

Individual and school factors affecting students' participation and success in higher education

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Abstract The purpose of this study is to identify school factors that affect students' achievements at the secondary and tertiary levels of education. The analysis included data of 9,894 students who studied in Auckland regional secondary schools in 2004. The results indicate that, although student demographic characteristics are associated with students' pathways and achievements, schools' demographic composition did not affect student outcomes. It was found, however, that schools' organisational factors do have an effect. At the university level, none of the schools' characteristics was related to students' achievements at the higher end of the achievement scale ($\text{GPA} \geq 4$). However, students from private or state-integrated schools were found to be more likely to achieve low GPA (< 2) than students who came from state schools. In conclusion, it is suggested that interventions targeting at-risk populations based on demographic factors should focus on individuals or groups rather than on institutions; while school-based interventions should identify the schools by their structure and function rather than by their demographic characteristics.

Keywords Higher education · Secondary schools · University

The purpose of this study is to identify schools' characteristics that affect students' enrolment and success at university level education. These characteristics include administrative determinants, such as schools authority; socio-geographic determinants, such as school decile¹; demographic determinants, such as gender, student socioeconomic status (SES) and ethnicity; and peer determinants, such as school-wide achievements. The study focuses on the first cohort of students to sit New Zealand's recently introduced

¹ A New Zealand system used to rank schools by the socioeconomic composition of their students. It ranges from 1 (low) to 10 (high) decile, <http://www.minedu.govt.nz/index.cfm?id=7697>.

National Certificate of Educational Achievement (NCEA) (Martin 2005; NZQA 2005, 2006) and the University of Cambridge International Examinations (CIE) (University of Cambridge Local Examination Syndicate 2004) in 2004.

Theoretical framework

Studying in tertiary level institutions and graduating with a university degree or a post-secondary professional diploma after leaving school is not an obvious pathway for all students (Morgaman et al. 2002). In 1993–1994, for example, Florida produced over 90,000 secondary school graduates of which only 47% had enrolled in tertiary education institutions by the following year; 6 years later just 58% of this tertiary-enrolled cohort had graduated with a Bachelor degree (CEPRI 2002). In New Zealand and Australia, only about 50% of the Year 11 cohort (age 16) is still enrolled between ages of 18 and 19 years (Collins et al. 2000; Ministry of Education 2004). By contrast, from a national sample of American students, Cabrera and Las Nasa (2001) found that 82% of fully qualified secondary school leavers and 48% of minimally qualified students apply to attend 4-year college (the norm for US degree programmes). Of the lower SES students, however, only 66% of the fully qualified and 35% of the minimally qualified applied for entry to 4-year college.

Students' characteristics, such as socio-demographic, aptitudes and previous achievements, have thus been shown to affect individuals' pathways to and through tertiary education (Brown and Burkhardt 1999; Byrne 1993; Muijs 1997). The way schools prepare their students may also have a significant effect on pathways to higher education (Arum 1998; Bragg et al. 2002; Polesel 1995). In Australia, for example, Gannicott (1998) and Marks et al. (2001) found that students attending independent schools gained higher Equivalent National Tertiary Entrance Rank (ENTER) scores than students attending Catholic schools; and Catholic students, in turn, gained higher ENTER scores than students attending government schools. However, while Marks et al found that the relationship between students' socioeconomic background and their ENTER performance did not differ substantially across school sectors in Australia, Win and Miller (2005) more recently determined that the effects of government, Catholic and independent schools is greatest on the students gaining lower level ENTER scores. In other words, the higher the ENTER, the smaller the difference. It is also interesting to note, however, that Kim and Placier (2004) did not find any differences between Australian Catholic and non-Catholic private schools.

In New Zealand, it has been suggested that the socioeconomic environment of a school does affect the likelihood of its students of enrolling in higher education. Thus, students from higher decile schools are more likely to enrol in higher education (Boyd et al. 2001; Cabrera and Las Nasa 2001). Boyd et al. (2001) also noted that students from higher decile schools were most likely to receive information on higher education from their families, whereas their lower decile counterparts tended to receive this information from school career counsellors, which may explain the disparity in the enrolment rates across these populations, particularly due to low intergenerational mobility (Comi 2003). King's (2004b) investigation of the characteristics of a New Zealand university's feeder schools found that schools' decile ranking was not associated with engineering student achievements because the majority of these students had attended higher decile schools (decile rankings of 8–10). In contrast,

Konstantopoulos's (2005) results from an analysis of data from three major US surveys² indicated that school region, the socio-economic status of families sending students to the school (SES) and certain other characteristics of the school's student body had considerable effects on student achievement at school. In particular, having controlled for individual SES, students in higher SES schools were found to have higher average achievements than students in lower SES schools. As Konstantopoulos (2005) also notes, the geographical location of a school may affect student enrolment in tertiary education. However, James (2001) suggested that higher education participation by people from rural and isolated areas may be affected less by distance from university campuses than by socio-economic circumstances.

Two conceptually different types of measures have been developed by Raudenbush and Willms (1995) to identify the school factors that affect students in schools. The first, which Raudenbush and Willms (1995) refer to as Type A school effects, incorporates a variety of school characteristics which correspond to the contextual factors of the school. These include the social and economic characteristics of the community in which the school is located and the demographic composition of the student body. In contrast, the specific practices within the school, including the administrative leadership, curricular content, utilization of resources, and classroom instruction are known as Type B effects.

Although this study focuses mainly on school characteristics that fall within the Type A effects category (Raudenbush & Willms 1995) (i.e. those not relating to schools' management and the teaching practices), it is important to note that Type B characteristics can powerfully affect student achievements as well. Hattie's (2005) synthesis of meta-analyses indicates that Type B factors such as the quality of teaching, a lack of disruptive students, peer influences, professional development, quality of instruction and feedback in the classroom have moderate to high effect sizes (.48–.81) on student achievements. Unfortunately, the administrative datasets that were available to this study included only limited data on Type B variables.

Extracurricular activities are also claimed to positively affect student achievements and schools tend to allocate significant resources to this area of school life (Shulruf et al. 2005; Shulruf et al. 2006c; Tolley et al. 2005). However, extracurricular activities such as academic clubs, mentoring, sports, hobby clubs and performance arts activities achieve only small to moderate effect sizes (.17–.38) (DuBois et al. 2002; Shulruf et al. 2006c). An important subgroup of the extra curriculum is the outreach programmes provided by tertiary institutions and developed partly as a service to the community and partly as a recruitment operation (O'Shea and Jones 2005; Perna 2002; Quigley 2002). The range of activities offered by individual outreach programmes affects the role of the programme and may vary from a purely recruitment role, to one more focused on increasing the diversity of applicants to increase the diversity of the institutions' student body. In the short term, however, the outreach activities should focus on increasing the number of the eligible students—not only through increasing student achievements in school but also by establishing constructive collaborations between schools and tertiary institutions (Jones et al. 2002; Outreach Task Force 1997). Whether these programmes achieve their goals is not known, particularly in New Zealand (Ringold 2005); however reports from USA indicate

² The National Longitudinal Study of the High School Class of 1972 (NLS-72); High School and Beyond study (HS&B-80); The National Educational Longitudinal Study of the Eighth Grade Class of 1988 (NELS 88).

that outreach programmes operated by universities do increase student achievements and their enrolment in higher education (Quigley 2002; Rodriguez et al. 2004).

In most New Zealand studies relating to students' pathways and tertiary education, individual students form the unit of analysis (for example see, Boyd et al. 2001; James 2001; Schleicher et al. 2005; Scott 2003; Vaughan 2005). In terms of New Zealand students' performances in literacy, the PISA 2000 results indicated that 16% of the variance is related to between schools factors, and within this variance, 31% relates to school context, 24% to school climate and seven percent to policies and resources (Schleicher et al. 2005). Further, findings from two Starpath studies indicate that a large number of students in particular degrees at one large New Zealand University are drawn from a small number of schools. For example, with regard to the student cohort enrolled in the Bachelor of Commerce degree at the university in question, it was determined that six secondary schools contributed almost a quarter of the standard cohort (excluding conjoint students); and 48% of them came from decile 10 schools (King 2004a). Similarly, within the Faculty of Engineering 52% of the students came from decile 10 schools and 63% from decile 8–10 schools (King 2004b). In addition to this apparently narrow pool of schools providing students for these degrees, it has also been found that, although some schools perform well in gaining entry for their students, these students did not necessarily demonstrate high completion rates or high grade point average scores (GPA) during their studies. On the other hand, it was noted that a number of schools which were less successful in gaining entry for their students produced students who completed their studies with good GPA performance (King 2004a, b).

It is suggested, therefore, that there is a need to identify how schools' characteristics affect students' participation and success in tertiary education and, based on such information, there is a need for the development of ways to improve schools' effects on tertiary participation and success.

Methods

Data

Data on schools and students for this study were received from two sources: the Ministry of Education website and the university in Auckland forming the focus of this study. Data concerning school decile, student demographic composition and student roll were retrieved from the Ministry of Education website (Education Review Office 2004), while the university's planning office provided data regarding students' achievements within the NCEA framework together with student admission and achievement data held on the university database.

The dataset included the following student data: gender, age, ethnicity, university entrance qualification (UE), first year university grade point average (GPA) and information regarding individuals' university application. The school data comprised: school decile; school roll; school year level span (Y7–15 or Y9–15; note that normally secondary education ends at Y13, but the Ministry's classification allows up to 15 years of secondary schooling); the ratio of students in Year 13 and Year 9 (the Y13/Y9 ratio gives an indication of the attraction of the senior school); school gender type; school authority (ownership); the ethnic composition of students within the school; school location (by district); the proportion of CIE candidates; and the school's participation in any of the

university's four outreach programmes (Salmond 2004). The four outreach programmes include (a) Mentoring and Tutoring Educational Scheme (MATES) programme: The New Zealand version of the Israeli Perach programme where university students mentor secondary school students (Fresko 1996, 1997); (b) Tuakana: Academic support programmes for Māori and Pacific students (Ayres et al. 2006); (c) Dream Fono: A programmes to inspire Pacific students to attend The University of Auckland and enhance self confidence; and (d) MATHS: A support programme for underachieving students in low decile schools.

It is noted that proxy data for SES, via student addresses (see Salmond and Crampton 2002), were available for most of the students who sat the National Certificate of Educational Assessment (NCEA) exams. However, since similar data was not available for those students taking CIE exams, this information was not included in the analyses.

Analyses

The analyses comprised two stages. The first stage was an analysis of school effects on students' pathways from secondary schools to the university ('Student Pathways Analysis'). The second stage was an analysis of school effects on students' performance at the university (e.g. first year GPA) ('Student Achievement Analysis'). It was essential to split the analysis to two stages since only 38% of the students who studied in the secondary schools eventually enrolled in the university. Hence the first stage considered all students but the second stage of the analysis considered only the student who actually enrolled in the university.

Student pathways analysis

The outcomes used for the Student Pathway Analysis comprised a series of outcomes made up of five combinations of the three binary variables: (i) the acquisition of the UE; (ii) enrolment at the university; and (iii) becoming an active student—i.e. having any type of achievement records on the university's database (see Table 1).

To meaningfully compare these outcomes and to identify the likelihood of students belonging to each of these groups—in other words, the likelihood of them reaching a specific point in their pathways—a series of five logistic regressions were undertaken using 'stepwise backward' methods.

Student achievements analysis

Student university achievements were measured using each student's first year GPA score.³ The student population was then split into three groups: high achievers, medium achievers and low achievers since it was assumed that the factors affecting student performance might be different for each group. The GPA results were recoded according to Table 2, below. Noteworthy, the purpose of this analysis was to measure the likelihood of students to belong to one of these three groups rather than predicting student GPA. It was assumed that comparing the low and the high achievers to the medium achievers was the most

³ The University's GPA scores are: A+ = 9, A = 8, A- = 7, B+ = 6, B = 5, B- = 4, C+ = 3, C = 2, C- = 1, D+/D/D- = 0.

Table 1 Student pathways analysis: groups comparison

Population	Target group	Reference group
All	UE achieved (UE)	UE not achieved (NUE)
UE not achieved (NUE)	Applied to the university (APP)	Did not apply to the university (NAPP)
UE achieved (UE)	Applied to the university (APP)	Did not apply to the university (NAPP)
UE not achieved (NUE)	Active student (STD)	Not a student (NSTD)
UE achieved (UE)	Active student (STD)	Not a student (NSTD)

Table 2 Recoded GPA scores

GPA grouping	Classification of achievement levels
$GPA < 2$	'Low achievers'—students gaining a GPA of less than 2
$2 \leq GPA < 4$	'Medium achievers'—students who passed their exams but gained a GPA score below the mean for the first year (GPA mean = 4).
$GPA \geq 4$	'High achiever'—students gaining a grade point average of 4 or above

appropriate approach since changes in student achievements are unlikely to be from one extreme to the other. Thus, the most relevant comparison is between interchangeable groups and not across the entire population. Furthermore, by using this type of analysis it was possible to identify factors that specifically affect the likelihood to belong to the low achievers versus the medium achievers groups but not the likelihood to belong to the higher versus the medium achievers groups and vice versa. Hence, this approach provides more meaningful and relevant results to specific groups of students. Hence, two logistic regression models were used to compare the likelihood of students achieving each low and high achievement levels versus medium achievement level ($GPA \geq 4$ vs. $2 \leq GPA < 4$; and $GPA < 2$ vs. $2 \leq GPA < 4$).

Results

The study dataset comprised of data from 69 secondary schools and their students who sat NCEA exams (Strathdee 2003) and/or CIE (University of Cambridge Local Examination Syndicate 2004) exams in 2004 within the Auckland Region. The dataset includes 9,894 students of whom 51% are male. Forty percent of the students are Pākehā (New Zealand European), 32% Asian, 14% Pacific, 6% Māori and 7% Others. The average age of the students is 17.8 years. The schools are distributed across the seven municipal authorities within the Greater Auckland region and the average school roll is 1104. The average school decile is 5.6 (see Table 3).

Of the 69 schools, 51 are state schools (74%), 15 are state-integrated (22%) and 3 are private; 47 of the schools are coeducational (69%), 10 are girls-only and 11 are boys-only; 17 of the schools start at Year 7 (25%) and the rest start at Year 9. The study was confined to the Greater Auckland region due to the availability of both school and university data.

Table 3 Summary of schools' characteristics by districts

District	No. of schools (%)	Mean decile	Mean school roll
Auckland City	25 (36)	5.1	1010
Franklin District	4 (6)	5.0	823
Manukau City	15 (22)	3.8	1247
North Shore City	10 (14)	9.3	1381
Papakura District	2 (3)	4.5	1528
Rodney District	4 (6)	6.8	765
Waitakere City	9 (13)	5.0	988
Total	69 (100)	5.6	1104

Student pathways analysis

The results of the regression series (Table 4) indicate that student demographics (age, gender, ethnicity) were related to student pathways. For example, it was found that the older the students were the less likely they were to gain UE, to apply to the university or to become active students. It was also found that boys were less likely than girls to gain UE (Odds Ratio (OR) = .67) but once gained, boys were more likely to apply to the university (OR = 1.19). In addition, students from all other ethnic groups were found to be less likely to gain UE than Pākehā. However, once Pacific students gained their UE they were more likely to apply to the university (OR = 1.51) and to become active students (OR = 2.27) than Pākehā students. Although students of Asian ethnicity were more likely to apply to the university than those of any other ethnicity, their likelihood to become active students did not differ significantly from Pākehā students. It is noteworthy that within the group who did not gain UE, Māori were more likely (OR = 3.16) than Pākehā to become active students, and students from other ethnicities were less likely to become active students than Pākehā (OR 0.43–0.74). This may be a result of formal or informal affirmative admission policies, aiming to increase Māori enrolment in the university.

In general, school characteristics were found to have more effect on students' pathways at the school-level than at the university-level. For example, school decile had a small but significant effect on the likelihood of students achieving UE (OR = 1.1). While school roll was not found to have any effect on student pathways, the Year 13/Year 9 ratio (providing an indication of the attraction of the senior school) was significantly related to the likelihood of gaining UE (OR = 2.54) and to becoming an active student, when UE had not been gained (OR = 2.84).

The type of school was found to be related to some pathway outcomes. For instance, students from private schools were less likely (OR = 0.56) than students from state schools to gain UE; students from state-integrated schools, on the other hand, were more likely (OR = 2.11) to gain UE than students from state schools.

In comparison to co-educational schools, students from girls-only schools were more likely (OR = 3.63) than students from co-educational schools to gain UE. The opposite was found to be true for boys: students from boys-only schools were less likely (OR = .22) than students from co-educational schools to gain UE. Among the students who did not gain UE qualifications, those who came from single gender schools were more likely to apply to the university (OR = 1.92 for boys and OR = 1.49 for girls). Students from Y7 to Y15 schools were found to be more likely than students from Y9 to Y15 schools to apply to go to university whether or not they gained UE (OR 1.30 and 1.78 respectively). Finally,

Table 4 Summary of student pathways (odds ratio) logistic regression (stepwise backward, *p* in .05 *p* out .10)

Population	All		NUE		UE		NUE		UE	
	UE vs. NUE unadjusted	UE vs. NUE adjusted	APP vs. NAAP unadjusted	APP vs. NAAP adjusted	APP vs. NAAP unadjusted	APP vs. NAAP adjusted	STD vs. NSTD unadjusted	STD vs. NSTD unadjusted	STD vs. NSTD unadjusted	STD vs. NSTD adjusted
Ethnicity (ref = Pākehā)										
Māori	.25	.31	.29	.56	.91	.96	1.18	1.18	.91	.92
Pacific	.16	.23	.51	.98	1.42	1.51	.58	.58	2.19	2.27
Asian	.77	.88	1.65	2.73	2.40	2.41	.25	.25	1.05	1.16
Others	.50	.53	.66	1.09	1.10	1.11	.30	.30	.79	.85
Age	.81	.75	1.11	.90	1.12	.86	.57	.57	.73	.71
Gender (ref = female)	.69	.67	1.04	1.19						
School decile	1.16	1.11								
School roll	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Y13/Y9 (proportion)	1.99	2.54					3.39	3.39	2.84	2.84
School gender type (ref = Co-Ed)										
Boys school	.72	.22	1.97	1.92			2.65	2.65	1.31	1.31
Girls school	1.59	3.63	1.29	1.49			.76	.76	2.57	2.57
Male proportion	.99	1.02					1.02	1.02	1.02	1.00
Pākehā proportion	1.01	1.01					1.02	1.02	.98	.98
Asian proportion	1.02	.99	1.01	1.01						
Others proportion					1.00	.99				
School authority (ref = state)										
Private school	.61	.56								
State integrated	1.03	2.11								

Table 4 continued

Population	All		NUE		UE		NUE		UE	
	UE vs. NUE unadjusted	UE vs. NUE adjusted	APP vs. NAAAP unadjusted	APP vs. NAAAP adjusted	APP vs. NAAAP unadjusted	APP vs. NAAAP adjusted	STD vs. NSTD unadjusted	STD vs. NSTD adjusted	STD vs. NSTD unadjusted	STD vs. NSTD adjusted
Institution type (ref = Y9–15)					.97	1.30				
District (ref = Auckland City)										
Waitakere City	.80	1.02	.43	.76	.85	.72	.22	.66	.22	.66
Franklin District	1.27	1.38	.22	.61	.53	.61	.04	.23	.04	.23
Manukau City	1.11	1.31	.64	.97	1.13	1.04	.45	.89	.45	.89
North Shore City	1.86	.89	.74	.86	1.00	.95	.33	1.03	.33	1.03
Papakura City	1.07	.91	.45	.89	.80	.78	.07	.52	.07	.52
Rodney District	1.08	.78	.14	.27	.39	.41	.21	6.43	.21	6.43
% of CIE sitters	.99	.99	1.01	1.02	.65	1.36	1.02	1.01	1.02	1.01
MATES	.67	1.20								
Tuakana	.26	1.54								
Dream Fono			.39	.70						
MATHS		.20			1.35	.52		.23		.03
Nagelkerke R ²		9,894 (100%)		0.18		.08		1,115 (11%)		2,628 (27%)
N				5,150 (52%)		4,744 (48%)				

Note: In bold $p < .05$

it was found that neither the specific ethnic composition nor the gender mix within a school affected students' pathways.

No statistically significant difference in students' pathways was revealed between students who came from Auckland City, North Shore City or Papakura City. However, it was found that students from Manukau City were more likely to gain UE (OR = 1.31) than Auckland City students. Students from Waitakere City and Rodney District appeared to be less likely to apply to the university in question regardless of whether they gained UE (OR 0.27–0.76); yet among the students without UE, students from Rodney District were the most likely to become active students (OR = 6.43).

An important issue considered in this study was whether student pathways are affected by the proportion of students within the schools sitting CIE examinations (De Boni 2002; Shulruf et al. 2006a). From this analysis it appeared that the proportion of CIE candidates within a school did not affect student pathways overall; that is, the fact that some students in some schools sit CIE exams or NCEA exams or both did not affect the likelihood of students in general gaining UE, applying to the university or becoming active students.

With respect to the University's four outreach programmes operated in schools it was found that students from 'MATES Schools' were more likely to gain UE and to apply to the university (OR 1.20, 1.36 respectively) than students from non-MATES schools. Students from 'Tuakana Schools' were more likely to gain UE (OR = 1.54) than students from non-Tuakana schools although no other effects were identified. Finally, it was found that students from schools that operated Dream Fono or MATHS were less likely to apply to the university than students who came from schools that did not operate these programmes.

Student achievements analysis

The second stage of the analysis involved only those students who entered the university ($N = 2,701$) and for whom the university had achievements measures: that is, students' first year GPA scores. As previously noted, it was assumed that different factors might affect the performance of higher-achieving students compared to those who were less successful; therefore, as previously described, the student population was split into three achievement groups (high, medium and low achievers—see 'Methods' section). Initially, both linear and binary regression models were tested revealing preference for the binary (logistic) regression model as it yielded higher R^2 values. The decision to split the students by the aforementioned GPA criteria, based on the context of the data (for details see the 'Methods' section), was confirmed when alternative population splits were tested. For example, when the student population was split into thirds ($GPA < 2.71$; $2.71 \leq GPA < 5.25$; $GPA \geq 5.25$) the R^2 values yielded for each subgroup were smaller (Table 5).

The assumption that different factors affect the performance of students achieving at different levels was found to be valid as the sets of independent variables that survived the stepwise process were different in each of the regressions.

At the individual level, it appeared that ethnicity affects student performance on both models (the higher and lower achievers regressions) as Pākehā students were more likely to achieve a higher GPA than those from any other ethnic group (however, it must be noted that the ethnic composition within a school did not have any meaningful effect on any students' first year university achievements). Among the higher achievers, older students were found to be more likely to achieve lower GPA scores (OR = .72); and, while gender

Table 5 Logistic regressions students' achievement (odds ratio) within university students only (backward stepwise method (p in .05 p out .10))

Sub-population Binary variables	GPA < 4			GPA > 2		
	(0) GPA < 2; (1) GPA \geq 2			(0) GPA \leq 4; (1) GPA > 4		
	Unadjusted	Adjusted	p	Unadjusted	Adjusted	p
UE achieved (ref not achieved)	1.96	1.72	.00			
Ethnicity (ref Pākehā)			.00			.00
Māori	.36	.35	.00	.68	.87	.67
Pacific	.33	.45	.00	.31	.38	.00
Asian	.79	.70	.01	.62	.72	.00
Others	.76	.82	.46	.56	.64	.05
Gender (ref female)	1.01	.76	.06			
Age 2004				.69	.72	.00
School decile				1.10	1.05	.04
Asian proportion	1.01	1.01	.09	.99	.99	.05
Others proportion	.99	.97	.00			
School roll				1.00	1.00	.07
Y13/Y9 proportion				2.09	2.23	.01
Institution type (ref Y9–15)	1.02	4.40	.00			
Scl. gender type (ref CoEd)			.05			
Boys' school	.93	1.37	.14			
Girls' school	.76	.72	.10			
Scl. authority (ref State)			.01			.03
Private school	.74	.40	.03	1.56	.49	.02
State integrated school	.61	.18	.00	.79	.62	.04
District (ref Auckland)			.05			
Waitakere	1.7	1.66	.06			
Franklin	.61	.52	.24			
Mankau	1.03	1.08	.69			
North Shore	1.12	1.00	.99			
Papakura	.58	.44	.04			
Rodney	2.04	.36	.18			
Tuakana	3.33	2.65	.06			
MATHS	9.37	8.52	.05	.22	.06	.01
Dream Fono					1.82	.04
Nagelkerke R^2		.114			.059	
N		1248			1880	

Note: In bold $p < .05$

did not affect achievements within the high achievers group, within the lower achievers, males tended to achieve lower GPA scores.

At the school level, school decile had no effect on students' GPA scores within the lower achievers and very little effect ($OR = 1.05$) on student GPA scores within the higher achievers. The type of school attended by students (Y7–15 or Y9–15) did not appear to affect the GPA scores of the highest achieving students ($GPA > 4$). However, for the lower

achieving students, those who studied in Y7–15 schools appeared to be more likely to achieve $\text{GPA} \geq 2$ ($\text{OR} = 4.40$) than those students who attended Y9–15 schools. School authority was found to be associated with student achievements within both subgroups (higher and lower achievers): students from state schools were more likely to achieve higher first year university GPA scores than students from private or state-integrated schools (within both subgroups). Although school roll was not found to be related to students' GPA scores, within the higher achievers group only, the Y13/Y9 ratio (indicating the strength/popularity of the senior school within the secondary school) was positively associated with high GPA ($\text{OR} = 2.23$). School district was not related to students' GPA, with one exception: students from Papakura were less likely to achieve $\text{GPA} > 2$ ($\text{OR} = .44$) within the lower achievers subgroup.

In terms of the university's outreach activity in schools it was found that students who came from schools operating MATHS outreach programmes were more likely ($\text{OR} = 8.52$) to achieve $\text{GPA} > 2$ within the lower achievers groups, but were *very unlikely* to achieve $\text{GPA} > 4$ ($\text{OR} = .06$) within the higher achievers group. On the other hand, students who came from schools operating Dream Fono were more likely ($\text{OR} = 1.82$) to achieve $\text{GPA} > 4$ within the higher achievers groups, but no effect was found within the lower achievers groups.

To summarise the Student Achievement Analysis, it appeared that studying in state schools had a positive effect on student achievement regardless of the level of GPA achievement. Also notable are the findings that, among the higher achievers, a school's Y13/Y9 ratio appears to be a good predictor for $\text{GPA} > 4$; and studying in a Y7–15 school predicts $\text{GPA} > 2$ within the lower achievers groups. The demographic characteristics of the students affected their first year university GPA scores, but the proportion of different ethnic subgroups in schools did not affect the likelihood of achieving high GPA.

Discussion

The objective of this study is to identify school characteristics that affect student pathways and outcomes. It was found that Pākehā students were more likely than students of any other ethnicity to gain UE qualifications and to achieve higher GPA scores in their first year at the university. These findings are consistent with previous studies in New Zealand which identified the disparity in educational attainment across ethnicities (Anae et al. 2002; Benseman et al. 2006; Maani 2000; Scott 2005; Shulruf et al. 2005). In relation to this issue, a notable finding concerns Māori students with no UE qualifications. The analyses revealed that although Māori students were more likely than any of their ethnic counterparts to become 'active students' ($\text{OR} 3.16$) (that is, to have active student records at the university), they were also the most likely group to achieve first year GPA scores of less than 2 ($\text{GPA} < 2$). A possible explanation for this is because it is more likely for Māori students to be accepted into the university via affirmation procedures, but once there, the high academic demands they encounter puts them at a greater risk of failure.

A different pathway emerged for Pacific students which indicated that those with UE qualifications were more likely than Pākehā and Māori to apply to the university and become active students ($\text{OR} 1.51$ and 2.27 respectively) but the likelihood of Pacific students achieving a low GPA at the end of their first year was high. These findings suggest that Pacific students have not derived much benefit from an affirmative admission policy, although all admissions schemes at the University apply to both Maori and Pacific students. In a recent study, Benseman et al. (2006) suggested that motivation, attitudes, pressures

from family and peer groups, lack of support services and language issues, as well as financial difficulties, are important factors affecting Pacific students' success at the tertiary level. Hence it is suggested that support for Pacific students should be focused on improving their performance *within* educational institutions rather than merely enhancing their motivation to enrol in higher education programmes.

For Asian students, the most notable finding was a greater determination to study at the university. The analyses revealed that this group was more likely to apply to the university than any other ethnic group, regardless of whether or not they gained the UE qualification. This is in line with Birrell (1994) who suggested that Asian students in Monash University in Australia have a high entry and low attrition rate, resulting from significant family support. Furthermore, the recent major growth of Asian students in New Zealand (Harman 2002) is similar to the flow of Asian students to industrial countries in the mid 1980s which as Cummings (1984) suggested, may explain the phenomenally high university application rate among Asian students observed at that time.

It is noted that boys were less likely than girls to gain UE, however, among those who gained UE qualification, boys were more likely than girls to apply to the university. However, the chances of boys becoming active students or gaining high GPA scores did not significantly differ from girls. Age was found to be negatively associated with UE acquisition and becoming an active student and, among the higher achievers, it was also negatively associated with achieving a GPA greater than 4. This pattern suggests that mature students may have faced difficulties during their secondary schooling and that they carried these educational challenges with them to the tertiary level.

To summarise at this point: in terms of individual variables, ethnicity and age both appear to affect student pathways and achievement. The main question arising from these findings concerns the extent to which these factors (when measured at the school level within school characteristics), and any other school characteristics affect individuals' educational outcomes.

The characteristics of a school, such as its size, ethnic diversity, gender mix, decile, type of funding etc., contribute to the experience students encounter as they travel their educational journey. Previous studies suggest that schools' characteristics have little or moderate effect on student outcomes (Hanushek et al. 2003; Hattie 2005; McGaw and Lievesley 2003; Teddlie and Reynolds 2001). The regression models presented in this study explain 3–23% of the variance in students' pathways from secondary through to the end of the first year at the university, as well as 6–11% of the variance in students' achievements at the end of the first university year. These findings concur with Schleicher et al. (2005) who found that 16% of the variance in New Zealand students' performance in literacy relates to between-schools factors. They are also similar to international findings which range between 10 and 30% (Luyten 2003; Opdenakker and Damme 2000), although Teddlie and Reynolds (2001) suggested that, for studies conducted in US, the explained variance ranged between 15 and 20% compared to 8 to 12% in Europe.

From the analysis of schools' characteristics carried out in this study, a school's ethnic diversity, gender distribution and size were all determined to have no effect upon student outcomes. However, although Lee and Smith (1997) also did not find any significant effect of the proportion of minority students in the school on student outcomes using three waves of data from NELS 88,⁴ they did suggest that the 'ideal' secondary school—defined in terms of effectiveness (i.e., learning)—should enrol between 600 and 900 students. This apparent contradiction could be an example of contextual difference as noted above

⁴ NELS 88: The National Education Longitudinal Study of 1988 (NCES 2006).

(US versus NZ schools) or, more likely, is due to the different methods of analysis used in each study. For example, Lee and Smith's (1997) finding of non-linear association between school size and achievements was echoed in the UK by Spielhofer et al. (2004). Both studies though used linear regression models. However, the current study extends the non-linearity concept and uses logistic regression models to compare the likelihood of students to belong to any of two consecutive achievement levels assuming that the predicting variable are unlikely to have extreme effect on student achievements. The predictive power of the models appeared to support that assumption since none of the regression models gained R^2 greater than .23. Furthermore, the findings presented by Spielhofer et al. (2004) suggest that school size is associated with the proportions of ethnic minorities in the school, which may imply that the proportion of minorities in schools by itself does not affect students' outcomes as it may well be only a marker.

A second ethnicity-related school characteristic in New Zealand is the school's decile ranking, which describes the overall SES of the student population. The decile figure allocated to a school indicates the extent to which it draws its students from low socio-economic communities.⁵ The findings presented in this study show that the higher the decile the more likely the school's students were to gain the UE qualification. This finding concurs with other studies carried out in New Zealand and elsewhere (Hughes and Pearce 2003; Raudenbush and Willms 1995; Thrupp 1995). However, once the students entered the university it was found that the school decile had no significant effect on student GPA at the end of the first year. This is in line with work carried out by Juhong and Maloney (2005) who, likewise, could not identify any measurable effect of school decile on the university students' GPA (see also, King 2004a, b). This is a crucial finding as it suggests that school socio-demographic factors do not affect student outcomes. It is important to note, however, that finding no school socio-demographic effect could, in fact, be an artefact because the university student population is selective; that is, only students who enrol and are qualified become active students. Further research is needed involving national data to check the validity of these findings.

As previously noted, it was only possible to carry out an 'ecological analysis' (Abramson 1988) of the socio-demographic factors due to incomplete socio-economic data of individual students being available. Overall however, it is worth noting that ethnicity had a significant effect on students' achievement at the individual level but was not at the school level (i.e. measured as the proportion of ethnic groups in the secondary school, or as the schools' decile ranking). It is also concluded that students' socio-demographic background affects students at the individual level, but studying in particular socio-demographic environments (school decile, ethnic and gender compositions) has no effect on student pathways, or on their achievements at the university.

Referring back to Raudenbush and Willms' (1995) Type A factors in schools (components not related to the management and the teaching practices within schools), it is suggested that since the socio-demographic characteristics of the school do not affect student outcomes, aspects of the school's administrative/structural processes remain possible factors that may affect students' outcomes. The investigation of schools' administrative factors suggests that different school types may affect student pathways and achievements. One interesting finding was the positive association between the Y13/Y9 student ratio and the likelihood of students gaining the UE qualification. This seems to contradict Hattie's (2005) findings, which suggest that retention in school has an average effect size of $-.20$ on student achievements. However, a possible explanation for this

⁵ <http://www.minedu.govt.nz/index.cfm?id=7697>.

discrepancy could be that the Y13/Y9 ratio is not only related to retention, but also to the level of the school's attraction within the community. It could be argued that schools that are perceived to be "better schools" attract more senior students (Y11–13) than other schools. Since the Y13/Y9 ratio was not related to student university achievements, it is possible that the effect of the Y13/Y9 ratio on student pathways is only an artefact. In the light of these inconclusive results, more research is needed to investigate the issues of student flow in and out of school, and its effects on the individual students who remain in the school.

The results of other analysis of Type A factors (or schools' characteristics) (Raudenbush and Willms 1995), such the starting year level (Y9–15 or Y7–15), school gender (single sex or co-educational) and school authority (ownership/funding mechanism) relate mostly to students in the lower achievements bands. For example, students from Y7–15 schools were found to be more likely to apply to the university, regardless of whether or not they gained UE, and less likely to gain a GPA score of less than 2. This suggests that studying in a secondary school that caters for students from Year 7 through to Year 13 increases the chances of better educational attainment. It is noted that the Educational Review Office (ERO) of New Zealand recently carried out research on the different types of schools (Education Review Office 2003) which used data from ERO reports. The results did not find significant differences between the two types of schools (Y7–15 and Y9–15). As no other relevant study from New Zealand was available, it is impossible to offer any particular reason for the apparent advantage of the Y7–15 school over the Y9–15 school.

In terms of the gender composition of the school, this study found that the likelihood of gaining UE qualifications decreased in boys'—only schools and increased in girls'—only schools. Yet, lower achievers (no UE) from single gender schools *were more likely to apply to the university* than their counterparts from coeducational schools. The literature on the effect of single gender schooling on participation in higher education is inconclusive (Baldwin 1990; Fuller 1995; Lee and Marks 1992; McEwen et al. 1997; Spielhofer et al. 2004). Nonetheless, Baldwin (1990) suggested that the differences in student enrolment in higher education from different gender-type schools was more attributable to the SES of the students' families than to the type of schooling they had experienced. Although Baldwin's suggestions may apply, it is noted that in the current study, the regression models included school decile but it only survived the stepwise process in the UE model. It is suggested, therefore, that the effect of single gender schools on students' pathways may be related to the complex interactions of a range of variables rather than socioeconomic factors alone.

Regarding private and state schooling, the findings indicate that students from private schools were less likely to gain UE qualifications. Furthermore, students from state schools were found to be more likely to achieve higher GPA scores (within all achievement bands) than students from non-state schools (private and state-integrated). As many private schools in Auckland are also single gender schools, it is possible that there is an interaction between these variables. The literature indicates that the effects of school-type on students' achievements differ across countries. For example, it has been found that in countries with strong religious tradition, students attending private schools perform better than those in state schools (such as Brazil, Belgium, Spain and Ireland). Conversely, in countries where the church has less influence, students from coeducational schools perform as well as students from private school (such as Mexico, Netherlands and Denmark), or better (as in Austria and France) (Lumley 1992; Vandenberghe and Robin 2003). It is suggested that possible explanations for the differences in outcomes for students attending single gender and/or private schools may come from two factors: the selection process and the

curriculum. Private schools select particular students, and/or particular students select private schools (Valerie et al. 1998); and private schools, most particularly religious schools, offer different subject options to their students (Shulruf et al. 2006a, b, c; Valerie et al. 1998). Further research is needed to explore differences in school curricula and their effect on student outcomes.

A further interesting finding to emerge from this study was the relationship between student pathways and school district; particularly concerning the likelihood of students applying to the university. It was found that students from Rodney and Waitakere were less likely than students from any other districts to apply for a place at the university. A possible explanation for the behaviour of Rodney's students relates to travelling distance. In order to attend the university in question, students from Rodney District would need to travel quite long distances into the city. Since there is another much closer university, it is possible that travelling distance and time makes the difference to these students. It is not so easy, however, to propose a similar explanation as to why students from Waitakere were less like to attend the university in question, since the distance from Waitakere to the both universities is similar. Further research to uncover the reasons for this behaviour is recommended. In terms of those students from Franklin District who were less likely to apply to the university, it is interesting to note that although distances into the city are similar to those from Rodney, there is no other university closer to Franklin District than the one in question. Therefore, it is suggested that students from Franklin may have chosen to study at the polytechnic or other tertiary institutions closer to their homes. Alternatively, since they would probably have had to leave their homes to study at the university, they might have chosen to move further afield and study at another university in the country.

Only two Type B variables (Raudenbush and Willms 1995) were available in the dataset: (i) type of secondary school assessment (NCEA versus CIE) and (ii) university outreach programme participation (at the school level). It was found that the percentage of CIE candidates in the school did not have any significant effect on students' pathways, nor on their first year GPA at the university. In a recent study, Shulruf et al. (2006a) suggested that the predictability of NCEA is as much as 4.8 times more effective than that of CIE, which provides a possible explanation for the insignificant effect that the proportion of CIE candidates in the school had on students' outcomes.

The second group of variables included in the pathways models was schools' participation in the university's outreach programmes. The most striking result to emerge from this analysis was that students from MATES schools were more likely to gain UE and to apply to the university. Although no evaluation at the individual level could be made, these results complement a previous MATES evaluation (Ayres 2006) which indicated that students were satisfied with their participation in the MATES programme and believed that their participation had contributed to their success at school and their aspiration to study at the university. It is suggested, therefore, that the positive association between schools participating in the MATES programme and student outcomes might be related to the actual effects that MATES had on students' pathways.

In relation to the other university's outreach programmes, students from Tuakana schools were found to be more likely to gain UE but students from Dream Fono and MATHS schools were less likely to apply to the university. In addition, students who came from schools operating MATHS or Dream Fono were found to be more likely to achieve a higher GPA within the lower and the higher achievers groups (respectively) than their counterparts who came from other schools. As no evaluations of these programmes were available, it was impossible to explain these effects, particularly since no data on individual participation in these outreach programmes were available. Previous studies suggest that

university outreach programmes increase the likelihood of students, particularly those from under-represented groups, to gain secondary school qualification (Perna 2002; Quigley 2002) and enrol in tertiary education (Brandes et al. 1997; Jones et al. 2002). It is suggested, then, that the schools who engaged in these outreach programmes may have been targeted or invited for specific reasons, such as low decile, low achievement levels, or low university enrolment rates. If this was the case, analysing the outreach programmes at the school level is vulnerable to selection bias. Thus, further research at the individual level is needed in order to determine the real effect the outreach programmes have on student outcomes and pathways.

It is important to note that the current study measures the effect of school factors on enrolment and success at *one university only*. In the Auckland region, there are numerous universities and polytechnics which offer a range of degree programmes. Any student preferences to enrol in this specific university, in any other degree provider locally or around the country, or overseas may affect the entire analysis. Therefore, any attempt to generalise these findings to the entire university sector should be made with caution. However, assuming that degree programmes are similar across universities and acknowledging that the assumptions have not been tested with data from other universities, the associations that have been found between schools factors and students' performance at the university could be applicable to other universities as well.

Overall, the findings indicate that school and individual characteristics affect students with lower achievements the most (that is, Non-UE students who applied to the university, or students with a first year GPA of less than 4). This finding is very important as it indicates that interventions aiming to increase participation and success in tertiary education should address two main areas: (i) students who are just about to succeed and (ii) the school factors that most affect at-risk students, rather than targeting all students or just those at the ends of the spectrum.

In conclusion, it is suggested that some characteristics of school do affect students' participation and success at the university. It is important to note, particularly for policy makers that, within Raudenbush and Willms' (1995) Type A factors, schools' demographic characteristics had no effect on student achievements while administrative/structure factors were influential. Further research is needed to disentangle this complex issue in order to determine ways to address school structures to the benefit of at-risk students.

Within the Type B factors, it appeared that the decision made by some schools to use the CIE system as a secondary school qualification did not make any difference to student outcomes. With reference to this and to the previously revealed low predictability of the CIE for participation and success at the university, it is suggested that schools reassess their policies in this regard.

Concluding comment

Schools are important agents affecting students' educational journey. The current study found that demographic characteristics affect student pathways to and success in higher education at the individual but not at the school level. In addition, school structure rather than secondary school assessment system were found to be the most influential factors affecting students at the school level. It is suggested that interventions targeting at-risk populations based on demographic factors focus on individuals or groups rather than on

institutions; while interventions targeting schools should identify the schools by its structure and function, rather than by its demographic characteristics.

References

- Abramson, H. J. (1988). *Making sense of data*. Oxford: Oxford University Press.
- Anae, M., Anderson, H., Benseman, J., & Coxon, E. (2002). *Pacific peoples and tertiary education: Issues of participation*. Auckland: Auckland Uniservices Ltd.
- Arum, R. (1998). Invested dollars or diverted dreams: The effect of resources on vocational students' educational outcomes. *Sociology of Education*, 71(2), 130–151.
- Ayres, E. (2006). *MATES 2005 evaluation report*. Auckland: University of Auckland.
- Ayres, E., Timperley, H., Shulruf, B., & Cooper, L. (2006). *2005 Tuakana programmes evaluation report number one*. Auckland: University of Auckland.
- Baldwin, G. (1990). Single sex schooling and subject choice: Pattern of enrolment at Monash University. *Australian Educational Researcher*, 17(3), 47–64.
- Benseman, J., Coxon, E., Anderson, H., & Anae, M. (2006). Retaining non-traditional students: Lessons learnt from Pasifika students in New Zealand. *Higher Education Research and Development*, 25(2), 147–162.
- Birrell, B. (1994). Competition for tertiary entrance: The Monash experience. *People and Place*, 2(2), 18–24.
- Boyd, S., Chalmers, A., & Kumekeawa, E. (2001). *Beyond school: Final year school students' experiences of the transition to tertiary study or employment*. Wellington: New Zealand Council for Educational Research.
- Bragg, D. D., Loeb, J. W., Gong, Y., Deng, C.-P., Yoo, J.-s., & Hill, J. L. (2002). *Transition from high school to college and work for tech prep participants in eight selected consortia* (Research/Technical No. V051A990006). National Research Center for Career and Technical Education, St. Paul, MN [BBB36652].
- Brandes, B. G., Hayward, G. C., Kirst, M. W., & Mazzeo, C. (1997). *PACE report: Higher education outreach programs: A synthesis of evaluations*. Policy Analysis for California Education.
- Brown, H. E., & Burkhardt, R. L. (1999). Predicting student success: The relative impact of ethnicity, income, and parental education. AIR 1999 Annual Forum Paper.
- Byrne, G. R. (1993). *Past, present and future: A Year 12 profile*. Unpublished MEd FTI: No, University of Melbourne, Parkville Vic.
- Cabrera, A. F., & Las Nasa, S. M. (2001). On the path to college: Three critical tasks facing America's disadvantaged. *Research in Higher Education*, 42(2), 119–149.
- CEPRI. (2002). *Postsecondary progression of 1993–94 Florida public high school graduates: 2002 update* (Research/Technical). Florida State Council for Education Policy, Research and Improvement, Tallahassee [BBB37224].
- Collins C., Kenway J., & McLeod, J. (2000). *Factors influencing the educational performance of males and females in school and their initial destinations after leaving school*. Deakin: Deakin University, University of South Australia.
- Comi, S. (2003). *Intergenerational mobility in Europe: Evidence from ECHP* (Working Paper No. 03.2003). Milan: University of Milan.
- Cummings, W. (1984). Going overseas for higher education: The Asian experience. *Comparative Education Review*, 28(2), 241–257.
- De Boni, D. (2002). Cambridge here for NCEA unbelievers. *New Zealand Herald*.
- DuBois, D. L., Holloway, B. E., Valentine, J. C., & Cooper, H. (2002). Effectiveness of mentoring programs for youth: A meta-analytic review. *American Journal of Community Psychology*, 30(2), 157–197.
- Education Review Office. (2003). *Students in years 9 and 10* (No. D-EducationReviewOffice0304). Wellington, New Zealand: Education Review Office.
- Education Review Office. (2004). ERO school and early childhood education reports. Retrieved 28 March 2006, from <http://www.ero.govt.nz/ero/publishing.nsf/Content/Reports>.
- Fresko, B. (1996). Effects of tutor-tutee intimacy, tutoring conditions and tutor background on college student tutor satisfaction. *Educational Studies*, 22(2), 147–164.
- Fresko, B. (1997). Attitudinal change among university student tutors. *Journal of Applied Social Psychology*, 27(14), 1277–1301.
- Fuller, A. M. (1995). The effects of single-sex classes on students' confidence and participation in mathematics. Unpublished MEd FTI: No, University of Melbourne, Parkville Vic.

- Gannicott K. (1998). *School autonomy and academic performance* (371.2 GAN). Australia: Commonwealth Department of Employment, Education and Training.
- Hanushek, E., Kain, J., Markman, J., & Rivkin, S. (2003). Does peer ability affect student achievement? *Journal of Applied Econometrics*, 18(5), 527–544.
- Harman, G. (2002). *Australia as a major higher education exporter*. Paper presented at the Consortium of Higher Education Researchers, the 15th Annual Conference Vienna.
- Hattie, J. (2005). The paradox of reducing class size and improving learning outcomes. *International Journal of Educational Research*, 3(6), 329–426.
- Hughes, D., & Pearce, D. (2003). Secondary school decile ratings and participation in tertiary education. *New Zealand Journal of Educational Studies*, 38(2), 193–206.
- James, R. (2001). Participation disadvantage in Australian higher education: An analysis of some effects of geographical location and socioeconomic status. *Higher Education*, 42(4), 455–472.
- Jones, M., Yonezawa, S., Ballesteros, E., & Mehan, H. (2002). Shaping pathways to higher education. *Educational Researcher*, 31(2), 3–11.
- Juhong, B., & Maloney, T. (2005). *Understanding the effects of ethnicity on academic success at university*. Auckland: The University of Auckland.
- Kim, M. M., & Placier, M. (2004). Comparison of academic development in Catholic versus non-Catholic private secondary schools. *Education Policy Analysis Archives*, 12(5).
- King R. (2004a). *2004 Tertiary analysis: Business and economics faculty, Starpath technical report 2*. Auckland: The University of Auckland.
- King R. (2004b). *2004 Tertiary analysis: Engineering faculty Starpath technical report 3*. Auckland: The University of Auckland.
- Konstantopoulos, S. (2005). *Trends of school effects on student achievement: Evidence from NLS:72, HSB:82, and NELS:92*. Bonn: The Institute for the Study of Labor.
- Lee, V., & Smith, J. (1997). High school size: Which works best and for whom? *Educational Evaluation and Policy Analysis*, 19(3), 205–227.
- Lee, V. E., & Marks, H. M. (1992). Who goes where? Choice of single-sex and coeducational independent secondary schools. *Sociology of Education*, 65(3), 226–253.
- Lumley, T. (1992). Coeducation and factors affecting choice of university courses. *Australian Educational Researcher*, 19(2), 51–60.
- Luyten, H. (2003). The size of school effects compared to teacher effects: An overview of the research literature. *School Effectiveness and School Improvement*, 14(1), 31–51.
- Maani, S. A. (2000). *Secondary and tertiary education attainment and income levels for Maori and non-Maori over time*. Wellington: Treasury New Zealand.
- Marks, G. N., McMillan, J., & Hillman, K. (2001). *Tertiary entrance performance: The role of student background and school factors*. Victoria: Australian Council for Educational Research.
- Martin, D. (2005). *Report on the performance of the New Zealand qualifications authority in the delivery of secondary school qualifications*. Wellington: State Service Commission.
- McEwen, A., Knipe, D., & Gallagher, T. (1997). The impact of single-sex and coeducational schooling on participation and achievement in science: A 10-year perspective. *Research in Science and Technological Education*, 15(2), 223–233.
- McGaw, B., & Lievesley, D. (2003). *Literacy skills for the world of tomorrow further results from PISA 2000*. Paris: OECD, UNESCO.
- Ministry of Education. (2004). *Education statistics of New Zealand for 2003*. Wellington: The Data Management and Analysis Division.
- Morgaman, P., Desai, A., Leone, D., McIntyre, B., Moore, E., Stuart, J., et al. (2002). *Postsecondary progression of 1993–94 Florida public high school graduates: 2002 update* (Research/Technical). Florida State Council for Education Policy, Research and Improvement, Tallahassee [BBB37224].
- Muijs, R. D. (1997). Predictors of academic achievement and academic self-concept; a longitudinal perspective. *The British Journal of Educational Psychology*, 67, 339–377.
- NCES. (2006). NELS:88/2000. Fourth follow-up: An overview. <http://nces.ed.gov/surveys/nels88/>. Retrieved 24 February 2006.
- NZQA. (2005). How grade averages are calculated. <http://nzqa.govt.nz/ncea/results/gradeaverages.html>. Retrieved 20 April 2006.
- NZQA. (2006). University entrance standard. <http://www.nzqa.govt.nz/ncea/ue/index.html>. Retrieved 26 April 2006.
- O'Shea, C., & Jones, M. (2005). *Creating tomorrows scientists and engineers: K-12 outreach that works*. Williamsburg, Virginia: College of William and Mary.

- Opendakker, M.-C., & Damme, J. V. (2000). Effects of schools, teaching staff and classes on achievement and well-being in secondary education: similarities and differences between school outcomes. *School Effectiveness and School Improvement*, 11(2), 165–196.
- Outreach Task Force. (1997). *New directions for outreach. Report of the University of California Outreach Task Force*. California: Board of Regents, University of California.
- Perna, L. W. (2002). Precollege outreach programs: Characteristics of programs serving historically underrepresented groups of students. *Journal of College Student Development*, 43(1), 64–83.
- Polesel, J. (1995). Victoria high school scholastic selection, social class, gender and ethnicity in an Australian public high school: a study of a secondary school in Melbourne's northern suburbs. Unpublished PhD FTI: No, University of Melbourne, Parkville Vic.
- Quigley, D. D. (2002). *The Early Academic Outreach Program (EAOP) and its impact on high school students' completion of the University of California's Preparatory Coursework. CSE Technical Report (Evaluative/Feasibility No. CSE-TR-589)*. California Univ., Los Angeles. Center for the Study of Evaluation [CIQ11702], National Center for Research on Evaluation, Standards, and Student Testing, Los Angeles, CA [BBB30050].
- Raudenbush, S. W., & Willms, D. (1995). The estimation of school effects. *Journal of Educational and Behavioral Statistics*, 20(4), 307–335.
- Ringold, D. (2005). Accounting for diversity: Policy design and Māori development in Aotearoa New Zealand. <http://www.fulbright.org.nz/voices/axford/ringoldd.html>. Retrieved 20 April 2006.
- Rodriguez, J. L., Jones, E. B., Pang, V. O., & Park, C. D. (2004). *Promoting academic achievement and identity development among diverse high school students*. San Diego State University.
- Salmond, A. (2004). *Equal opportunities annual reports summary 2004*. Auckland: University of Auckland.
- Salmond, C., & Crampton, P. (2002). *NZDep2001 Index of Deprivation User's Manual (User's Manual)*. Wellington: University of Otago, Wellington School of Medicine and Health Sciences.
- Schleicher, A., Albiser, E., Charbonnier, E., Davidson, M., Guillot, S., Heller, J., et al. (2005). *Education at a glance: OECD indicators—2005 Edition*.
- Scott, D. (2003). *Participation in tertiary education*. Wellington: Ministry of Education New Zealand.
- Scott, D. (2005). Retention, completion and progression in tertiary education in New Zealand. *Journal of Higher Education Policy and Management*, 27(1), 3–17.
- Shulruf, B., Hattie, J., & Tumen, S. (2006a). *The predictability of enrolment and first year university results from secondary school performance*. Auckland: Starpath—Project for Tertiary Participation and Success, The University of Auckland.
- Shulruf, B., Keuskamp, D., & Timperley, H. (2006b). *Coursetaking or subject choice? Technical report #7*. Auckland: University of Auckland.
- Shulruf, B., Meagher-Lundberg, T., & Timperley, H. (2006c). *Extra curricular activities and high school students: A systematic review, technical report #6*. Auckland: University of Auckland.
- Shulruf, B., Tolley, H., & Tumen, S. (2005). *Students' pathways and achievements, technical report No. 4*. Auckland: University of Auckland.
- Spielhofer, T., Benton, T., & Schagen, S. (2004). A study of the effects of school size and single-sex education in English schools. *Research Papers in Education*, 19(2), 133–159.
- Strathdee, R. (2003). The qualifications framework in New Zealand: Reproducing existing inequalities or disrupting the positional conflict for credentials. *Journal of Education and Work*, 16(2), 147–164.
- Teddle, C., & Reynolds, D. (2001). Countering the critics: responses to recent criticisms of school effectiveness research. *School Effectiveness and School Improvement*, 12(1), 41–82.
- Thrupp, M. (1995). The school mix effect: The history of an enduring problem in educational research, policy and practice. *British Journal of Sociology of Education*, 16(2), 183–203.
- Tolley, H., Smith, S., Gasson, C., Tumen, S., Timperley, H., & Shulruf, B. (2005). *Students, staff and school engagement in extra-curricular activities, a scoping study*. Auckland: University of Auckland.
- University of Cambridge Local Examination Syndicate. (2004). University of Cambridge International Examination. <http://www.cie.org.uk/CIE/WebSite/AboutCIE/AboutCIE.jsp>. Retrieved 17 August 2006.
- Valerie, E. L., Todd, K. C.-H., David, T. B., Douglas, G., & Becky, A. S. (1998). Sector differences in high school course taking: A private school or Catholic school effect? *Sociology of Education*, 71(4), 314.
- Vandenbergh, V., & Robin, S. (2003). *Does (private) education matter? Recent evidence from international OECD data*. Louvain-la-Neuve, Belgium: Universite Catholique de Louvain.
- Vaughan, K. (2005). The pathways framework meets consumer culture: Young people, careers, and commitment. *Journal of Youth Studies*, 8(2), 173–186.
- Win, R., & Miller, P. W. (2005). The effects of individual and school factors on University students' academic performance. *The Australian Economic Review*, 38(1), 1–18.