



MINISTRY OF EDUCATION

Te Tāhuhu o te Mātauranga

School leavers' progression to bachelors-level study

This report forms part of a series called Secondary to tertiary transitions.

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SUMMARY

This study considers the likelihood of studying at bachelors level in a population of New Zealand school leavers 17 to 21 years-of-age, starting their tertiary studies for the first time between 2005 and 2008.

The study found that the likelihood of studying at bachelors level depended on how well the student performed at school, their ethnic group, the socio-economic status (decile) of the last school they attended, and whether or not they progressed directly to tertiary education after leaving school.

Overall, 71 per cent of the students in the study population studied at bachelors level. For those students who progressed to formal provider-based tertiary study, 86 per cent studied at bachelors-level. If these students also gained University Entrance (UE) and progressed directly to tertiary study, 90 per cent studied at bachelors level.

Generally, the likelihood of studying at bachelors level increased with increasing levels of academic achievement – measured by the relative number of excellence and merit results compared to achieved and not achieved results.

The socio-economic status or decile of the school a student attended is also associated with the likelihood of studying at bachelors level. For students with UE who progressed directly to tertiary study, those with lower achievement scores had much the same likelihood of studying at bachelors level, between 70 and 80 per cent, irrespective of the school decile. However, across the remainder of the achievement score range, students from lower-decile schools had significantly lower likelihoods than students from other schools, and students from mid-range decile schools had significantly lower likelihoods than students from higher-decile schools. To have a 95 per cent likelihood of studying at bachelors level, a lower-decile school student had an achievement score of 85, while a higher-decile school student had an achievement score of 55 for the same likelihood.

The ethnicity of a student was a further factor affecting the likelihood of studying at bachelors level. In this study, ethnic group was reported using single/combination categories of identification for each ethnic group. Given that some students changed their ethnic responses between school and tertiary study, each student was characterised as never, ever or solely belonging to the European, Māori, Pasifika and Asian ethnic groups. Each person in the study population was classified as never-Asian, ever-Asian, or sole-Asian, and similarly for the other three groups.

The study found that for European and Asian students who gained UE and who progressed directly to tertiary study, school decile had little or no influence on the likelihood of studying at bachelors level. On the other hand, for Māori and Pasifika students who gained UE and who progressed directly to tertiary study, those from lower-decile schools with mid to higher achievement scores who belonged to either the ever- or sole-Māori, or sole-Pasifika ethnic groups, had significantly lower likelihoods of studying at bachelors level than similar students from higher-decile schools.

1 INTRODUCTION

Tertiary education provides substantial benefits to those who succeed in their studies. People with tertiary qualifications, particularly bachelors degrees or higher, have, on average, higher employment rates and higher earnings. They have generally higher levels of health and healthier lifestyles, experience greater satisfaction with their lives, and overall, have better prospects of improving their socio-economic status (Smart 2006, OECD 2008). Tertiary educated people also have higher employment rates later in their lives (OECD 2008).

Study at degree level at a university in New Zealand requires a person to have gained University Entrance (UE), which is based on credits achieved from standards primarily from the National Certificate of Education Achievement (NCEA) level 3 qualification. Entry requirements are relaxed somewhat for adult learners, but most people who study at bachelors level are 18 to 24 years of age, and usually do so immediately after leaving school.

Other studies have previously considered the transition from school to tertiary study. Ussher (2008), in particular, considered the choices New Zealand school leavers made across the broad range of tertiary education pathways. Ussher's study used data linking NCEA results and tertiary enrolment data. It included all students leaving school, regardless of their leaving qualifications and looked at all tertiary education destinations. But for students without UE, study at bachelors level is usually not an option open to them.

The present study also uses data that links individual students' NCEA results to their tertiary enrolment records. It considers only those students who do have UE or NCEA level 3 or higher, and examines who goes on to study at bachelors level after leaving school. Students with this level of qualification do have a choice as to what they study, so it is revealing to see who does *not* study at this level.

There is a further important dimension to this study. In the analysis of outcomes of education in New Zealand there is much focus on Māori and Pasifika ethnic groups (Ministry of Education 2008a, 2008b, Earle 2008). This is because the data consistently shows that on average, Māori and Pasifika students have lower levels of academic achievement than European and Asian students in secondary school. The introduction of the NCEA has improved student outcomes, including for Māori and Pasifika, but Māori and Pasifika achievement remains at levels much below that of European and Asian students. For example, school leavers gaining UE have increased over recent years, rising from 32 per cent in 2004 to 43 per cent in 2008 (Minister of Education 2009)¹. But again the figures are lower for Māori and Pasifika students. In 2004, the proportion of Māori school leavers with UE was 12 per cent, rising to 20 per cent in 2008. For Pasifika, the figures were 14 per cent rising to 23 per cent (op. cit.).

This picture of Māori and Pasifika student achievement belies the fact that many Māori and Pasifika students do succeed in gaining high level NCEA qualifications. In this study, by just considering students who have been successful in gaining the qualifications that enable progression to bachelors level study, it is possible to compare tertiary study destinations controlling for this source of disparity.

This study considers the likelihood of a student studying at bachelors level, given they have achieved UE or NCEA level 3 or higher school qualification. The explanatory factors used in the study include gender, whether or not the student gained UE, whether the student progressed to tertiary study immediately after leaving school, or took some time off, how well they did in

¹ In the results reported in this section, a student's ethnicity is based on a prioritised method of classification. Refer to the study variables section for a discussion on how ethnic group was determined in this study.

their studies, the socio-economic status (the school decile) of the last school they attended, and the student's ethnicity. The study used data linking secondary school leavers and their achievements with post-secondary enrolments.

The next section considers other studies which have looked at the factors affecting the likelihood of studying at tertiary level, both in New Zealand and overseas.

Section 3 describes the study population, while section 4 describes the study variables used.

Section 5 describes the results of this study, and the study concludes in section 6 with a brief discussion of the results.

The appendix shows the sample sizes for the various models used in the study.

2 PREVIOUS WORK

There are numerous studies that deal with the likelihood of studying at tertiary level and the factors that can affect this.

O'Connor (2009) found the interaction between socio-economic status and ethnicity as the most important factor explaining low enrolment rates by Hispanic students' in United States community colleges. This was explained by a lack of information about higher education among Hispanic students and their parents.

Bowers-Brown (2006) found that United Kingdom children from lower socio-economic families were less likely to borrow money to fund their higher education, and that their achievement levels were lower. Their limited understanding of the unwritten conventions that define success in the majority culture led to a low expectation of studying at tertiary level.

Junor and Usher (2004) reported a link between academic performance and socio-economic circumstances in Canada. Children in low socio-economic families were more likely to have missed out on the kinds of family, school and community support that tend to foster academic achievement. Other factors included low socio-economic families being less well-informed about existing opportunities in post-secondary education (including the actual costs and availability of financial assistance) and less aware of the economic benefits. In their view, lower-income youth do not see post-secondary education as a genuine option, not only because of the cost (perceived or real), or their academic ability, but simply because it is not part of their world-view.

Lambert et al (2004) showed that participation in post-secondary education in Canada was positively related to the level of engagement in secondary school. In addition, parental educational attainment and the values parents place on post-secondary education were also thought to be important. 'Parents with post-secondary credentials may provide greater levels of parental involvement, increased expectations and attitudes for academic success and increased familiarity with the post-secondary education process and experience. Additionally the value parents place on education may be transmitted by actively providing an environment conducive to educational attainment.'

Davis-Kean and Sexton (2009) reported that United States parents' beliefs and expectations regarding achievement exert a strong influence on children's outcomes. Parental education levels were a major factor in this.

Bélanger et al (2009) using Canadian data, also found this. They reported that parents' education, peer and school role models, and the students' own ability and achievement were important in the likelihood of a student aspiring to higher education. More highly educated parents provide greater encouragement, and are more engaged in school work and extracurricular activities, and they speak with a set of assumptions that positively affect their children. Peers with higher educational aspirations were influential in determining a student's own plans. In addition, a benefit of attending private (or in New Zealand terms, high decile) schools was that students developed close friendships with other students planning to further their study, which in turn influenced aspirations. Finally, Bélanger et al cite incidental and opportunity structures as also being important. These include such factors as family structure, urban-rural residence, gender, visible minority status, education costs, hours of employment, and local and global economic conditions.

Cooper (2009) also reported that the lack of financial capital and concerns about finance negatively influenced students' aspirations for college in the US. In addition, while a college-going culture is created in high schools for select students (advanced academic tracks, higher

income), for at-risk students (lower academic tracks, lower income) college-awareness activities are often not provided in the classroom.

In New Zealand, Chapple (2000) wrote that social status arising from one's parents, family and other peers has an influence on decision-making, and that social ostracism was an important consideration for people. In other words, if parents and peers do not value education and socio-economic success, any individual who aspires to academic success stands to lose social status by acquiring it. Māori may also lack information on how to succeed in socio-economic terms as a consequence of their social networks. In his conclusions on labour market outcomes, Chapple finds it is sole-Māori² with low literacy, poor education and living in geographical concentrations of Māori who experience labour market problems, not the Māori ethnic group as a whole.

In a longitudinal analysis of the Christchurch Health and Development study (CHDS) dataset, Fergusson et al (2008) found that, in New Zealand, socio-economic status at birth and educational outcomes were highly correlated. However, their results showed that socio-economic status and social class were not simply related to differences in access to economic resources, but rather, reflected consistent differences in values, attitudes and behaviours. In their study cohort at least, material conditions played little role in educational disadvantage. The major factors involved were individual cognitive ability, child behaviour, and family aspirations.

In contrast, Marie et al (2008), also using the CHDS cohort, showed that the origins of underachievement for Māori were, for the most part, explained by their exposure to family socio-economic disadvantage in childhood, rather than by factors relating to cultural identity. In their view, the factors that placed young Māori at an educational disadvantage clearly overlapped and were similar to the factors that led to educational disadvantage amongst non-Māori. This study also used the ethnic categories of sole-, mixed and never-Māori.

Leslie et al (2002) found admission into Britain's higher education system was based primarily on qualifications; the higher the qualification achieved in secondary school, the more likely an acceptance. They also found that the 6 per cent less chance of gaining an acceptance by ethnic minority students compared to students of European ethnicity was because ethnic minority students generally had lower level qualifications. When qualification level was held constant, the study found that some minority ethnic groups were more likely to be accepted (Chinese and Indian students), but Black-African, Black-Caribbean and other black students were less likely to be accepted than students from the European ethnic group.

Leach and Zepke (2005) undertook a literature review of the decision making process for prospective tertiary students, with a focus on New Zealand. They found that the decision-making process was complex, and the process started much earlier than years 11 or 12. They too found that socio-economic factors were the most powerful predictors of outcomes. Decisions to study at tertiary level are influenced by parents, the student's own academic success, and by the costs involved and financial support available. Additionally, they found that a family's experiences of tertiary education inform decisions, and parents' prior experience was positively associated with children also taking on tertiary study. Lastly, they found that the decision making process was more complex for Māori and Pasifika students, because these groups have traditionally been under-represented in tertiary education. This complexity arises from the facts that some ethnic groups do not have, or seek, the benefits offered by tertiary education; that these non-traditional groups often choose tertiary study to enrich their communities, rather than

² Sole-Māori are those people who indicated just one ethnicity, Māori, as their ethnic group. This contrasts with those people who indicated Māori plus one or more other ethnic groups as their ethnicity, the mixed Māori group. The Māori ethnic group as a whole includes both categories of ethnicity. The complementary group is those people who have never indicated Māori as their ethnicity.

(solely) for personal gain; and that differences among non-traditional ethnic groups are considerable.

Leach and Zepke (2005) also report evidence for the difficulty that 'at-risk' groups have in deciding to study at tertiary level. At-risk students were those who belonged to low socio-economic families, had changed school a number of times, had low grade point averages in grades 6 to 8, belonged to single-parent families, had been held back at some stage of their school careers and had one or more siblings drop out of school. They report that Bland (2002, cited in Leach and Zepke 2005) did attempt to explain why at-risk students find it difficult to decide in favour of tertiary education. Bland suggested that students from at-risk groups must move away from their own cultures when they enter tertiary education. He likens this to committing 'cultural suicide', as they must make a clean break from the communities and cultures in which they were raised as a prerequisite for educational success. This rather dramatic description echoes the ideas of Chapple (2000), who described this process as 'social ostracism'.

The recurring theme is that generally, ethnic minority students are less likely to study at tertiary level compared to their mainstream peers. A few studies suggest this is because they are less suitably qualified or felt that they were not able to afford the study. But the majority of the studies suggest it is a function of family background and upbringing, attitudes and knowledge of both the opportunities and the benefits of tertiary education. While low socio-economic status is often correlated with under-achievement, the literature shows that values and beliefs may also be influencing behaviours, although these are not necessarily independent of socio-economic status.

In summary, ethnic group and socio-economic status are important factors influencing post-secondary school study. What these studies have not been able to do is control for the students' level of academic ability – how well they performed in their studies relative to other students. This study sets out to answer the question, is the likelihood of undertaking tertiary study much the same between people when socio-economic conditions and ethnic group are controlled for, and when taking into account the level of academic attainment and the student's academic ability?

3 THE STUDY POPULATION

3.1 Data sources

Two sources of data were used. School achievement data was provided by the New Zealand Qualifications Authority. This was linked, via the national student number³ to tertiary enrolment data supplied by tertiary education providers to the Ministry of Education. The tertiary education data included enrolments in formal provider-based courses, industry training, and targeted training.

3.2 The students

Previous studies (Ussher 2008, Scott 2008) have used these data sources, but, in those studies, the data was constructed so as to create school leaving year cohorts. That is, students leaving school in the same year were considered as cohorts. For students in tertiary education but without a school achievement record, a school leaving year was required to be imputed. In some circumstances this is problematic. Students who leave school, then undertake some tertiary study, and then go back to school (to complete or raise their school qualifications), are difficult to fit into a scheme that requires a single school leaving year.

For the present study, a different approach was used. Birth dates are accurately known, so cohorts in this study were based on birth years. In any one year, each student is known to be either at school, in some type of tertiary education, in neither, or in both. It is also possible to determine the first year the student started tertiary education, and if they took a break between leaving school and starting this study.

The study population for the present study was defined as people born between 1985 and 1991 who had left school. For those who were studying at tertiary level, their first year of study was selected. This resulted in the study including tertiary enrolments in the years 2005 to 2008 for people 17 to 21 years of age. The study also included those students who had left school but had not started any tertiary study. Students with missing school decile were excluded; this group is essentially those students who studied at the Correspondence School. Few students were in this category, so do not distort the findings of the analysis. International fee paying students were also excluded. From the remaining group, only students with UE or NCEA level 3 or higher were selected. Note that a student can achieve UE without necessarily obtaining NCEA level 3, and visa versa.

If students studying at tertiary level were enrolled in more than one course of study, the highest level of study was used. For example, if a student was studying for a level 3 certificate and a level 7 bachelors-level qualification, the bachelors study would have been selected.

A student's school qualification was needed in the analysis, which meant that only students with NCEA results were included in the study. This excluded two groups of students. The first group was those students who leave school without receiving any NCEA credits or qualifications, but who do go on and either study at tertiary level or undertake some other post-secondary educational activity. However, it is unlikely that their exclusion would bias these results, since, in the main, they will not be the students who achieved UE or NCEA level 3, and so would be excluded from the study population.

³ More information on the national student number can be found at <http://www.minedu.govt.nz/NZEducation/EducationPolicies/Schools/SchoolOperations/NationalStudentNumber/InformationForParentsAndStudents/FrequentlyAskedQuestions.aspx>

The second group of students excluded were those who exclusively sat non-National Qualifications Framework examinations (mostly Cambridge International or International Baccalaureate), and while these will be more likely to have attained higher-level school qualifications, and were therefore more likely to go on to study at bachelors level, there are relatively few of these students, and so will not affect this study in any significant way.

Students from schools known to offer Cambridge International or International Baccalaureate examinations were also excluded from the study population.

The final study population consisted of 65,726 students.

4 THE STUDY VARIABLES

4.1 Ethnic group

This study presented an interesting methodological challenge in dealing with ethnicity. The study population of students was derived by merging four different sources of data; school NCEA results, formal tertiary-provider-based enrolments, and enrolments in industry training and in targeted training undertaken in tertiary institutions. Each of these data sources contained information about the ethnicity of the student, collected independently of the others and at different times. The NCEA results and provider-based enrolment data each contained up to three responses a person gave to indicate their ethnicity. The industry training and targeted training data each have one ethnicity field, which has been prioritised in the order Māori, Pasifika, Asian, Other and European.

Previous studies using the linked school and tertiary outcomes data had resolved this problem by either using the NCEA student data as the source of a student's ethnicity, or the tertiary enrolment data as the source. However, using just one source of data to determine ethnicity does not take into account the fact that an individual's ethnicity can and does change (Callister et al 2009). The problem then was how to accurately and appropriately record the (possibly varying) ethnicity of a student, using the diverse ethnic data available.

One option would have been to use a prioritised method to report ethnicity, based on all the ethnicity fields in the data. However, official guidance from Statistics New Zealand discourages the use of prioritised ethnicity (Statistics New Zealand 2006), and the method can result in undercounting some ethnic groups⁴. The recommended method of reporting ethnicity is to use single/combination responses. In this method, a person is placed in the particular category they fall in: for example the single responses Māori or European, or the combination responses Māori/European or Māori/European/Pasifika. This method has limitations (Leather 2009), and particularly for this study, results in small cell sizes for some categories. It also does not address the problem of changing ethnicity.

The method used in the present study to resolve these difficulties is to use the 'ever-ethnic' method of reporting ethnic group⁵. Three categories of ethnicity are determined – 'never', 'ever' and 'sole' – for each ethnic group. It is essentially the single/combination method of reporting ethnicity but with many of the categories combined. By including all the sources of ethnicity in all the data across years, it also captures any changes to a person's ethnicity over time.

To derive the ethnicity of a student in the study population, all ethnicity fields, in all datasets, in all years, are considered. Considering each ethnicity in turn, if the data shows only one ethnicity, the student is placed in the sole-ethnic category. If the data never shows that ethnicity, the student is placed in the never-ethnicity category. And if the data shows that ethnicity in some cases and not others, or in combination with another ethnic group, the student is placed in the ever-ethnicity category.

For example, considering the Māori ethnic group, if a person was recorded as Māori in the NCEA achievement data, but as European and Māori in the tertiary data, they are counted in the ever-Māori category. If, on the other hand, none of the ethnic group fields in any of the data at

⁴ It is the European and Pasifika ethnic groups which show the greatest degree of undercounting. By the nature of the method, Māori counts are unaffected, and the Asian ethnic group, because there is little overlap with other ethnic groups, is largely unaffected.

⁵ This system of reporting ethnicity was first used in New Zealand in health research by Pomare et al (1995).

any time ever shows Māori as an ethnic group, they are counted as never-Māori. And if the Māori ethnicity has only ever been recorded, they are counted as sole-Māori. These three states are captured in the one variable. One of these variables is created for each of the Māori, Pasifika, European and Asian ethnic groups. A fifth ethnic group in the data was ‘other’. These ‘other’ ethnic students were included in the data and the statistical modelling, but were not specifically reported in the study. Table 1 shows the correspondence between the multiple response and prioritised methods of reporting ethnicity, compared to the method used in this study. Table 2 shows the sizes of these ethnic group categories in the study population.

Table 1

Comparison of selected single/combination response ethnic categories, and their equivalent prioritised and ever-ethnic categories

Single/combination response*	Prioritised ethnicity	Ever-ethnic categories
Māori	Māori	Sole-Māori Never-Pasifika Never-European Never-Asian
Pasifika	Pasifika	Never-Māori Sole-Pasifika Never-European Never-Asian
European	European	Never-Māori Never-Pasifika Sole-European Never-Asian
Māori+Pasifika	Māori	Ever-Māori Ever-Pasifika Never-European Never-Asian
Māori+European	Māori	Ever-Māori Never-Pasifika Ever-European Never-Asian
Pasifika+European	Pasifika	Never-Māori Ever-Pasifika Ever-European Never-Asian
Māori+Pasifika+European	Māori	Ever-Māori Ever-Pasifika Ever-European Never-Asian

*Not all possible single/combination response categories are shown.

Table 2

Summary of sample sizes for each ethnic group category by ethnic group

Ethnic group category	European	Asian	Māori	Pasifika
Never indicated that ethnicity (never-ethnic)	13,908	55,543	58,860	62,200
Have or have ever indicated that ethnicity (ever-ethnic)	6,778	2,093	4,609	1,847
Only ever indicated that ethnicity (sole-ethnic)	45,040	8,090	2,257	1,679
Sole category as percentage of total ethnic group	87%	79%	33%	48%

It had been the intention to compare these ever-ethnic group variables together, enabling the modelling of interactions between them. However, the variables are likely to be correlated⁶. To avoid any problems in the analysis, the ever-ethnic variables were analysed separately, with a different regression run for each of the four ethnic groups considered in the study.

It should be pointed out that the never-, ever- and sole-ethnic method of reporting ethnicity is not a measure of, or a proxy for, the strength of a person's cultural or ethnic affiliation. These categories simply represent the history of an individual student's declarations on data capture forms over a period of time, and do not reflect the range of reasons a student might choose one or more particular categories. For example, a person who is regarded as ever-Pasifika may have ties to their culture as strong as, or stronger, than a person regarded as sole-Pasifika, and similarly for people in the other ethnic groups. The measure of ethnicity in this study, as in most administrative data, represents the *identification* of a person's ethnicity⁷. It is what a person has said they are, when asked to indicate their ethnicity on a form or in a census. This is distinct from the *identity* of a person, which is the ethnicity they think they are. Two further facets of identity can be defined: *attachment*, which indicates to what extent a person can speak the language, knows the customs, and participates in their ethnic group's cultural activities, for example, and *orientation*, which is a person's ethnic identity in a given situation or context (this applies mostly to those people with multiple ethnic identifications). While these other facets of identity may have an influence on educational and other outcomes, they were not able to be measured in this study.

One possible problem with this method of measuring ethnicity in this study is that for students who do not go on to any type of tertiary education, the ethnic categorisation is based only on school achievement records⁸. That is, there is less chance for an ethnicity to change over time and, consequently, less chance for the ever-ethnic category to occur, resulting in the sole-ethnic group being over-represented. Since this latter group does not study at bachelors (or any) level, there is a potential for bias in the results. While this is a potential problem in the study, in practice, no bias was found⁹.

4.2 University entrance

Gaining University Entrance was a significant factor in determining whether a student studied at bachelors level after leaving school. This is not surprising, since most bachelor degree enrolments are at universities and that for those aged under 20 years, UE is the minimum requirement for entrance to degree study. In the present study, the research question hinged on considering the likelihood of studying at bachelors level for people who had the opportunity to do so. It was important therefore to control for whether or not a student had gained UE. In the study population, 90 per cent of students had gained UE.

⁶ I am indebted to Robert Didham and Paul Callister for useful discussions on this topic.

⁷ These facets of identity were described by Tahu Kukutai in a paper presented at the University of Otago's School of Medicine and Health Sciences seminar series, 21 August 2009 titled, "Exploring ethnicity: Concepts, tools and 'evidence'". They are used with permission.

⁸ I am also indebted to an anonymous reviewer for pointing this out.

⁹ When the logistic regression analysis is performed excluding students with no tertiary records (so the bias is completely removed), the results and conclusions reached are the same as when they are included in the data. Additionally, using just the ethnicity data in the school achievement records to determine the ever-ethnic categories (which also completely remove the bias), the conclusions reached are again the same. The results of these tests are available from the author.

While 71 per cent of students overall in the study population studied at bachelors level, for those that did gain UE, 77 per cent studied at bachelors level.

There were also differences between ethnic groups. Table 3 shows the proportion of students with UE by ethnic group category. Given that UE is a prerequisite for study at this level, the differences in UE attainment between and within ethnic groups are likely to result in differences in the likelihood of studying at bachelors level. But the statistical modelling controls for levels of achievement and qualifications gained, so that differences in the likelihood of studying at bachelors level between and within ethnic groups cannot be attributed to differences in qualifications or achievement.

Table 3
Proportion of students with University Entrance by ethnic group category

Ethnic group	Never-ethnic	Ever-ethnic	Sole-ethnic
<i>European</i>	87%	89%	91%
<i>Asian</i>	89%	91%	93%
<i>Māori</i>	90%	88%	75%
<i>Pasifika</i>	90%	87%	75%

4.3 Time off between school and tertiary study

For the students in the population selected for this analysis, most start tertiary study in the year after they leave school. There are some circumstances where a student is enrolled in tertiary study in their last school year. This can happen in a number of ways, but most usually because students undertake one or more tertiary courses as a complement to their school work. For the purposes of this study, a student is considered to go directly to tertiary study if they start that study in the same year, or the year after their last school year.

Whether a student progressed directly to tertiary study, or took some time off before starting, was an important variable in the study. Students who made a direct progression to tertiary study comprised 76 per cent of the study population, while 8 per cent took some time off before starting tertiary study, with a further 16 per cent not indicating any type of tertiary study (see table 4).

Table 4
Details of students making direct or indirect progressions to tertiary study

	Direct progression	Took time off	Did not progress	Total
Number of students	50,067	5,371	10,288	65,726
Proportion of students	76%	8%	16%	100%
Proportion who studied at bachelors level	86%	69%	0%	71%

Of the students who progressed directly to tertiary study, 86 per cent studied at bachelors level. This compares to 69 per cent for those that took some time off. Overall, 71 per cent of the study population were studying at bachelors level.

This variable also posed some methodological challenges. The variable might have been included in the regression models using the three states (direct, indirect and did-not-progress), but for students who did not progress in the time period used to define the study population, there are no students studying at bachelors (or any) level. To overcome this, the variable was included as a binary variable, which amalgamated the indirect and did-not-progress categories.

This is reasonable since there is no way of determining if some of the students in the did-not-progress category might start tertiary study in the following years. In addition, the focus of the report is on students making a direct progression to tertiary study. Further research is needed to look at the characteristics of students moving indirectly to tertiary study.

There is also a difference between and within ethnic groups. Table 5 shows the proportion of students progressing directly to tertiary study after leaving school, by ethnic group and whether or not the student gained UE. Overall, 79 per cent of students progressed directly to tertiary study if they gained UE, compared to 55 per cent of students without UE.

Table 5

Proportion of students progressing directly to tertiary study by ethnic group and University Entrance status

Ethnic group	Gained University Entrance			Did not gain University Entrance		
	<i>Never-ethnic</i>	<i>Ever-ethnic</i>	<i>Sole-ethnic</i>	<i>Never-ethnic</i>	<i>Ever-ethnic</i>	<i>Sole-ethnic</i>
European	79%	85%	78%	55%	66%	53%
Asian	77%	89%	85%	53%	75%	70%
Māori	79%	83%	58%	56%	64%	36%
Pasifika	79%	86%	73%	53%	71%	56%

It can be seen that the proportions progressing directly are higher for students who gained UE. Since the proportions of students studying at bachelors level is far higher for students who progress directly to tertiary study, it is important to control for both UE and the timing of the progression to tertiary study if valid comparisons are to be made between students.

4.4 Achievement score

The variable measuring how well a student performed is named the ‘achievement score’ in this report. The achievement score variable has been used in other studies (Ussher 2008, Scott 2008, Earle 2008) and has previously been referred to by the name ‘expected percentile’. This measure of student achievement was developed for analysing NCEA results by Michael Johnston at the New Zealand Qualifications Authority (NZQA). Readers are referred to Ussher (2008) for a more detailed description of this variable.

Most students in the study population have achievement scores in the range 20 to 90. Sole-Pasifika and sole-Māori generally have lower achievement scores, while sole-Asian students have generally higher scores (see table 6).

Table 6

Mean achievement scores by ethnic group category

Ethnic group	Never-ethnic	Ever-ethnic	Sole-ethnic
European	48.0	45.6	48.6
Asian	47.4	48.0	53.6
Māori	48.9	44.2	38.5
Pasifika	48.7	43.1	37.1

As will be seen, students with higher achievement scores are more likely to study at bachelors level. Differences in achievement scores between and within ethnic groups will therefore result in differences in the propensity to study at this level. It is important then to control for achievement score in the statistical modelling. It is worth noting however, that there are fewer

students with higher achievement scores for the sole- and ever-Māori, and sole- and ever-Pasifika ethnic groups. This increases the size of the confidence limits in the reported results.

The achievement score was included in the regression models as a continuous variable. The logit of the dependent variable was essentially linear against achievement score.

4.5 School decile

The decile of the last school attended was categorised into three groups, corresponding to school deciles of 1-2, 3-8 and 9-10. These categories were used because there were distinct differences in the results for students from schools with deciles 1 and 2, and 9 and 10, but for the others, the results were essentially the same. Using just three groups simplifies the analysis and the presentation of the results with no loss of detail.

The school decile is based on the socio-economic characteristics of the communities from which a school draws its pupils. This means that school decile does not necessarily indicate the socio-economic status of an individual student or their family. This is because most secondary schools draw from diverse communities and hence, most will have at least some high socio-economic students on their rolls. In spite of this, school decile was found to be quite important in explaining student outcomes. However, care must be used in interpreting the findings and in extrapolating the results. In effect, there is a risk that using school decile masks underlying differences in outcomes for different socio-economic groups. However, it is generally regarded that the results for the higher and lower decile ranges are less influenced by this variability, since these schools will have the highest proportion (in lower-decile schools) and the lowest proportion (in higher-decile schools) of lower socio-economic students.

School decile is also likely to be a proxy for a number of school characteristics which are important in determining the likelihood of choosing to study at tertiary level. Thrupp and Lupton (2006) indicate that socio-economic composition affects school processes in numerous ways which would cumulatively boost the academic performance of schools in middle-class settings, and suppress it in low socio-economic settings. This would have a direct bearing on the likelihood of further study, since without the requisite qualifications and standards, study at higher levels is not an option.

Leach and Zepke (2005) cite research which shows that students from higher decile schools have access to more information about tertiary study, and students in these schools develop tastes for the type of training received and occupations held by their, or their peers, parents. Bélanger et al (2009) also cite the positive effects of private (higher decile) schools on student aspirations for further study. While school decile as a proxy for socio-economic status is somewhat compromised by the fact that not all students in a school belong to the socio-economic level as indicated by the school decile rating, certainly every student in a school is exposed to the ethos and expectations of their school.

It is not possible to separate the socio-economic and school factors or to include them individually in the analysis, but it is clear that students from low-decile schools are more likely to leave school with lower levels of attainment, and have less experience learning in a motivated and motivating environment.

4.6 Gender

The gender of a student was determined from the NCEA records.

While there are more female students than male students in the study population (59 per cent are female), the proportion that go on to bachelors-level study is much the same; that is, of the 71 per cent of the population who do go on to bachelors study, 60 per cent are female.

Table 7 shows the observed proportions of students in bachelors-level study by gender for the entire study population.

The table shows that, once a student has achieved UE or NCEA level 3 or higher, there is little difference between males and females in their likelihood of choosing to study at bachelors level. When gender was included in the logistic regression models, it was found to be statistically significant for Māori and Asian ethnic groups, but not for European or Pasifika. Where it was significant, it was of low strength, with females more likely to study at bachelors level, but only very slightly so. The results of the modelling however, show the average likelihood of studying at bachelors level for all students, ignoring gender. This was done for pragmatic reasons, to avoid either reporting both gender's results for some ethnic groups (which were essentially identical), or choosing to report either the male or female results. Given that gender has very low explanatory power, this does not bias the results of the study.

Ussher (2008) also found that gender was not a strong predictor of whether a student studied at bachelors level, although it was important in the choice to undertake industry training.

Table 7

Proportion of students studying at bachelors level by gender and ethnic group category

Ethnic group category	Observed proportion of students studying at bachelors level		
	Males	Females	Total
Never European	68%	69%	69%
Ever European	76%	76%	76%
Sole European	70%	72%	71%
Never Asian	68%	70%	69%
Ever Asian	81%	83%	82%
Sole Asian	79%	82%	80%
Never Māori	71%	73%	72%
Ever Māori	72%	72%	72%
Sole Māori	40%	40%	40%
Never Pasifika	70%	72%	71%
Ever Pasifika	72%	76%	74%
Sole Pasifika	50%	53%	52%
Total	70%	72%	71%

5 RESULTS

Logistic regression was used to analyse the relationship between a student’s likelihood of studying at bachelors level (or higher¹⁰) given the decile of their final school, their ethnic group and how well they did at school compared to other students. In addition, whether or not a student gained UE, and whether or not a student progressed directly to tertiary study after leaving school, were also included. Whether a student had achieved a NCEA level 3 qualification or not was found not to be important in understanding the results.

Different models were formulated for each of the ethnic groups. The variables and their interactions in the logistic regression models were found to explain a significant amount of variance in the data for each of the ethnic group models. Table 8 shows the goodness of fit statistics for each of the four ethnic group models, and the model used to produce the results for all ethnic groups combined. In all five models, the R² value is above 0.52, indicating considerable power – more than in most models in education¹¹. The C statistic also indicates strong predictive power. Of the students who actually progressed to bachelors-level study, the model correctly predicts bachelors study as the outcome for 88% of them.

Table 8
Goodness of fit statistics for the regression models

Goodness of fit statistic	Ethnic group variable used in the model				
	<i>European</i>	<i>Asian</i>	<i>Māori</i>	<i>Pasifika</i>	<i>All groups</i>
Adjusted R squared	0.5426	0.5394	0.5297	0.5280	0.5269
C statistic [†]	0.886	0.885	0.879	0.879	0.878

† The C statistic is the probability of a student actually studying at bachelors level having a higher expected probability of studying at bachelors level (estimated from the model) than a student who is not actually studying at bachelors level.

Tests were conducted for the presence of multicollinearity between the independent variables in the models¹². No evidence of multicollinearity was found.

In all models, ethnic group, achievement score, school decile, time off and UE were found to be significant. That is, one needs to consider all five variables together to understand the relationship between the propensity to study at bachelors level and these other variables.

As noted previously, the time-off variable was included in the model as a binary variable; students either went directly to some type of tertiary study, or they did not. This latter group includes students who did study at tertiary level after a break, and those who, in the time frame chosen to delineate the study population, had not (yet) started tertiary study. Because the latter group contains these two quite different outcomes, they are not considered further in this report.

¹⁰ There were a few students who were studying at level 8 honours, post-graduate certificates or diplomas. These may have been valid enrolments, but mostly these come about because students enrol in a four-year bachelors course including honours, for example, which is coded in the data as being at level 8.

¹¹ It should be noted that the R² statistic in a logistic regression cannot be interpreted as the proportion of variance explained by the predictor variables (SAS Institute Inc. 2005).

¹² Multicollinearity is a statistical phenomenon in which two or more predictor variables in a multiple regression model are highly correlated.

Additionally, the study focuses on those students who gained UE, since this is the usual prerequisite for study at this level.

The results of the logistic regressions are converted to probabilities (the expected likelihood of studying at bachelors level) using the model equations derived from the regressions.

Sample sizes for the four ethnic group regression models are given in appendix A.

5.1 Overall results

The majority of students in the study population (82 per cent) attended formal tertiary study with a tertiary provider, with 2 per cent enrolled in industry training, and less than 0.5 per cent in various targeted training courses. A total of 16 per cent were not involved in tertiary education activities of any kind.

In the study population, on average (combining students who progressed directly to tertiary study, or took some time off) 71 per cent of students were studying at bachelors level, 5 per cent at diploma level, 4 per cent at certificate level 4, and a further 4 per cent were studying at certificate levels 1 to 3. As mentioned, a total of 16 per cent of the study population were not enrolled in any form of tertiary study. This last group of students were overseas (possibly to study at bachelors level elsewhere), found work, or were involved in some other activity. There is a chance that some of them will eventually go on to some type of tertiary study in New Zealand in the coming years.

For students who progressed directly to formal provider-based tertiary study after leaving school, 86 per cent were studying at bachelors level. For those in this group with UE, and who progressed directly to tertiary study, the figure is 90 per cent.

In table 7, it can be seen that the proportion of students studying at bachelors level varies by ethnic group category. It can be seen that overall, lower proportions of students who identify solely with the Māori or Pasifika ethnic groups study at bachelors level. Seventy-two per cent of students who were ever-Māori went on to study at bachelors-level after leaving school, compared with 40 per cent who were sole-Māori. Asian students show the highest proportions studying at bachelors level.

5.2 Achievement score and school decile

Figure 1 shows the expected probability of studying at bachelors level by achievement score and school decile for students with UE who progressed directly to tertiary study. The results are averaged over all ethnic groups. Results are only shown for achievement scores in the range 20 to 90 since very few students with these characteristics had achievement scores outside this range.

It can be seen that achievement score has a large effect on the likelihood of studying at bachelors level once UE status and the timing of the progression to tertiary study are controlled. Students with higher achievement scores are far more likely to go on to study a bachelors degree, and this occurs across all school decile categories.

At the lower end of the achievement score range (below 30), the likelihood of studying at bachelors-level for most students is between 70 and 80 per cent.

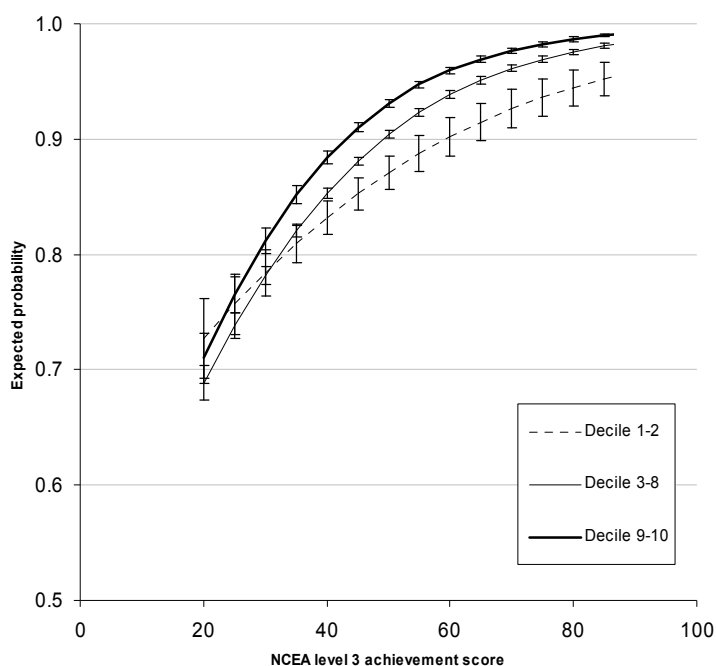
At achievement scores above 30, students from higher-decile schools have a statistically significantly higher likelihood of studying at bachelors level than other students. Students from lower-decile schools have a statistically significantly lower likelihood of studying at bachelors level than other students at achievement scores of 35 and higher. Students from mid-decile

schools are significantly different from both other groups, with likelihoods falling between these other two groups. While at the highest achievement scores students from lower-decile schools have quite high likelihoods of studying at bachelors level, at around 95 per cent, this is still significantly lower than other students.

Higher-decile school students with an achievement score of 55 have a 95 per cent likelihood of studying at bachelors level. Lower-decile school students, on the other hand, have an achievement score of 85 for the same likelihood. For students from mid-decile schools, the equivalent achievement score is 65.

Figure 1

Expected probability (and 90 per cent confidence limits) of studying at bachelors level by school decile and achievement score



For students who gained University Entrance, and progressed directly to tertiary study after leaving school. Where confidence limits do not overlap, there is at least a 95 per cent certainty that the means in question are statistically different. Note the vertical axis starts at 0.5.

5.3 Achievement score, school decile and ethnic group category

The graphs in figure 2 (page 23) show the expected probability of studying at bachelors-level by achievement score and school decile, controlling for ethnic group category, for students who gained UE and progressed directly to tertiary study after leaving school. Each row of graphs (never-, ever- and sole-European for example) is the output from a single model run. Ninety per cent confidence limits are shown¹³. Confidence limits are wider when there are fewer students in the study population for the given combination of variables.

It is useful to comment briefly on the graphs as a whole. For any one row of graphs, each ethnic group category represents a distinct group of students, with no overlap between them. That is, when considering any one ethnic group (each row in the figure), each student is in one and only one of the three categories for that ethnic group. Each row considers the entire study population separately for each ethnic group. This means that a student who is in the sole-European

¹³ Ninety per cent confidence intervals are used so that readers can be at least 95 per cent certain that, when the intervals do not overlap, the means are statistically different (Schenker and Gentleman 2001, Payton et al 2003).

category, will also be in the never-Asian, never-Māori and never-Pasifika categories in the other rows of the figure (see table 1). Given the size of the sole-European group (see table 2), it is not surprising that the graphs for these four cases are similar.

A similar situation occurs with the never-European category. This group will contain all those students who are sole-Māori, sole-Pasifika and sole-Asian, and any other combination of these groups that exclude the European ethnic group, and as a consequence, the results will be influenced by these other ethnic group categories. A similar situation occurs for the other never-ethnic results. These characteristics need to be kept in mind when interpreting the graphs.

The general pattern seen in the results is one where the likelihood of studying at bachelors level increases with increasing achievement score, although the rate of increase declines after an achievement score of about 50. This is the pattern seen in figure 1. This generally holds true across school decile categories, and generally across the ethnic group categories.

The most obvious aspect of the results is that, in general, there is consistency in the pattern of responses both within and between ethnic groups. However, there are some striking exceptions. The consistency in part results from the fact that the sole-European, never-Asian, never-Māori and never-Pasifika categories contain much the same group of students. In spite of this, in each row of results, and for the sole-ethnic column, the results for some groups of students are very similar.

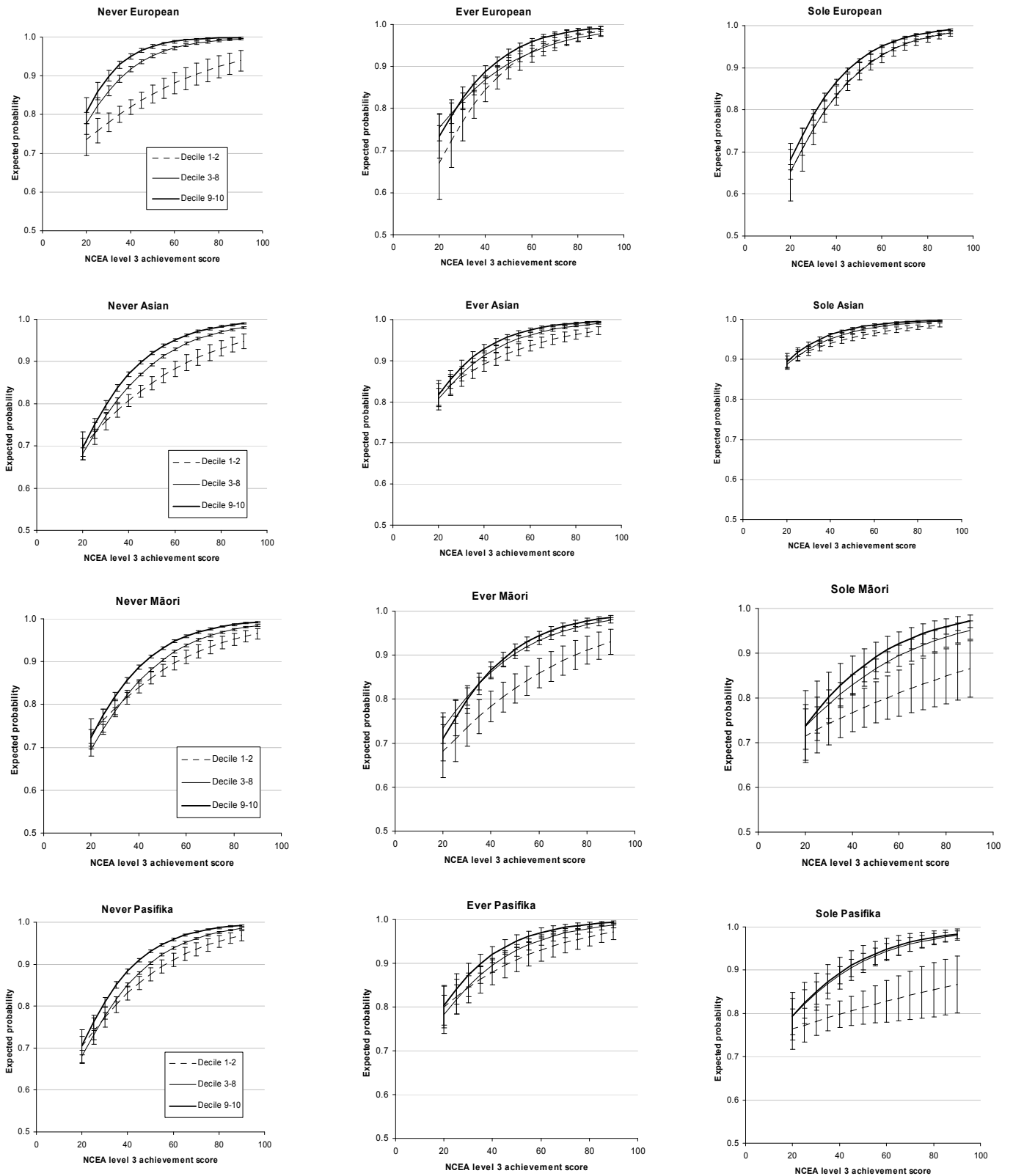
The similar results generally occur for students from the mid- to higher-decile schools with higher achievement scores. For these students, when achievement scores are above 50, the likelihood of studying at bachelors level is, in the main, over 90 per cent. For Asian students, the likelihood is somewhat higher, while for sole-Māori students from mid-decile schools it is slightly lower, but still above 85 per cent.

Differences between ethnic groups are seen between European and Asian students on the one hand, and Māori and Pasifika on the other. European and Asian students all basically show the pattern just described, regardless of the decile of the school the student attended. For sole-Māori and sole-Pasifika students however, students from lower-decile schools with mid to high achievement scores show significantly lower likelihoods of studying at bachelors level compared to other students. This occurs in the middle range of achievement scores in the case of Māori, and for achievement scores above 35 in the case of Pasifika. For ever-Māori there is a similar situation, with students from lower-decile schools with achievement scores over 40 having a significantly lower likelihood of studying at bachelors level than similar students from other schools. Ever-Pasifika students do not show differences between students from schools of different decile ratings. Ever-Asian students from low-decile schools also show a difference in likelihood of studying at bachelors level for achievement scores in the 50 to 90 range, but the differences are small when compared to the differences seen for Māori and Pasifika.

Within ethnic group differences can also be seen. The ever- and sole-ethnic categories for each ethnic group show little difference for European and Asian students, but for Māori and Pasifika students there are some differences. For ever-Māori, lower-decile school students have a lower likelihood of studying at bachelors level than other students across nearly the whole range of achievement scores. For sole-Māori on the other hand, the difference between the lower-decile school students and others is greater than that seen for ever-Māori, but these are only statistically significantly different in the middle range of achievement scores. For Pasifika, the sole-Pasifika group are quite substantially different from the ever-Pasifika group.

For students with the lowest achievement scores there are also differences between ethnic groups, with Asian students showing the greatest difference. Asian and Pasifika students with lower achievement scores have higher likelihoods of studying at bachelors level.

Figure 2
 Expected probability (and 90 per cent confidence limits) of studying at bachelors level by achievement score, school decile and ethnic group



For students who gained University Entrance, and progressed directly to tertiary study after leaving school. Where confidence limits do not overlap, there is at least a 95 per cent certainty that the means in question are statistically different. Note the vertical axis in these figures starts at 0.5.

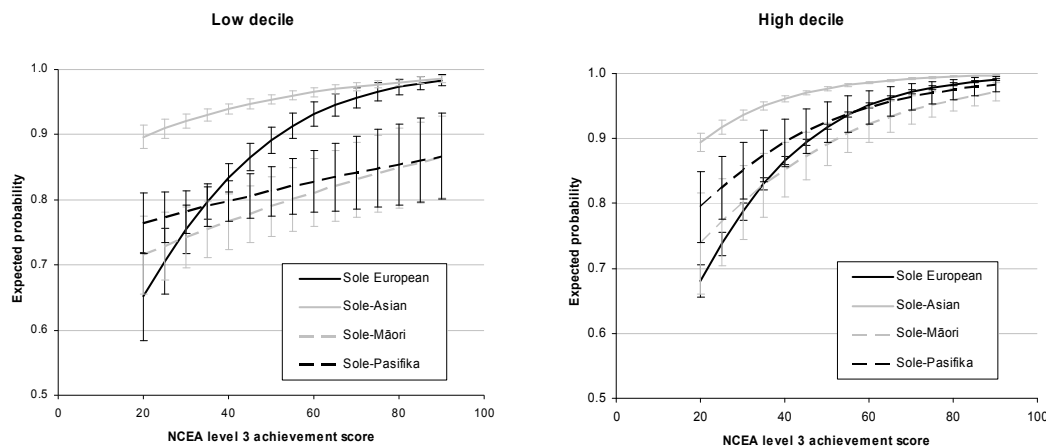
In the sole- and ever-European, sole-Asian, and ever-Pasifika groups, school decile does not have a statistically significant association with the propensity to study at bachelors level.

It is worthwhile commenting on the results of the never-European group. As mentioned previously, this category contains all those combinations of ethnic identifications excluding Europeans. Specifically, it contains the Māori and Pasifika ethnic groups and the Asian group in nearly equal proportions (refer to table 2). While the individual ever- and sole-ethnic group categories for Māori and Pasifika show wide confidence limits because of their relatively smaller group sizes, the never-European group is substantial (at nearly 14,000 students), and has correspondingly narrower confidence limits. The never-European group shows significantly lower likelihoods of studying at bachelors level for students from lower-decile schools, across nearly the entire achievement score range. This reinforces the finding that the lower likelihood of studying at bachelors level for these lower-decile school students is a real effect. It is likely that in a few years time, when more data is available, the findings for these smaller ethnic group categories will become more certain.

Figure 3 shows the results for the sole-ethnic groups for the higher- and lower-school decile groups. This figure more clearly shows between-ethnic group differences, and the differences between the high and low school decile groups.

Figure 3

Expected probability (and 90 per cent confidence limits) of studying at bachelors level by achievement score, ethnic group category for low and high decile school students



For students who gained University Entrance, and progressed directly to tertiary study after leaving school. Where confidence limits do not overlap, there is at least a 95 per cent certainty that the means in question are statistically different. Note the vertical axis starts at 0.5.

For students from higher-decile schools, sole-Asian students have a very high likelihood of studying at bachelors level across the entire achievement score range. For the other ethnic groups, there is no statistical difference between the students from higher-decile schools. At the highest achievement scores, all students have essentially the same very high likelihood of progressing to bachelors-level study.

For students from lower-decile schools however, the situation is somewhat different. As described above, the sole-Asian and sole-European students exhibit the same pattern as their higher-decile school counterparts – school decile is not a factor in determining the propensity to study at bachelors level. At the highest achievement scores, Asian and European lower-decile school students have much the same likelihood of studying at bachelors level, but for Māori and

Pasifika students, the likelihood is significantly lower, and this occurs from achievement scores of around 50 and higher.

In summary, the higher the achievement score, the more likely a student is to study at bachelors level. For Asian and most European students, school decile has no bearing on this. However, for Māori students generally, and sole-Pasifika students, with higher achievement scores from lower-decile schools, there is a significantly lower likelihood of progressing to study at bachelors level.

6 DISCUSSION

This study has found there are several factors that interact to influence the likelihood of studying at bachelors level for students leaving school. For those students with the qualifications that allow them entry to bachelors-level study, their level of school achievement was an important factor. In addition, for some students, the decile of the school they attended influenced this likelihood, while for other groups of students, their ethnic identification was also important.

Previous reports on educational outcomes in New Zealand have consistently shown differences between ethnic groups. In performance at school, rates of transition to higher levels of tertiary education, and success in tertiary education, young Māori and Pasifika students tend not to reach the same levels as European and Asian students. This study too, found differences between ethnic groups, but only for students from lower-decile schools, and then only for students with higher achievement scores. The results for students with higher achievement scores from higher-decile schools showed essentially no differences between ethnic groups – Māori and Pasifika students in the study population were just as likely to study at bachelors level as their European and Asian counterparts. It is clear that when achievement levels and socio-economic factors are controlled for, there is no difference in the likelihood of studying at bachelors level for students from higher-decile schools.

This study has also demonstrated differences *within* some ethnic groups. For the Asian ethnic group, ever-Asian students with lower achievement scores were less likely to progress to bachelors-level study than sole-Asian students. And for Pasifika, it is the sole-Pasifika students with higher achievement scores from lower-decile schools who are less likely to progress to bachelors-level study.

On the other hand, there are essentially no differences between the sole- and ever-European ethnic group categories, either by achievement score, or by school decile. For Māori, sole- and ever-Māori students showed similar patterns; Māori students with higher achievement scores from lower-decile schools were less likely to progress to bachelors level study than students from higher-decile schools.

The method of reporting ethnicity in the present study, using never-, ever- and sole-ethnic categories for each ethnic group, is a way of dealing with different sources of ethnicity in the study data, and the fact that a student's ethnic identification could vary. This variation in ethnicity represents the phenomenon of ethnic mobility (Callister et al 2009). People's ethnicity can, and does change, and for data that spanned several years of a person's life, using just a single source of ethnicity does not seem appropriate.

It is worthwhile reiterating that the ethnic group categories in the present study do not represent the degree of cultural alignment, cultural affiliation, or cultural strength. Rather, it simply records the choices made by individuals in their responses to questions on data capture forms. This measure of ethnicity, as in most administrative data, represents the *identification* of a person's ethnicity, not their ethnic identity, their cultural or ethnic attachment, or their ethnic orientation¹⁴. While these other facets of identity may have an influence on educational and other outcomes, they were not able to be measured in this study.

Several other studies have found within ethnic group differences in New Zealand (although only the Māori ethnic group has been studied in this manner in the past). Chapple (2000) found

¹⁴ Section 4.1 (Ethnic group) gives a more complete description of these facets of ethnicity.

differences between sole- and ever-Māori groups for employment rate and median income, controlling for education level and other social factors. Chapple showed that in some cases, the differences between these groups were diminished when controlling for other factors. In his summary, he states it is ‘sole-Māori living in rural areas, with low levels of education, lower than average literacy, and living in Northland and in the central North Island’ who have lower unemployment rates relative to others in the same area. Like the present study, Chapple found that no single variable explains the observed differences between groups; rather, a number of interacting variables need to be considered to understand the trends.

Marie et al (2008) also found differences between sole- and ever-Māori groups for various educational attainment measures, but these differences were diminished when controlling for socio-economic factors¹⁵. That paper finds that the proportion of people in their study cohort who attended university was not different between ethnic groupings when controlling for socio-economic factors, but without this control, sole-Māori participation was much lower. This finding is interesting, since it is known that Māori generally have the highest participation rates in tertiary education, although this is mostly in the lower level qualifications (Ministry of Education 2009).

Their results also show lower completion rates for bachelor-level study for sole-Māori and ever-Māori ethnic categories, compared to the non-Māori group, and this persisted somewhat even when controlling for socio-economic factors. The factors that might affect the completion of a degree are likely to be different from, but possibly overlap, the factors that affect the decision to start a degree¹⁶. However, the overall conclusion reached by Marie et al (2008) is that socio-economic conditions are more important than ethnic identity in explaining differences in educational achievement.

One further New Zealand study warrants discussion. Fergusson et al (2008), using the same cohort as Marie et al (2008), found that a person’s financial circumstances played little role in educational disadvantage. Instead, it appeared that individual cognitive ability, child behaviour and family aspirations were important. In particular, Fergusson et al found that access to material resources did not link directly to later educational achievement. While they found a link between the decile rating of a young person’s school and their family’s socio-economic status, there was no evidence that school decile was related to education achievement after other factors (notably childhood cognitive ability and parental aspirations) were taken into account¹⁷.

The present analysis finds that it is neither ethnic identification alone, nor the school alone (acting as a proxy for socio-economic status, or factors associated with the school itself), which provide the best explanation of the likelihood of moving from school to bachelors study. Rather, both factors appear to be important, together with the student’s level of achievement. After controlling for tertiary study entry requirements, it is the *higher* achieving students from schools with *lower* decile ratings, for *some* ethnic groups, and for *some* of the people in an ethnic group, that are associated with educational disadvantage.

What the present study cannot do is determine the causal links between the study variables and bachelors-level study. For this, qualitative research needs to be undertaken. What this study has done however is to report these important findings, so at least this deeper research can begin.

¹⁵ It should be noted that in the Marie et al (2008) study, sample sizes were quite small (50 for the sole-Māori group, 56 for the ever-Māori group).

¹⁶ Studies have shown that academic ability is by far the strongest factor affecting course completion rates (Scott 2008), and the Marie et al study was not able to control for this.

¹⁷ Fergusson et al (2008) did not include ethnicity as an explanatory variable in their model, however.

APPENDIX A SAMPLE SIZES

Tables showing sample sizes for the four models used in the study.

University Entrance status	School decile category	Progressed directly to tertiary			Took a break		
		Never European	Ever European	Sole European	Never European	Ever European	Sole European
<i>Did not gain UE</i>	<i>Deciles 1-2</i>	246	52	83	238	34	70
	<i>Deciles 3-8</i>	539	316	1,457	467	169	1,374
	<i>Deciles 9-10</i>	230	108	678	131	37	562
<i>Did gain UE</i>	<i>Deciles 1-2</i>	869	329	655	344	65	216
	<i>Deciles 3-8</i>	4,941	3,215	18,694	1,318	601	5,343
	<i>Deciles 9-10</i>	3,737	1,583	12,335	848	269	3,573

University Entrance status	School decile category	Progressed directly to tertiary			Took a break		
		Never Asian	Ever Asian	Sole Asian	Never Asian	Ever Asian	Sole Asian
<i>Did not gain UE</i>	<i>Deciles 1-2</i>	344	19	18	328	8	6
	<i>Deciles 3-8</i>	2,012	74	226	1,881	31	98
	<i>Deciles 9-10</i>	807	43	166	652	6	72
<i>Did gain UE</i>	<i>Deciles 1-2</i>	1,600	108	145	575	13	37
	<i>Deciles 3-8</i>	22,742	956	3,152	6,672	118	472
	<i>Deciles 9-10</i>	13,936	637	3,082	3,994	80	616

University Entrance status	School decile category	Progressed directly to tertiary			Took a break		
		Never Māori	Ever Māori	Sole Māori	Never Māori	Ever Māori	Sole Māori
<i>Did not gain UE</i>	<i>Deciles 1-2</i>	256	50	75	183	36	123
	<i>Deciles 3-8</i>	1,950	242	120	1,660	132	218
	<i>Deciles 9-10</i>	938	64	14	673	33	24
<i>Did gain UE</i>	<i>Deciles 1-2</i>	1,355	294	204	417	66	142
	<i>Deciles 3-8</i>	23,977	2,238	635	6,337	456	469
	<i>Deciles 9-10</i>	16,693	822	140	4,421	176	93

University Entrance status	School decile category	Progressed directly to tertiary			Took a break		
		Never Pasifika	Ever Pasifika	Sole Pasifika	Never Pasifika	Ever Pasifika	Sole Pasifika
<i>Did not gain UE</i>	<i>Deciles 1-2</i>	218	40	123	236	18	88
	<i>Deciles 3-8</i>	2,109	98	105	1,871	48	91
	<i>Deciles 9-10</i>	969	38	9	713	7	10
<i>Did gain UE</i>	<i>Deciles 1-2</i>	1,281	197	375	465	32	128
	<i>Deciles 3-8</i>	25,527	864	459	6,926	152	184
	<i>Deciles 9-10</i>	17,265	307	83	4,620	46	24

REFERENCES

- Bélangier, C., F. Akbari and P. Madgett (2009) *Why some youths do not realise their post-secondary education aspirations*, *Tertiary Education and Management*, 15 (3): 209–225.
- Bowers-Brown, T. (2006) *Widening participation in higher education amongst students from disadvantaged socio-economic groups*, *Tertiary Education and Management* 12: 59–74.
- Callister, P., Didham, R. and Kivi, A. (2009) *Who are we? The conceptualisation and expression of ethnicity*, Official Statistics Research Series, 4. Available from <http://www.statisphere.govt.nz/official-statistics-research/series/default.htm>.
- Chapple, S. (2000) *Māori socio-economic disparity*, Paper for the Ministry of Social Policy September 2000, Public Access New Zealand Inc., accessed 23 June 2009, http://www.publicaccessnewzealand.com/files/chapple_maori_disparity.pdf.
- Cooper, M.A. (2009) *Dreams deferred? The relationship between early and later postsecondary education aspirations among racial/ethnic groups*, *Educational Policy* 23 (4): 615–650.
- Davis-Kean, P.E. and Sexton, H.R. (2009) *Race differences in parental influences on child achievement*, *Merrill-Palmer Quarterly*, 55 (3): 285–318.
- Earle, D. (2008) *Hei titiro anō i te whāinga. Māori achievement in bachelors degrees revisited*, Wellington: Ministry of Education.
- Fergusson, D.M., Horwood, L.J. and Boden, J.M. (2008) *The transmission of social inequality: examination of the linkages between family socio-economic status in children and education achievement in young adulthood*, *Research in Social Stratification and Mobility* 26: 277–295.
- Junor, S. and Usher, A. (2004) *The price of knowledge*, *Policy Options* December 2004–January 2005: 61–65.
- Lambert, M., K. Zeman, M. Allen and P. Bussière (2004) *Who pursues post-secondary education, who leaves and why: results from the Youth in Transition Survey*, Ottawa: Statistics Canada, 81-595-MIE2004026.
- Leach, L. and N. Zepke (2005) *Student decision-making by prospective tertiary students. A review of existing New Zealand and overseas literature*, Wellington: Ministry of Education.
- Leather, F. (2009) *Prioritising data in an increasingly multi-ethnic society*. Institute of Policy Studies working paper 09/05, Wellington: Victoria University of Wellington.
- Leslie, D., Abbott, A., and Blackaby, D. (2002) *Why are ethnic minority applicants less likely to be accepted into higher education?* *Higher Education Quarterly*, 56 (1): 65–91.
- Marie, D., Fergusson, D.M. and Boden, J.M. (2008) *Educational achievement in Māori: the roles of cultural identity and social disadvantage*, *Australian Journal of Education* 52(2): 183–196.

- Minister of Education (2009) *08 New Zealand schools. Ngā Kura o Aotearoa. A report of the compulsory schools sector in New Zealand 2007*, Wellington: Ministry of Education.
- Ministry of Education (2008a) *Ka Hikitia – managing for success*, Wellington: Ministry of Education.
- Ministry of Education (2008b) *Pasifika Education Plan 2008-2012*, Wellington: Ministry of Education.
- Ministry of Education (2009) *Profile and trends 2008. New Zealand's tertiary education sector*, Wellington: Ministry of Education.
- Payton, M.E., M.H. Greenstone and N. Schenker (2003) *Overlapping confidence intervals or standard error intervals: what do they mean in terms of statistical significance?* *Journal of Insect Science*, 3:34.
- Pomare, E., Keefe-Ormsby, V., Pearce, C., Reid, N., Robson B. and Watene-Haydon N. (1995) *Hauora. Māori standards of health. A study of the years 1970-1991*. Wellington: Te Ropu Rangahau Hauora a Eru Pomare/Eru Pomare Māori Health Research Centre.
- O'Connor, N. (2009) *Hispanic origin, socio-economic status, and community college enrolment*, *The Journal of Higher Education* 80 (2): 121-145.
- OECD (2008) *Education at a glance 2008. OECD indicators*, Paris: OECD.
- SAS Institute Inc. (2005) *Categorical data analysis using logistic regression*, Cary, NC: SAS Institute Inc.
- Scott, D. (2008) *How does achievement at school affect achievement in tertiary education*, Wellington: Ministry of Education.
- Schenker, N. and Gentleman, J.F. (2001) *On judging the significance of differences by examining the overlap between confidence interval*, *The American Statistician* 55(3): 182-186.
- Smart, W. (2006) *Outcomes of the New Zealand tertiary education system – a synthesis of the evidence*, Wellington: Ministry of Education.
- Statistics New Zealand (2006) *The impact of prioritisation on the interpretation of ethnicity data*, Wellington: Statistics New Zealand.
- Thrupp, M. and R. Lupton (2006) *Taking school contexts more seriously: the social justice challenge*, *British Journal of Educational Studies*, 54 (3): 308–328.
- Ussher, S. (2007) *Tertiary education choices of school leavers*, Wellington: Ministry of Education.
- Ussher, S. (2008) *Post-school choices: How well does academic achievement predict the tertiary education choices of school leavers?* Wellington: Ministry of Education.



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