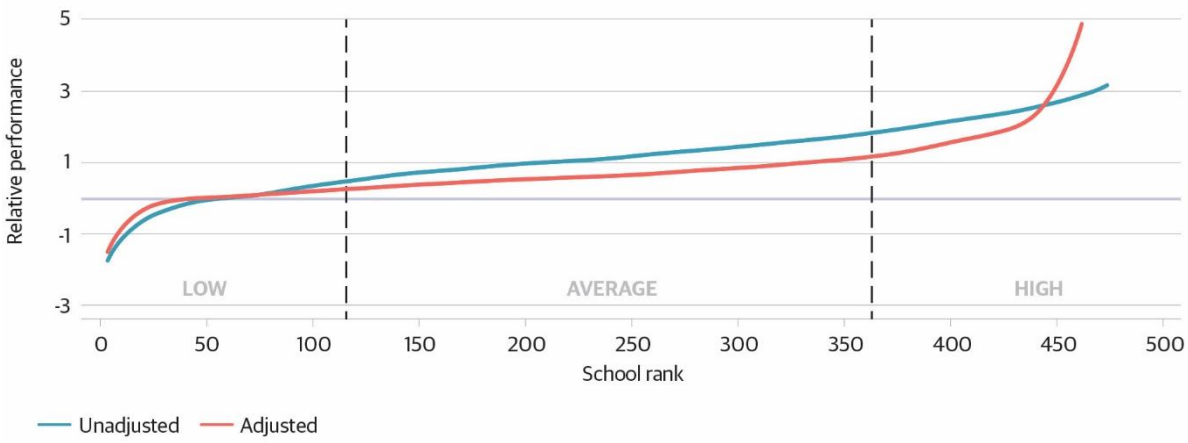
Equation 5: Unrestricted – Adjusted logit regression annotated

$$\underbrace{A_i}_{School\ Authority} = \underbrace{\beta_0}_{Constant} + \underbrace{\beta_1 T_i}_{Time\ effects} + \underbrace{\beta_2 X_i}_{Student\ effects} + \underbrace{\beta_3 W_i}_{Parent\ effects} + \underbrace{\epsilon_i}_{Random\ error}$$

Section 6A: Distribution of school performance

In the Initiative's second report on school evaluation, *In Fairness to our Schools*, we created three performance categories (low, average and high) based on the distribution of school performance for all the secondary schools in New Zealand. Figure 1A shows this distribution.

Figure 1A: Unadjusted and adjusted performance of New Zealand secondary schools – UE attainment (2008–17)



Source: Author's calculations from Statistics New Zealand's Integrated Data Infrastructure.

Figure 1A shows both the unadjusted (blue) and adjusted (red) distribution of school performance. The unadjusted curve shows the distribution before our tool separated the contribution of family background, while the adjusted curve shows the distribution after. Each curve represents the individual 'contextualised value-added' scores for the approximately 480 secondary schools in New Zealand.[23]

In this report, the term 'contextualised value-added' describes each school's 'school-specific effect.' This 'contextualised value-added' score is *not* a 'value-added' score like that used in other countries such as Australia, the United States and the United Kingdom which measures academic gains from the beginning of one period to the end of another.

Rather, this school performance tool attributes the residual effect to each secondary school after adjusting for the family background characteristics of each student. Section 2A of the Appendix states the functional form of the tool.

Both curves represent estimated school effects and have a level of uncertainty that we are unable to show in this figure. To account for this uncertainly, we created three broad categories low-, average-, and high-performing.

In practice, schools performing in the bottom 25% broadly perform below expectations, middle 50% as expected and top 25% above expectations. Expectations of school performance are based on the socioeconomic breakdown of their students. The exact weightings of specific socioeconomic factors are discussed in detail in *Separating School and Family*. For an in-depth discussion of our tool, see Chapter 3 in *In Fairness to Our Schools*.

Endnotes

[1] Emma Rowe, "Fewer students are going to public secondary school in Australia," *The Conversation* (19 June 2017).
[2] New Zealand Now, "The School System" Website.
[3] The Initiative's IDI research project MAA2017-29 used linked Administrative data in the IDI to create our student-parent dataset. The final dataset contained student/individual-level data from the Ministry of Education, Ministry for Children (previously Child, Youth and Family (CYF)), Ministry of Social Development (MSD), New Zealand Police, Department of Corrections, Inland Revenue Department (IRD), Department of Internal Affairs (DIA), and the 2013 Census. The dataset covered the years 2008 to 2017 and 398,961 students across 480 secondary schools in New Zealand.
For an in depth discussion of our dataset, please see the data section of our technical report: Joel Hernandez, "Separating School and Family: Evaluating the Effects of School and Family Background on Student Performance in NCEA" (Wellington: The New Zealand Initiative, 2019).
[4] Ibid.
[5] Note that the number of students and schools in our dataset are not official statistics but numbers produced after randomly rounding the respective student and school counts to base 3 (RR3) in compliance with rule 5.1.1 in Statistics New Zealand's *Microdata Output Guide*. Statistics New Zealand, *Microdata Output Guide*, 4th edition (Wellington: New Zealand Government, 2016).
[6] Note that the number of students and schools in our dataset are not official statistics but numbers produced after randomly rounding the respective student and school counts to base 3 (RR3) in compliance with rule 5.1.1 in Statistics New Zealand, *Microdata Output Guide*, Ibid.
[7] Alice Sullivan, et al. "Educational Attainment in the Short and Long Term: Was There an Advantage to Attending Faith, Private, and Selective Schools for Pupils in the 1980s?" *Oxford Review of Education* 44:6, 806–822, 806.
[8] Note that the number of students and schools in our dataset are not official statistics but numbers produced after randomly rounding the respective student and school counts to base 3 (RR3) in compliance with rule 5.1.1 in Statistics New Zealand's *Microdata Output Guide*. Statistics New Zealand, *Microdata Output Guide*, 4th edition (Wellington: New Zealand Government, 2016).
[9] Note that the number of students and schools in our dataset are not official statistics but numbers produced after randomly rounding the respective student and school counts to base 3 (RR3) in compliance with rule 5.1.1 in Statistics New Zealand, *Microdata Output Guide*, op. cit.
[10] Joel Hernandez, "In Fairness to Our Schools: Better Measures for Better Outcomes" (Wellington: The New Zealand Initiative, 2019).
[11] Joel Hernandez, "Separating School and Family," op. cit.
[12] Note that the number of students and schools in our dataset are not official statistics but numbers produced after randomly rounding the respective student and school counts to base 3 (RR3) in compliance with rule 5.1.1 in Statistics New Zealand, *Microdata Output Guide*, op. cit.
[13] Note that the number of students and schools in our dataset are not official statistics but numbers produced after randomly rounding the respective student and school counts to base 3 (RR3) in compliance with rule 5.1.1 in Statistics New Zealand, *Microdata Output Guide*, op. cit.
[14] Note that the number of students and schools in our dataset are not official statistics but numbers produced after randomly rounding the respective student and school counts to base 3 (RR3) in compliance with rule 5.1.1 in Statistics New Zealand, *Microdata Output Guide*, op. cit.
[15] Future research using our dataset could confirm the demographic distribution of students among low-, average-, and high-performing schools.
[16] OECD, "PISA in Focus 7 Private schools: Who benefits?" (Paris: OECD Publishing, 2011).
[17] Ibid.
[18] Ibid.
[19] Ibid.
[20] Ibid.
[21] OECD, "PISA 2018 Results (Volume V)" (Paris: OECD Publishing, 29 September 2020 (forthcoming)). And Ministry of Education, New Zealand PISA 2018 database.
[22] Joel Hernandez, "In Fairness to Our Schools," op. cit.
[23] In this report, we use the term 'contextualised value-added' to describe the schools fixed-effect estimated for each secondary school in the country. This school 'contextualised value-added' score is *not* a typical 'value-added' score like that used in other countries such as Australia, the United States and the United Kingdom.

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ABOUT THE INITIATIVE

The New Zealand Initiative is an independent public policy think tank supported by chief executives of major New Zealand businesses. We believe in evidence-based policy and are committed to developing policies that work for all New Zealanders.

Views expressed are those of the author and do not necessarily reflect the views of The New Zealand Initiative, its staff, advisors, members or officers.

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