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Building on strengths: Educational pathways that benefit Māori students

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Disclaimer

The opinions, findings, recommendations, and conclusions expressed in this paper are those of the authors, not Te Puni Kōkiri or Motu Economic and Public Policy Research.

These results are not official statistics. They have been created for research purposes from the Integrated Data Infrastructure (IDI) and Longitudinal Business Database (LBD) which are carefully managed by Stats NZ. For more information about the IDI or LBD please visit https://www.stats.govt.nz/integrated-data/.

The results are based in part on tax data supplied by Inland Revenue to Stats NZ under the Tax Administration Act 1994 for statistical purposes. Any discussion of data limitations or weaknesses is in the context of using the IDI for statistical purposes and is not related to the data's ability to support Inland Revenue's core operational requirements.

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Executive Summary

This paper is an economic analysis of the pathways through education that lead to strong outcomes for Māori students, and how these differ by gender and for students with different interests and aptitudes ('specialties') in high school. The focus is labour market outcomes, but some non-labour market outcomes are also considered. The paper is intended to help inform policy development and career advice to both school-aged students and older Māori people considering returning to education.

Our focus is on Māori students who gained a level 2 NCEA certificate between 2004 and 2007 when aged 16 to 19. We use individual-level data from Statistics New Zealand's Integrated Data Infrastructure to examine the educational pathways and labour market outcomes of these students for 12 subsequent years. We measure labour market success through the amount students could potentially be saving annually 12 years after level 2 based on their income, tertiary fees, and minimal assumed living costs ('annual savings') and the total savings they could have accumulated up to this point ('cumulative savings'). One limitation of these data is that they cover only 12 years after NCEA level 2, not the whole working life. However, measuring annual savings gives us some ability to predict how cumulative savings will evolve after the end of the observed period. We measure non-labour market outcomes using a range of questions on topics such as health and control over one's life, drawn from the 2018 Te Kupenga survey.

Level 2 subjects do not define careers

We find that students with different specialties at level 2 take different pathways through subsequent education on average, but there is substantial overlap among students with different specialties. This means students at level 2 should not feel defined by the subjects in which they are currently experiencing success, but should be aware they can gain knowledge in new areas and change their career trajectories.

Women gain more education but men can save more

Although the women in every specialty except Business end up more educated on average than the men, the men in each specialty have substantially higher annual and cumulative savings than the women. This gender savings gap is especially large for less educated individuals.

Bachelor's degrees benefit women more than men

Regardless of specialty, women have the strongest labour market outcomes if they earn at least a bachelor's degree. For men, however, the same is clearly true only for men who are top academic performers at school. Men with other specialties pay a high opportunity cost of higher education, and 12 years after level 2 the cumulative savings of bachelor's graduates have not caught up with those of their peers with only level 4 to 6 qualifications. However, in most specialties the more educated men have higher annual savings, so their cumulative savings may catch up with and surpass those of their less educated peers further down the track. In addition, bachelor's qualifications in some fields *are* clearly financially beneficial for men. Our findings should thus not be interpreted as suggesting Māori men should not gain degree-level qualifications, rather they should carefully consider the field in which they embark in higher qualifications and be prepared to wait a substantial period for their education to pay off financially.

As well as having strong labour market outcomes, women with at least a bachelor's degree tended to have at least as strong non-labour market outcomes as less qualified women. In contrast, compared with men with level 5 or 6 industry training qualifications, men with at least bachelor's degrees reported lower life satisfaction, health, and control over their lives.

Vocational training yields strong outcomes for men and sometimes women

Men in essentially every specialty who gain industry training qualifications at level 4 to 6 have very strong outcomes, but the same is true only for women in a select group of specialties. Even in specialties in which industry training is very lucrative for women and likely to fit with their interests, such as Engineering and Technology, few women pursue this pathway. Existing research suggests this may result from a combination of gender norms, lack of encouragement for women into such vocational pathways, and work environments that are not as welcoming nor as inclusive for women as they could be. There could be benefit from career guidance that is free from gender stereotypes, and encourages female school students with relevant interests into educational routes such as engineering and trades.

Some popular fields of tertiary study yield little financial benefit

Society and Culture and Creative Arts, which include the study of various aspects of Māori arts and culture, are two fields of study commonly pursued by both men and women at level 4 and above. In most specialties, such qualifications do little to boost the labour market outcomes of

either gender. Study in these fields may have a range of other benefits such as connection to one's culture, self-enrichment, or enjoyment, though we find little correlation between study in these fields and the non-labour market outcomes we examine. Recent years have seen an increase in demand in the labour market for employees knowledgeable of tikanga Māori and te reo Māori. The timing of the data used may mean this is not reflected in our findings. That is, more recent cohorts of students may gain larger labour market benefits than the studied cohort do from education in these fields.

Overall, while students may have non-financial reasons for pursuing higher level study in Society and Culture or Creative Arts, they should be aware before making this choice that the labour market benefits it offers may be quite limited.

Not all STEM study leads to strong job prospects…

Despite the government's promotion to Māori of Science, Technology, Engineering, and Mathematics (STEM) education on the basis there is a skills shortage in the field and it offers secure jobs that pay well, we do not find this rosy view to be universally true. Although students with Engineering qualifications tend to do well in the labour market, students who study (or gain qualifications) in Natural and Physical Sciences at level 4 or above or Information Technology at levels 4 to 6 tend to have labour market outcomes comparable to or weaker than otherwise similar students who do not study at this level in any field. Students entering these two fields should be aware they are not necessarily easy tickets to high-paying jobs.

…but higher study in some fields is financially beneficial

Higher qualifications in other fields can be much more beneficial. For men in every specialty, qualifications in Engineering and Related Technologies at level 4 or above tend to lead to strong outcomes. Men with degrees in the field tend to have higher annual but lower cumulative savings than men with level 4 to 6 qualifications in it. Degrees in Management and Commerce are associated with strong outcomes for women in all specialties and men in specialties such as Top 10%, Humanities, Social Sciences, and Sciences. The competitive field of Health at bachelor's level and above offers strong earnings to academically capable women, whereas degrees in Education seem to benefit women in specialties such as Education, the Service Sector, and Māori, as well as women who are Generalists.

Connection to culture is valuable

Students in our sample who study Māori at NCEA level 3 have higher te reo Māori proficiency as adults than similar students who do not, and such men also report less loneliness and more control over their lives. This highlights the value of connection to one's culture, despite the fact we find no evidence such study improves labour market outcomes. However, recent cultural shifts could mean future cohorts of students will also benefit financially from these skills.

Educational pathways to desirable outcomes may change in the future

This study examines the pathways through education and the labour market that led to strong outcomes for a cohort of Māori students who gained level 2 NCEA between 2004 and 2007. This is not to claim current and future cohorts of students will only gain success through following these pathways. Cultural, social, economic, and technological changes may open new avenues to desirable personal and professional outcomes.

JEL codes

I20, I21, I23, I26, J15, J16

Keywords

Māori; education; school; tertiary education; vocational training; qualifications; returns to education; New Zealand

Summary haiku

Gender gaps are stark.
Plan your study carefully,
consider lost work.

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1 Introduction

This paper investigates the pathways through education that lead to strong labour market outcomes for Māori students, and how these differ for students with different interests and aptitudes in high school.[1] It is an economic analysis, part of a larger programme of work for Te Puni Kōkiri, intended to support policy development and inform advice that encourages Māori students into educational pathways that are likely to result in good outcomes. The primary focus is labour market outcomes, but some non-labour market outcomes are also considered.[2] The analysis could inform the decisions of both school-aged students and those who decide later in life to return to education.

The ongoing effects of colonisation have disadvantaged Māori relative to Europeans in Aotearoa New Zealand's education system and labour market, as evidenced by persistent ethnic educational and earnings gaps. This disadvantage may be compounded by many Māori students lacking information or inspiration that shows them what education might build off their talents and lead them to labour market success. This research is intended to help address this gap.

We use individual-level data from the Integrated Data Infrastructure (IDI) to investigate the educational and employment pathways of Māori students in Aotearoa. Our main focus is Māori students who have a level of academic success, indicated by achieving NCEA level 2 between the ages of 16 and 19, but who are not top students academically at level 2.[3] We limit this sample further to those who gained NCEA level 2 between 2004 and 2007 to enable us to follow their pathways for 12 subsequent years.

For each individual, we use their earnings, any fees they paid for tertiary study, and an estimate of minimum living costs to approximate their potential cumulative savings each year up to 12 years after gaining NCEA level 2. This allows us to calculate two measures of the labour market success of Māori students: (potential) cumulative savings after 12 years and average annual savings in years 11 and 12. The available data have the limitation that we are only able to track the savings of students for 12 years after NCEA level 2, not their whole careers until retirement. This limitation is partially overcome by considering annual savings after 11 to 12 years as well as cumulative savings, because annual savings provides some information about how cumulative savings can be expected to increase after the observable period.

[1] Throughout this paper, we consider students to be Māori if they report Māori ethnicity, regardless of whether they report any additional ethnicities. We use ethnicity as opposed to descent because data on descent are available only for a subset of the population.

[2] Education has many potential benefits beyond the financial rewards it offers. Our focus on the financial aspects should not be taken to imply that individuals should choose their educational pathways solely or even primarily to maximise their income. However, financial considerations do matter for many. The information provided by this analysis will be valuable in enabling such people to make informed choices about education that balance financial rewards with their other objectives.

[3] We analyse as a separate group the top-performing students.

Taking a strengths-based approach, we next categorise students into specialties based on the subjects they did well in or achieved a lot of credits in at NCEA level 2 to capture their early life interests and aptitudes.[4] We then investigate for each specialty the pathways through education and life that are associated with being in the top 20% of cumulative or annual savers within the specialty and gender. We consider separately students of each gender in each specialty because successful pathways may differ for each of these groups. For example, in some specialty fields, higher education leads to greater labour market outcomes, but in others gaining more on-the-job experience is more valuable. Similarly, we split men and women and analyse their decisions separately as labour market pathways can be very gendered. These gender differences can arise from social norms, the effects of childbearing, high levels of solo parenting by women, women's greater role in caring for elderly relatives, differing interests, values, or priorities, or various other forces, and lead to segregation by occupation, industry, and nature of work. The results from these analyses are summarised in this report and detailed in 15 separate specialty profiles.

Because material wellbeing is only one aspect of overall wellbeing, we also investigate the educational pathways that lead to desirable non-labour market outcomes, such as control over one's life, drawing these from the 2018 Te Kupenga survey. For these outcomes, we pool students of all specialties together due to the small sample size.

Although our findings should not be interpreted as strictly causal, in our regression analysis we control for various aspects of students' backgrounds, including overall academic performance. This means our results can be considered suggestive of the educational pathways that might lead to strong labour market outcomes for Māori with particular skills and interests. Because we study only a particular cohort of students, we cannot say whether future Māori students will necessarily have to follow to same pathways to do well in the labour market. Cultural, social, economic, and technological changes may change the relative rewards to different knowledge and skills or open new possibilities for future generations of students. Furthermore, our results should not be taken as implying Māori students should follow only paths that have been taken by many Māori before them.

Our focus is an economic analysis of the educational pathways that have been associated with labour market success for Māori men and women over the past two decades. This analysis offers just one piece of the picture, and could be complemented by studies that took other approaches or were founded in the ideas of other disciplines. In particular, we do not attempt to

[4] The classification of students into specialties takes into account the difference between Unit Standards and Achievement Standards. The details of the classification method are described in Appendix 2.

provide a mātauranga Māori perspective, though we recognise this will form an essential part of the broader understanding. We also do not take the approach of many earlier studies and compare the labour market outcomes of Māori and non-Māori with similar education; the remaining questions in this area are left for future work.

The remainder of this report is as follows. Section 2 touches on the relevant literature, though primarily refers the reader to a separately published literature review. Section 3 describes our data sources and construction, detailing the 15 specialties, the construction of our savings variables and non-labour market outcomes, and giving an overview of the pathway characteristics we consider. Section 4 discusses several aspects of our approach to the analysis, explains the content of the specialty profiles, and describes the analysis of non-labour market outcomes. Section 5 contains results. It begins by describing the savings and self-employment of our full population of Māori students. It then characterises the students in each specialty, compares the savings outcomes of students by specialty and level of education, and presents the results of the analysis of non-labour market outcomes. Summaries of the results for each specialty on the pathways to strong labour market outcomes are relegated to Appendix 7, but Section 6 discusses commonalities in and differences between the results for the different specialties and draws overall conclusions.

2 Literature

Sin et al. (2022) provide a literature review on three areas relevant to this research: pathways students can take through the education system in Aotearoa, the relationship between higher education and labour market outcomes, and the labour market value of Māori medium education and te reo Māori-English bilingualism. Here we summarise only a few relevant points.

Previous literature has found a positive relationship between education and earnings. This association varies by gender (Arrazola and de Hevia, 2007), field of study (Kim et al., 2015), and level of qualification (Park et al., 2014). It has also been found to vary by ethnicity (Li 2018; De Silva, 2009; Ñopo et al., 2004; and Trentini, 2013). These findings are replicated in Aotearoa (Scott, 2020), particularly with variation in the strength of the relationship by ethnicity (Mahoney, 2014). Mahoney (2014) shows earnings vary by field of study, and Scott (2009) shows Māori are disproportionately represented in fields such as Society and Culture, Education, and Creative Arts, and are underrepresented in fields such as Management and Commerce, Engineering, and Architecture (Meehan et al., 2017). Thus, differences in the fields in which Māori gain qualifications may contribute to ethnic differences in the relationship between education and earnings.

Besides ethnic differences in the returns to education, ethnic differences also exist in rates of higher education, and these differences in Aotearoa explain a considerable fraction of the earnings gap between Māori and New Zealand Europeans (New Zealand Treasury, 2018). These differences in education are already evident in school. For instance, 72% of enrolled Māori students obtained NCEA level 2 in 2020 compared with 83% of enrolled European New Zealanders. This difference doesn't capture the fact Māori are already less likely than Europeans to be enrolled in school at this age. Furthermore, Meehan et al. (2017) find approximately 15.6% of eligible Māori enrol in a bachelor's degree before age 20 compared with 39.2% of European New Zealanders. Of these, 49.2% of Māori students complete their bachelor's within five years compared with 69.9% of New Zealand Europeans. In 2021, 14,625 Māori students participated in apprenticeships, up from previous years, compared with 50,230 NZ European students. Similarly, 28,120 Māori students were in traineeships in 2021, compared with 86,215 European students (Tertiary Participation, 2022).[5] Māori are also employed in different industries on average to New Zealand Europeans, being disproportionately employed in wholesale and retail, manufacturing, and utilities and construction. As these industries tend to be lower-paying, this too may contribute to ethnic differences in returns to education.

While ethnic differences in participation in higher education in Aotearoa have been well documented, a gap exists in the literature in terms of identifying pathways to successful outcomes specifically for Māori students. This research responds to this gap.

3 Data

3.1 Data sources

The data used in this study are drawn from Statistics New Zealand's Integrated Data Infrastructure (IDI). The IDI is a collection of individual-level data drawn from various administrative and survey data sources that covers essentially the full population of Aotearoa and links data on individuals drawn from different sources. The main sources used in this research are data on high school and tertiary education from the Ministry of Education, earnings data from Inland Revenue, and non-labour market outcomes data from Te Kupenga 2018 (Statistics New Zealand's survey of Māori wellbeing, conducted as an add-on to the 2018 Census).

[5] Apprenticeships are long-term courses that involve on the job training in different trades. Traineeships are shorter-term programmes that primarily facilitate upskilling, or polishing of existing skills.

3.2 Population of interest

This study focuses on Māori students who achieved a certain level academically, as indicated by receiving a level 2 NCEA certificate. We focus on those who received this certificate between 2004 and 2007 when they were aged 16 to 19.[6] NCEA certificates can be gained at school or through tertiary study; we include students who gained their certificate either way. To minimise missing data and data linkage issues, we limit our population to students who are linked to the IDI spine.[7]

A level 2 NCEA certificate requires students to have achieved at least 60 credits at level 2 or above, and another 20 credits at any level. We restrict our sample to those who had achieved at least 40 credits at level 2 before gaining their level 2 certificate (most, but not all, of whom had achieved 60 or more credits at level 2). The students among these who had achieved fewer than 60 credits at level 2 may have studied partially under an alternative system (such as International Baccalaureate), but did a sizeable proportion of their level 2 study under the NCEA system.

We first exclude the few students who died in 2020 or earlier because their outcomes are not fully observed. We further exclude those who were overseas for more than six months in the year they gained NCEA level 2, or either of the following two years. Students who were overseas during this period are likely to have done further education there, and that will not be captured by the Ministry of Education data. We finally exclude students who were overseas too much in the 12 years following NCEA level 2 (as described in Appendix 1) because we have too little information about their labour market outcomes. Excluding students who are overseas for too long (based on these two rules) results in the exclusion of just under 5,000 students, or slightly over 20% of the sample.

3.3 Specialties

We classify each student in our sample into one or more specialties based on their interests and aptitudes at NCEA level 2, specifically the subjects in which they received high grades or gained many credits.[8] The exact rules for placing students in specialties are described in Appendix 2. All students are allocated to at least one specialty. Students may have subsequently done higher level study in these same subject areas, but this is not necessarily the case.

[6] One caveat of this, however, is the recent trend for young Māori to leave school early to financially assist their parents. Such students who do not attain a level 2 NCEA certificate are not included in our sample.
[7] The linkage rate to the spine for Ministry of Education data in the IDI is 81.5%. See https://vhin.co.nz/wp-content/uploads/2020/01/Understanding-linkage-in-the-IDI.pdf.
[8] These credits may be gained at school or through tertiary study, and some students may have worked for a few years before getting their level 2 NCEA certificates.

Students are not forced by the NCEA system to specialise at level 2, but many core subjects are no longer compulsory at this level, so not all students will take credits in mathematics, for instance. There are 13 subject-specific specialties, based on the categorisation of fields available in the Ministry of Education schools data: Māori; Humanities; Social Sciences; Sciences; Arts and Crafts; Computing and IT; Business; Agriculture, Forestry, and Fisheries; Community and Social Services; Education; Service Sector; Engineering and Technology; and Manufacturing, Planning, and Construction. The subfields that contribute to each specialty are given in Appendix 3.[9] In addition, we construct two extra specialties: Generalists and Top 10%. Generalists are students who didn't pass at least 16 credits in any one subject area, but who did achieve enough credits to gain the NCEA level 2 certificate. These students may not yet have figured out where their interests lie, or may have low engagement with school. Top 10% students are the students with the highest academic achievement at level 2, specifically, those whose level 2 percentile scores at the end of the year they gained NCEA level 2 were in the top 10% of students in our sample.[10] We analyse these students separately because they are highly academically capable and would likely do well in the labour market no matter what educational route they took. Top 10% students are excluded from the other specialties.

3.4 Outcome variables

3.4.1 *Cumulative and annual savings*

Many different measures could be used to capture aspects of success in the labour market, including state of employment, the duration or stability of the employment, weekly hours worked, variability of weekly hours worked, hourly earnings, gaps in employment, and annual earnings. Higher education may increase annual earnings in the long run, but it may also come at the cost of delaying entry into paid employment and may require the payment of tuition fees. Non-wage sources of income, such as self-employment income, also affect the money an individual has available to live on or save for an asset (such as a house). To summarise all such factors into one measure of financial resources that could be used to support material living standards, we construct potential cumulative savings (henceforth 'cumulative savings') starting from the year in which the student gained NCEA level 2. This measure is *potential* because it doesn't subtract the student's actual expenditure, but rather subtracts an estimate of minimum living costs. This means it is not affected by the individual's living situation or attitude towards

[9] The subfields attributed to the specialties may be available to study in high school, at tertiary institutes, or both.
[10] Percentile scores are calculated from the grades students achieved in different credits and are a summary measure of academic achievement. See Appendix 4 for full details of their calculation.

spending. The measure includes net income from a range of sources and subtracts tuition fees, thus capturing the opportunity cost of higher education and its potential benefits.

Included in potential savings is income from wages and salaries, self-employment, benefits, paid parental leave, claimant compensation, withholding payments, and estimated income from overseas earnings.[11] Although the IDI provides information on when individuals were out of Aotearoa, it has no information on where they were during this time, whether they were working, or how much they earned. A high proportion of our population spent a substantial amount of time overseas in the 12 years after gaining NCEA level 2, so dropping all such individuals would cause problematic sample selection and dramatically reduce the sample size.[12] We thus exclude only the more extreme cases and estimate overseas earnings for the others. We make assumptions about what they were doing overseas based on the length of time they spent overseas and what they were doing in Aotearoa before and after being overseas. Based on a comparison of median wages in Australia and Aotearoa, Australia being a major destination for New Zealanders going overseas, we assume an individual's wage earnings overseas are 50% higher than they would be in Aotearoa.[13]

To determine how much individuals could potentially save, we deduct from their net income any fees incurred by tertiary study, sourced from Ministry of Education enrolment data,[14] and an annual estimated cost of living calculated from the Living Wage. The New Zealand Living Wage estimates the hourly wage a family of two adults and two children would need to afford the necessities of life and be active citizens in the community if they worked 60 hours per week between them. It was first calculated for 2013 and has been reviewed annually since. Most years it has been around 85% of the median New Zealand hourly wage. Hence, in years prior to the Living Wage being available (2004 - 2012) we instead use 85% of the median hourly wage.[15] To convert the Living Wage rate into the annual cost of living for one adult, we first calculate the annual household income from the Living Wage in the corresponding year. In our main

[11] Although not all these income sources are returns to labour, they all contribute to financial resources and may be affected by work choices or interact with them. Wage and salary earnings in a year and withholding payments in a year were each capped at $150,000. Claimant compensation was capped at $50,000.

[12] A Ministry of Education 2012 report finds that of the population of students who borrowed a student loan and left study between 1999 and 2008, 9,891 Māori students (14%) relocated overseas by 2010 compared with 51,939 (20%) non-Māori students. The report also finds groups with lower propensities to travel overseas, for example, people of Māori and Pasifika ethnicity, are more likely to stay overseas. However, this sample is limited to those who borrowed on a student loan to attend tertiary education. Scott (2018) provides information on a group of students who are more similar to our sample, though does not provide an ethnic breakdown. He shows that 7 years after leaving school, 17% of students who left school in 2009 were overseas, with this value increasing with years since leaving school.

[13] We also alternatively tried assuming overseas earnings were the same as in Aotearoa or twice as high as in Aotearoa, but the overall changes were modest, so these results are not presented.

[14] Student fees were capped at $20,000 per annum. Refer to Appendix 5 for more details.

[15] Because we apply estimated living costs equally to all individuals aged 18 and over, our comparisons between students are not sensitive to assumptions about the cost of living, though the absolute magnitude of savings is.

specification, we assume the cost of living for one adult is 30% of this annual household amount; we also consider an alternative tough saving specification in which the cost of living for one adult is 40%. We assume individuals pay these living costs each year from age 18. At ages 16 and 17, living costs are assumed to be covered by their parents or caregivers. We do not deduct the direct costs of raising a child from potential savings, so this value should be interpreted as potential savings before the direct costs of having children are deducted. However, the opportunity cost of children in terms of wage income foregone is captured by our measure of potential savings.[16]

We recognise our assumptions may not be realistic for many individuals, and thus the dollar amounts of savings we calculate should thus be considered indicative only. However, interpersonal comparisons are minimally affected by our assumptions, so comparisons of the savings of individuals who took different educational pathways are much more reliable.

To calculate cumulative savings from the annual amount saved, we assume students begin with zero savings in the year they attain NCEA level 2. Each year they are charged interest on any existing debt, receive interest on any positive savings, and add all their income not spent on living costs or tuition fees to their cumulative savings. All dollar values are converted to real 2020 terms using the CPI, and we assume a real interest rate of 2.3%.[17]

The latest students in our sample achieved NCEA level 2 in 2007. We use savings data until 2019, so they are not affected by the impact of the Covid-19 pandemic. This gives us 12 years of savings after NCEA level 2. Although cumulative savings at this point are informative about total financial resources at this time and the ability of students to put a deposit on a house, this measure of labour market outcomes disadvantages students who pursued higher level qualifications. Such students tend to have lower cumulative savings because it took them longer to enter the labour market, but they may have higher annual earnings and thus greater potential for saving in the future. To capture this potential for greater future savings, we thus also consider as an outcome annual savings at the end of the 12-year period. Specifically, we use average annual savings over years 11 and 12 to smooth some of the year-to-year variation.[18,19]

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[16] Note less educated individuals are more likely to have more children and to have them at younger ages. Cultural differences also contribute to differences in fertility between Māori and other ethnicities.

[17] This is Treasury's long-term risk-free nominal discount rate of 4.3%, allowing for 2% annual inflation. https://www.treasury.govt.nz/information-and-services/state-sector-leadership/guidance/financial-reporting-policies-andguidance/discount-rates/discount-rates-and-cpi-assumptions-accounting-valuation-purposes

[18] Alternatively, cumulative and annual income could have been similarly constructed and analysed. The advantage to using savings instead of income is that it incorporates the full opportunity cost of education, which is relevant to education decisions.

[19] Consistently with our constructed potential savings measure, StatsNZ (2022) reports that individual net worth typically increases with age until retirement. Young people (15-24) have a median real (2020) net worth of $3000, while people in the 65-74 age group have a median net worth of $417,000. Europeans aged 15 and over have a median individual net worth of $145,000, while Māori have a median net worth of $40,000 (adjusting age profiles to match that of the full New Zealand population and not including collective assets such as Māori land and trusts).

3.4.2 Top savers and top earners

In much of our analysis we focus on the pathways that make students more likely to be in the top 20% of Māori cumulative or annual savers among those of their gender in their specialty.[20,21] This is based on the idea that, while financial resources are beneficial to a point, additional income beyond that level is unrelated to wellbeing.[22,23] We assume those in the top 20% of savers have sufficient financial resources that higher income would provide minimal additional benefits. Furthermore, we hypothesise many successful individuals may deliberately reduce their work in order to pursue other objectives they consider more important (e.g., greater community involvement or spending more time with their families (Balderson et al., 2020)).[24] Thus the highest earners in each specialty are not necessarily those who should be considered most successful in the labour market.

3.4.3 House deposit

We also categorise students in each year by whether their cumulative savings are high enough for them to put a deposit on a house. The key motivation for summarising the financial outcome in this way is that home ownership in Aotearoa is often perceived as a marker of labour market success. To own a home means an individual both worked and saved hard enough to invest their money in property. It is an objective many strive for as part of the traditional sequence of 'get married, buy a house, have children'. From a practical standpoint, homeowners have more freedom to personalise their dwellings to their tastes and needs, are freed from the risk of eviction (though can still fall into trouble if they get behind in their mortgage payments), and escape the unequal power of the landlord-tenant relationship. Additionally, the considerable disparity between Māori and Pākehā rates of homeownership adds interest to this metric.[25]

Our results on ability to put a deposit on a house are sensitive to the assumptions we make and should be treated with caution. To illustrate the degree of sensitivity, we calculate ability to put a deposit on a house under two scenarios: an easy scenario and a tough scenario, while noting neither set of assumptions is likely to be 'true' in any absolute sense. In the easy

[20] In line with the rest of our analysis, we look at within-Māori differences and investigate the pathways associated with being in the top 20% of Māori savers, not the top 20% of all savers in Aotearoa. The earnings trajectories of different ethnicities are likely to be affected by varying opportunities, cultural norms and priorities.

[21] We do this for the full set of 15 specialties, including 'Top 10%'. In analysing the Top 10% specialty, we are thus looking within students who were in the top 10% academically, and comparing those in the top 20% of savers with those outside the top 20% of savers.

[22] It also enables us to conduct some analysis that would not be possible if we were to treat savings as a continuous measure.

[23] Kahneman and Deaton (2010) find that emotional well-being rises with higher income, however, there is no additional progress beyond an annual income of around $75,000 USD.

[24] This is premised on the idea of a 'backward bending' labour supply curve, which formalises the idea that when people's hourly income increases beyond a point they prefer to work fewer hours each week and spend more time engaged in other activities.

[25] The 2013 New Zealand census showed 56.8% of Pākehā owned their home, compared with 28.2% of Māori.

scenario, we assume first-time homeowners purchase a house worth 60% of the median house price in the corresponding year.[26] To calculate cumulative savings in this scenario, we use our main set of assumptions described above, including that the cost of living for one individual is 30% of the cost for a household of two adults and two children. We also assume an individual purchases their first home with a partner or friend, and so needs half the deposit themselves. We assume the full house deposit required is 10% of the house price, or 5% per individual. We do not impose a requirement that income is high enough to service a mortgage. The tough scenario differs in that here first-time homeowners purchase a house worth 80% of the median house price, and the cost of living for one individual is assumed to be 40% of the cost for a household.

3.4.4 Self-employment

We identify Māori who are self-employed each year using the methods described in Fabling and Mare (2015).[27] Workers are considered self-employed if they fall into one of four groups. The first of these are employees who have the same ID code recorded as employer and employee in the Inland Revenue data. The second and third groups are workers who declare positive profit from being a registered shareholder or registered partner respectively. Finally, the fourth group are those who report being sole proprietors. We investigate the proportion of students who are self-employed each year, and show how savings differ for those who are ever self-employed in the 12 years following NCEA level 2 (compared with those who are never self-employed).

3.4.5 Non-labour market outcomes

For the subsample of our population who responded to the 2018 Te Kupenga survey, we also analyse the effect of different pathways through education and employment into successful non-labour market outcomes. We analyse seven non-labour market outcomes: fluency in te reo Māori, life satisfaction, physical and mental health, freedom from loneliness, control over one's own life, and sufficiency of income. Each of these can be assessed using a question from the 2018 Te Kupenga survey, linked to the 2018 New Zealand Census.

Te reo Māori proficiency is measured using the question, "How well are you able to speak Māori in day-to-day conversations?" Respondents can answer this in one of five ways: 1 – very well; 2 – well; 3 – fairly well; 4 – not very well; or 5 – no more than a few words or phrases.

[26] Data from REINZ, 2022. The house prices we use change over time. For example, in 2000, the median real (2020) house price was $259,000, and by 2019 it had risen to $598,000.

[27] Note this construction results in a slightly different set of self-employed individuals to the procedure used by Statistics New Zealand.

Life satisfaction is measured using the question, "How do you feel about your life as a whole?" Respondents answer on an 11-point scale from 0 to 10, with 0 being "completely dissatisfied" and 10 being "completely satisfied".

Physical health is assessed using the question, "In general, would you say your health is excellent, very good, good, fair, or poor?" Answers are on a 5-point scale from "poor health" to "excellent health".

Self-assessed mental health is evaluated based on responses to the WHO5 questions.[28] The WHO5 questions ask respondents to state how often they have felt the emotions expressed in each statement in the last two weeks. Frequencies are categorised into six groups: all the time, most of the time, more than half of the time, less than half of the time, some of the time, and at no time. We allocate the six groups values of 1 to 6, with higher values denoting more of the time, and sum values over the five questions. The WHO5 statements are:

- I have felt cheerful and in good spirits
- I have felt calm and relaxed
- I have felt active and vigorous
- I woke up feeling fresh and rested
- My daily life has been filled with things that interest me.

Freedom from loneliness is measured using the question, "In the last 4 weeks, how much of the time would you say you have felt lonely?" Respondents can answer on a 5-point scale from "all of the time" to "none of the time".

We measure the amount of control people feel they have over their own lives using the question, "How much control do you feel you have over the way your life turns out?" Respondents can answer this question using an 11-point scale from "no control at all" to "complete control".

We measure sufficiency of income using the question, "Thinking about how well your total income meets your everyday needs, would you say you have 'not enough' money, 'only just enough' money, 'enough' money, or 'more than enough' money?" While income sufficiency is related to actual income, the two are distinct concepts because perceived income sufficiency also depends on demands on income (such as supporting dependents) and the material possessions a person considers necessary for everyday needs. Some people with low income in dollar terms may believe their modest means support a very good life and may choose not to try to pursue higher earnings.

[28] The WHO5 are a recognised method of collecting short-term mental health indicators from the World Health Organisation.

For simplicity of analysis and interpretability, responses to these questions are treated as cardinal, not just ordinal, and each variable is scaled to have a standard deviation of 1. More positive values indicate more desirable outcomes.

3.5 Pathway variables

We consider the pathways taken by students through school and tertiary education, as well as some aspects of their pathways outside education. The aspects we consider include:

- the decile and urban/rural location of the student's school (the school they attended in the year the gained NCEA level 2, or the last school attended previously if they were not at a school the year of NCEA level 2)
- whether they gained NCEA level 2 at school or from a tertiary institute (if they were enrolled in a school the year they gained NCEA level 2, we assume they gained it at school)
- whether they achieved a level 3 NCEA certificate within 1 or 5 years of gaining NCEA level 2, and whether they gained University Entrance within 1 year (very few students who had not gained UE within a year subsequently gained it)
- level of highest qualification gained within 10 years of NCEA level 2
- number of credits achieved in industry training at any level and at level 4 and above, and the highest level of any industry training qualification gained within 10 years of NCEA level 2
- the types of tertiary institute enrolled at within 10 years of NCEA level 2 and the urban/rural locations of the schools and tertiary institutes attended
- whether they attended a tertiary institute in a different region to their school
- the fields of study in which the student achieved at least 14 credits at level 2, and similarly at level 3
- the fields of study in which they passed at least 0.5 EFTS of courses at levels 2+, 4+, 7+, and 8+ within 10 years of NCEA level 2 (0.5 EFTS is equivalent to half a year of full-time study; the field classifications differ here due to data availability)[29]
- the fields in which students were awarded qualifications at each level within 10 years of NCEA level 2 (often these align with the fields where students passed EFTS, but high drop-out rates from tertiary study mean this is also frequently not the case)
- the periods in which the students had children, based on Department of Internal Affairs data on births (any children born overseas are not observed)

[29] Refer to Appendix 6 for the fields of study used to categorise students by EFTS and qualifications at tertiary level.

- time spent overseas based on border crossing data from the Ministry of Business, Innovation, and Employment (the strong assumptions required to impute overseas income mean the relationship between these variables and savings should not be over-interpreted)
- the sector, firm size, and industry of the firms where the student gained work experience in the first 5 years after NCEA level 2.

4 Approach

This section begins by explaining the approach we take to identifying good pathways through education for Māori students. It then describes the analysis of labour market outcomes by students' specialty, and finally outlines the pooled analysis of non-labour market outcomes.

4.1 Comparison groups

Our main goal in this report is to investigate the pathways through education that lead to strong labour market outcomes for Māori students. To do this, we choose to compare within Māori rather than comparing Māori students with students of other ethnicities, compare within groups of students who show similar interests and aptitudes in high school, and compare within gender. This section explains each of these choices.

Prior research has shown Māori on average have weaker labour market outcomes than non-Māori in New Zealand.[30] The reasons for this include the ongoing negative impacts of colonisation, discrimination and differential encouragement in the education system, employment, and other spheres of life, different opportunities in the geographical areas where they live, values that tend to be more community-oriented as opposed to individual-oriented, and various other reasons.[31] Such factors can affect Māori labour market outcomes both directly and through causing low educational attainment.

The magnitudes of the impacts of these mechanisms and the actions required to mitigate their negative effects on Māori labour market outcomes are the focus of considerable ongoing research and policy action. Here we largely bypass these questions and ask instead the pathways that currently appear beneficial to Māori, taking as given the values they hold and the external environment they face. Focussing solely on Māori allows us also to examine the relationship between educational pathways and non-labour market outcomes that are likely to be valued different by Māori and non-Māori, such as proficiency in te reo Māori.

[30] See, for example, Mare (1995), Mahoney (2014), and Theodore et al. (2017).
[31] See, for example, Li (2018), Sin and Stillman (2013), Theodore et al. (2017), Walker (1990), Vaithianathan (1995).

We compare the outcomes of students with similar interests and aptitudes in high school because it is likely that different pathways through education benefit students with different tendencies. While we don't have explicit information on the subjects students enjoy at NCEA level 2, we believe it is fair to assume students tend to focus on subjects they're good at or enjoy once they have this freedom near the end of high school. We can proxy students' aptitude in subjects by the number of NCEA credits they achieve in them and the endorsements of those credits.

Part of the goal of this research is to be able to recommend educational pathways to different students. We believe it would be counterproductive to recommend pathways to students that they won't be able to follow (or will have excessive difficulty following) because they don't enjoy the required subjects or they find them particularly difficult. This would likely result in many students dropping out without learning much and without completing their intended qualifications, possibly accruing debt without improving their earning potential. Students who enjoy their courses of study are more likely to stick at them, excel in them, and turn them into satisfying and financially rewarding careers. The large existing income gap between Māori and Europeans in Aotearoa, and the high proportion of Māori who are unable to achieve a comfortable material standard of living, highlight the importance of helping students onto pathways that are likely to lead to financial security.

Another reason to compare students with similar aptitudes at school is that different abilities, such as a quick grasp of mathematics or skill with one's hands, are valued differently by the labour market. Students with more similar skills have more similar potential in the labour market, so the students within each specialty who perform best in the labour market can be thought of as fulfilling the (labour market) potential offered by their natural abilities. Students with similar aptitudes who performed less strongly in the labour market may have been able to perform better by following a different educational course.

When thinking of the subjects in which students achieve a lot of credits at level 2 as capturing their early interests and aptitudes, two caveats should be borne in mind. First, the subjects offered to students may vary by the size, decile, and location of the school. In particular, small, low decile schools may offer a reduced range of subjects, limiting students' abilities to specialise at level 2 in some fields. Second, the subjects students take at this level are also affected by the encouragement they receive from teachers, other professionals, their iwi, whānau, and friends.[32] Students may also study subjects they don't enjoy because they believe

[32] Concerningly, racial stereotypes held by the people giving the advice can lead them to advise Māori students to lower their expectations and avoid subjects seen as difficult or academic. This limits their future options and interferes with their ability to fulfil their potential.

they will be beneficial for their futures. Students' specialties should not therefore be thought of as entirely determined by their innate gifts and interests.

Finally, we analyse students and their outcomes separately by gender. This is not based on the assumption only one gender can or should follow particular educational or career paths. Rather, it acknowledges there is considerable occupational segregation based on gender in the labour market. Some of this could be because men and women have different preferences for fields of study or types of work, and enjoy and feel comfortable in different types of workplace. However, it is also driven by social norms and other societal influences, which tend to change slowly. From a practical standpoint, some specialties are dominated by one gender. Analysing the genders separately prevents us identifying pathways that are successful for the dominant gender in such specialties, and assuming they apply to men and women equally.

4.2 Specialty profiles for labour market outcomes

The results from our analysis of labour market outcomes for each specialty are detailed in separately published specialty profiles. This report summarises only the main findings from the analysis. The specialty profiles should be read in combination with this report to gain a full understanding of the background for the study and details of the data.

Each profile begins by characterising the students in that specialty, including the level of education they attain, the fields in which they study, and their savings. It then investigates how their savings vary by level and type of highest qualification, fields of higher study, and pathways outside education. Within each of these areas, it focuses on both cumulative and annual savings as described in the Data section, and for each of these focuses on the correlates of being a top saver (i.e., being in the top 20% within the gender and specialty).

The first type of analysis conducted in each area is bivariate analysis, which looks at one pathway characteristic at a time and asks which are associated with a high probability of being a top saver of either type. The associated tables show the proportion of non-top savers with each characteristic, the proportion of top savers with each characteristic, and the odds ratio, defined as the probability a student with the characteristic is a top saver divided by the probability a student without the characteristic is a top saver. Statistical tests of whether the odds ratio is different to 1 are also presented. An odds ratio above 1 indicates the characteristic is positively correlated with being a top saver, whereas an odds ratio below 1 indicates the characteristic is negatively correlated with being a top saver.

The results from these odds ratio tests should be interpreted with some caution. The relationships revealed here are not necessarily causal, and even to the extent they are, the

causality might not be direct. For instance, a student who achieves at least 14 credits of maths at level 3 might be more likely to be a top saver because students who voluntarily study maths at this level tend to be academically able and motivated and would do well regardless of what they studied (a selection effect, which is a non-causal mechanism), or because such students are also likely to achieve credits in engineering and this leads to strong job opportunities (omitted variable bias, which is another non-causal mechanism). Alternatively, they might be more likely to be a top saver because the skills gained through the maths credits directly made them more valuable to employers (a direct causal mechanism), or because the maths credits enabled them to pursue particular fields of study in higher education and this further study was beneficial in the labour market (an indirect causal mechanism). However, the odds ratio tests are still informative about the pathways that are disproportionately taken by students who go on to do well in the labour market, and are a good starting point for Māori students at level 2 who are planning for their future.

As well as this bivariate approach, we also run regressions of being a top saver on students' background characteristics and various combinations of characteristics of the pathways they take. Controlling for multiple characteristics of the students and their pathways simultaneously, including their overall academic achievement at level 2, reduces the potential for selection effects and omitted variable bias (described above). However, we do not attempt to control for every factor that could affect labour market outcomes. Thus the relationships between characteristics and being a top saver found here should still be considered suggestive of causality, rather than strictly causal.

4.3 Pooled analysis of non-labour market outcomes

A secondary goal of this report is to examine the pathways that lead to desirable non-labour market outcomes. This analysis uses data from the 2018 Te Kupenga survey, so covers only a fraction of our overall sample. To increase the sample size, we thus pool students in all specialties. However, because of the large differences between men and women, we still analyse the genders separately. Similarly to in the specialty profiles, we run regressions of each outcome on various characteristics of the students' pathways. The same caveats about causality apply.

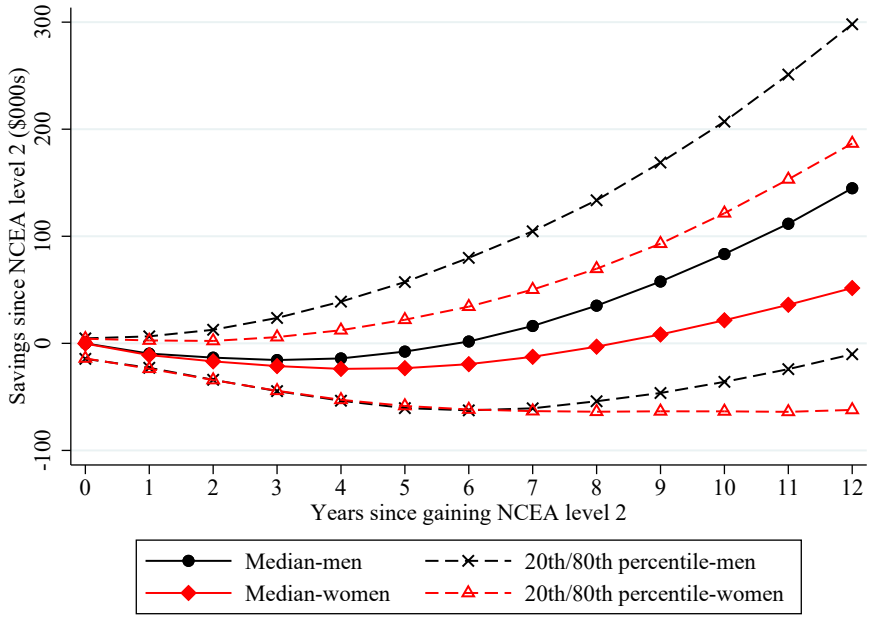
5 Results

5.1 Savings and self-employment of Māori students in the sample

This section pools all students in our sample and investigates how their cumulative and annual savings change in the years after they gain NCEA level 2. It also shows the proportion of the students who can afford a house deposit at each point in time.

Figures 1 and 2 show the cumulative and annual savings over time for men and women.[33] For both, annual savings become negative for several years after NCEA level 2, showing any earnings at this stage are insufficient to cover tertiary fees and our conservative estimate of living costs. This results in median cumulative savings that become negative and remain so until six years after NCEA level 2 for men (and nine years after for women), even though annual savings become positive in years four and five respectively. By 12 years, the median of men's cumulative savings has grown to nearly $150,000, compared with only $50,000 for women. At this time, men's annual savings are nearly $30,000 compared with $15,000 for women. This means men's cumulative savings will continue to increase their lead over women's in subsequent years. There is a similarly large gender gap in cumulative savings at the 80th percentile of the distribution and a smaller gap at the 20th percentile.

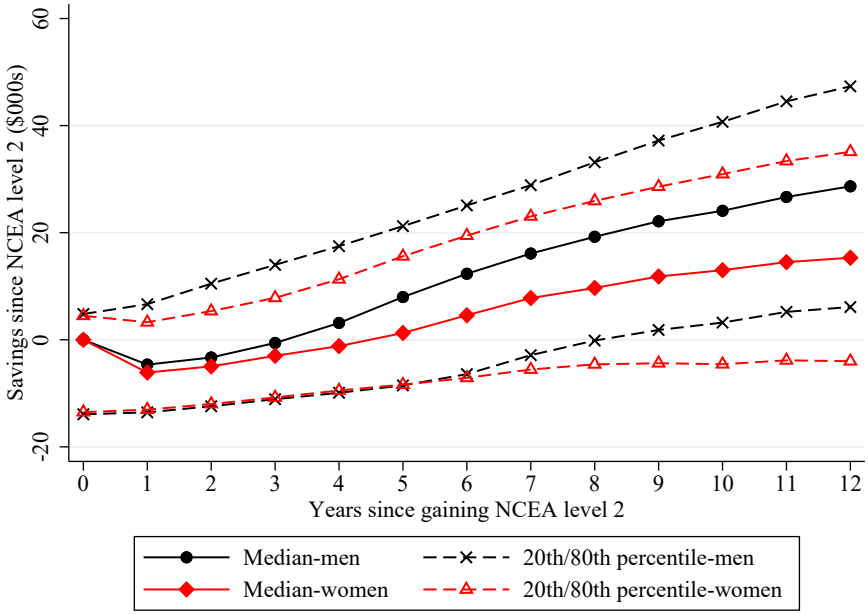
Figure 1: Cumulative savings over time by gender



Notes: This figure shows how the median, 20th percentile, and 80th percentile of cumulative savings since gaining NCEA level 2 change over time for men and women.

[33] Note, year 0 is the first year in which students can save. Because we deduct estimated minimal living costs when calculating savings, those with low incomes in this year show as having negative savings in year 0.

Figure 2: Annual savings over time by gender

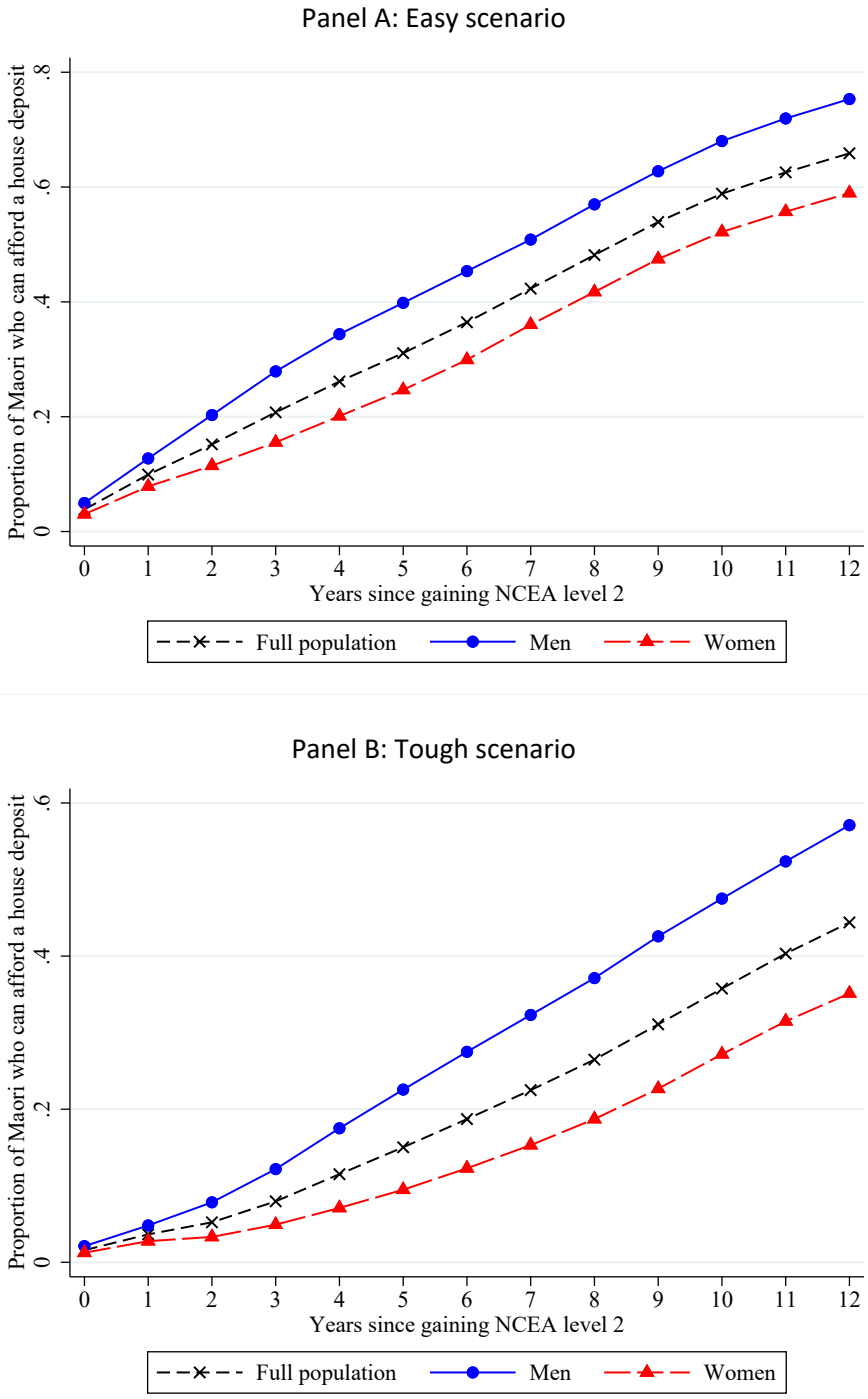


Notes: This figure shows how the median, 20th percentile, and 80th percentile of annual savings change over time for men and women.

Figure 3 shows the proportion of students who can afford a house deposit over time by gender. Panel A shows the easy scenario which assumes first-time homeowners purchase a house worth 60% of the median house price in the corresponding year, have a cost of living equivalent to 30% of the cost for a household of two adults and two children, and need to contribute 5% of the house price. The proportion of both men and women who can afford a house deposit increases steadily over time, though at each point more men than women can afford a deposit. Six years after NCEA level 2, we estimate around 30% of women and over 45% of men can afford a house deposit. By 12 years, this has increased to nearly 60% of women and over 75% of men. However, these values should be treated with caution because they are sensitive to the assumptions used and do not require the individuals to have high enough annual income to service a mortgage. Furthermore, they assume a very frugal lifestyle and do not account for certain costs, such as raising children.[34]

[34] The 2018 New Zealand Census reports 43.7% of individuals aged 25-29 live in an owner-occupied dwelling compared to 79.5% of 60-64 year olds.

Figure 3: Proportion of students who can afford a house deposit over time by gender



Notes: This figure shows the proportion of men, women, and total students who are estimated to be able to afford a house deposit each year under an easy scenario (Panel A) and a tough scenario (Panel B).

To give an idea of how our assumptions affect these results, Panel B presents results from the tough scenario. In this scenario, we assume first-time homeowners purchase a house worth 80% of the median house price in New Zealand in the corresponding year. We also assume their cost of living is 40% of the cost of living for a family of two adults and two children, and they contribute 5% of the house price to the house deposit. In this case, growth in the proportion of

individuals who can afford a house deposit is initially slow, but increases for both genders after a few years. Six years after NCEA level 2, we estimate somewhat under 15% of women and not quite 30% of men can afford a house deposit. After 12 years, these values have increased to around 35% of women and nearly 60% of men.

Note a number of factors that we do not consider also affect the ability of individuals to purchase houses. For instance, many deposits on first houses are at least partially funded by the parent or parents or the purchaser. Because parents of Māori students have on average lower earnings than parents of European students, this channel is less available to Māori students.

5.1.1 Self-employment of students in the sample

Self-employment is one means through which Māori may purse a comfortable income, and becoming one's own boss is viewed by some as a mark of success or having 'made it' in the labour force. Te Matapaeroa (2020) reported that in the 2020 tax year 23,364 Māori owned businesses (8.8% of total businesses with shareholder data),[35] 38,280 Māori were sole traders (14.7% of sole traders), and there were 10,143 significant employers of Māori (5.6% of businesses with employment data). While the number of Māori sole traders and significant employers of Māori declined from previous years, the number of Māori-owned businesses rose by 18.2% between 2010 and 2020.

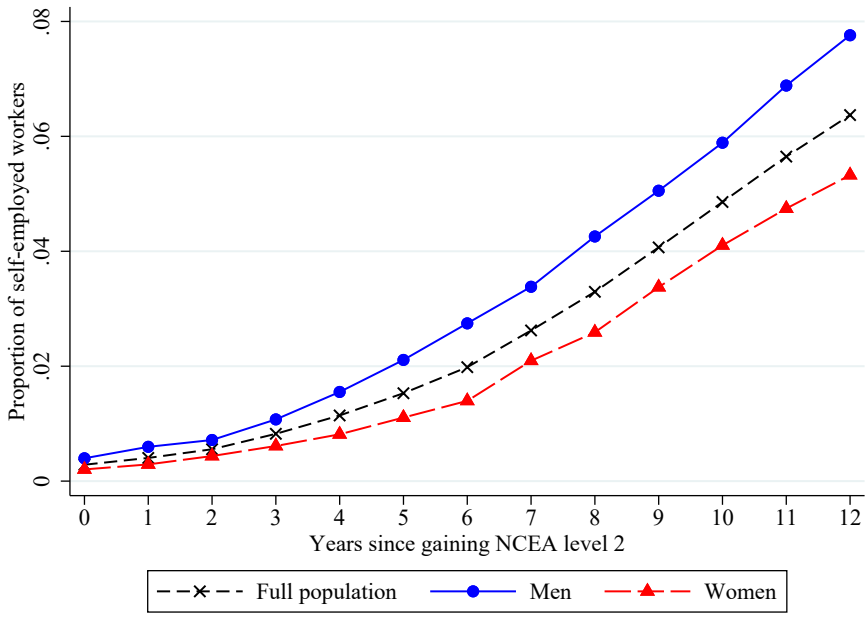
However, starting one's own business may involve sacrificing wage or salary income for a time while building the business, and even once it is established, income is likely to be more variable than is the income of employees. In some industries, self-employment may be an objective because it is the best way to increase earnings. In other industries it may be pursued by people with other goals, such as helping their community, being more in control of their work and life, or expressing their creativity. However, for some individuals, self-employment may be an undesirable last resort if they are unable to secure a suitable position as an employee.

In each specialty profile we examine both the proportion of students who are self-employed over time and how the savings of those who are ever self-employed differ from the savings of those who are never self-employed.[36] Here for our full population of Māori students, we show only the proportion who are self-employed.

[35] Over half of Māori-owned businesses are in four industries: i) construction, ii) agriculture, forestry and fishing, iii) professional, scientific and technical services, and iv) rental, hiring and real estate services.

[36] Note we compare the savings each year of those *ever* self-employed with those never self-employed, rather than comparing the savings each year of those *currently* self-employed with those currently not self-employed. This is to avoid confounding composition effects with the earning effects of self-employment. However, the analysis we conduct is not intended to be a comprehensive attempt to estimate the effect of self-employment on income or savings, which would be a much more complex undertaking.

Figure 4: Proportion of students self-employed over time by gender



Notes: This figure shows the proportion of men, women, and total students who are self-employed each year relative to the year in which they gained NCEA level 2.

Figure 4 shows the proportion of men, women, and students overall who are self-employed each year. Students who are self-employed may also be employees in the same year. Overall the proportion self-employed is relatively low, though higher for men than for women. The proportion of men who are self-employed doesn't exceed 2% until five years after NCEA level 2. By 12 years after level 2, nearly 8% of men are self-employed. By this same date, barely over 5% of women are self-employed.

5.2 Characteristics of students in each specialty

This section summarises the characteristics of students who specialised in each subject area at level 2, focussing on our population of students who gained a level 2 NCEA certificate between 2004 and 2007. Tables 1 and 2 present this information for the 13 subject specialties, Generalist, and Top 10% students. The specialties vary in size, the largest being Humanities, with 3,762 students, followed by the Service Sector, with 2,502 students. The smallest subject specialty is Education, with 252 students, followed by Manufacturing, Planning, and Construction, with 381 students.

Table 1: Characteristics of students in each specialty

Specialty	Number of students	Female	Average age at NCEA level 2	Ethnicities (total response)				
				European	Pasifika	Asian	MELAA	Other ethnicity
All students	**17,847**	**57.8%**	**17.5**	**71.4%**	**8.2%**	**1.9%**	**1.1%**	**0.9%**
Māori	1,242	60.4%	17.3	29.7%	8.7%	1.0%	1.0%	S
Humanities	3,762	55.0%	17.5	71.0%	8.9%	2.0%	1.5%	0.8%
Social Sciences	1,617	63.6%	17.5	83.1%	9.1%	2.4%	0.9%	0.7%
Sciences	2,301	54.1%	17.4	81.6%	7.0%	2.3%	1.0%	1.3%
Arts & Crafts	1,944	69.1%	17.6	78.1%	9.9%	2.3%	1.2%	1.2%
Computing & IT	1,809	57.4%	17.5	70.0%	7.8%	1.8%	1.0%	1.2%
Business	969	67.2%	17.4	74.6%	8.4%	1.9%	1.2%	0.6%
Agriculture, Forestry & Fisheries	426	19.7%	17.5	66.2%	4.2%	2.1%	S	S
Community & Social Services	624	45.7%	17.6	71.2%	6.7%	S	1.0%	S
Education	252	97.6%	17.6	73.8%	7.1%	2.4%	S	S
Service Sector	2,502	76.3%	17.6	69.5%	8.8%	1.8%	1.1%	0.7%
Engineering & Technology	1,212	23.0%	17.5	76.0%	6.7%	1.7%	1.0%	1.2%
Manufacturing, Planning & Construction	381	10.2%	17.5	68.5%	9.4%	S	1.6%	S
Generalist	195	49.2%	17.8	70.8%	7.7%	S	S	S
Top 10%	1,749	64.7%	17.4	81.8%	6.2%	1.9%	0.9%	1.4%

Notes: This table describes the students with each specialty at NCEA level 2. "S" denotes very uncommon values that were suppressed according to Statistics New Zealand's confidentiality rules.

The specialties also vary greatly in the gender mix of students they attract. The most male-dominated specialty is Manufacturing, Planning, and Construction, which is just 10.2% women, followed by Agriculture, Forestry, and Fisheries, which is 19.7% women. The most female-dominated specialty is Education, which is 97.6% women, followed by the Service Sector, at 76.2% women. Overall, 57.8% of the students included are women, potentially because Māori women are more likely than Māori men to achieve NCEA level 2. Among the Top 10% students, this gender imbalance is greater, with 64.7% being women.

Age of NCEA level 2 attainment varies little between specialty. The youngest median age is 17.3 years, for students who specialised in Māori, and the oldest is 17.8, for Generalists. All students included in this study report Māori as an ethnicity, but Table 1 shows the percentage of each specialty who also report other ethnicities. Students who specialise in Māori are least likely to also be European, at 29.7%, and students who specialise in Social Sciences are most likely to also be European, at 83.1%. The specialty Māori is an outlier here: no other specialties are less than 66% European. Overall, 8.2% of students are also Pasifika, and this ranges from a low of 4.2% in Agriculture, Forestry, and Fisheries to a high of 9.9% in Arts and Crafts. The percentages of students who report also being Asian, MELAA, or other ethnicities are low for all specialties.

The first three columns of Table 2 show the distribution across school deciles of students in each specialty. Those who specialised in Māori are again outliers, being most over-represented at decile 1 to 3 schools and most under-represented at decile 8 to 10 schools. Top 10% students are skewed in the other direction, being disproportionately drawn from high-decile schools. Students who specialised in Social Sciences are also fairly disproportionately drawn from high-decile schools.

All students included in this study successfully gained a level 2 NCEA certificate, but some did this while in tertiary study after leaving school. Overall, about one in five students gained NCEA level 2 at a tertiary institution.[37] This was most common among Generalists (50.0%), students who specialised in Agriculture, Forestry, and Fisheries (34.3%), and students who specialised in Manufacturing, Planning, and Construction (33.1%). It was least common among Top 10% students (7.1%) and those who specialised in Social Sciences (11.7%).

[37] Students who gained an NCEA level 2 certificate while enrolled at school may have simultaneously been taking some courses through a tertiary institution, but we categorise these students as gaining level 2 at school.

Table 2: Characteristics of students in each specialty continued

Specialty	School decile			Gained NCEA level 2 at a tertiary institution	Attended school outside main urban areas	Percent with multiple specialties	Median percentile score at NCEA level 2	Median cumulative savings after 12 years		Median annual savings after 12 years	
	Deciles 1-3	Deciles 4-7	Deciles 8-10					Main scenario	Tough scenario	Main scenario	Tough scenario
All students	**27.8%**	**45.8%**	**26.4%**	**20.9%**	**30.4%**	**22.4%**	**0.412**	**$86,019**	**-$1,867**	**$21,400**	**$14,718**
Māori	58.3%	29.5%	12.2%	18.9%	38.2%	12.5%	0.423	$25,374	-$59,920	$14,432	$7,757
Humanities	23.6%	47.5%	28.9%	18.3%	27.2%	22.2%	0.419	$100,497	$12,221	$23,976	$17,293
Social Sciences	16.7%	49.4%	33.8%	11.7%	20.1%	29.3%	0.453	$82,969	-$3,450	$24,729	$18,017
Sciences	19.7%	50.5%	29.7%	12.5%	29.8%	32.0%	0.473	$88,827	-$425	$24,502	$17,849
Arts & Crafts	25.0%	47.5%	27.5%	18.6%	23.7%	19.4%	0.421	$58,140	-$30,026	$18,060	$11,422
Computing & IT	38.5%	43.0%	18.5%	20.5%	42.9%	39.9%	0.371	$91,642	$2,539	$19,967	$13,274
Business	26.2%	49.8%	23.9%	14.8%	32.5%	58.7%	0.441	$98,457	$9,707	$22,748	$16,120
Agriculture, Forestry & Fisheries	32.8%	53.0%	14.2%	34.3%	63.8%	24.5%	0.319	$165,232	$78,134	$24,749	$18,037
Community & Social Services	28.3%	44.9%	26.8%	21.0%	41.6%	48.6%	0.384	$120,494	$32,206	$24,199	$17,487
Education	18.3%	58.5%	23.2%	26.8%	21.0%	56.0%	0.399	$48,196	-$40,339	$10,534	$3,912
Service Sector	31.0%	47.6%	21.5%	30.0%	30.9%	29.1%	0.350	$66,035	-$23,463	$16,293	$9,644
Engineering & Technology	28.6%	45.6%	25.8%	28.9%	32.5%	36.7%	0.390	$178,478	$89,501	$28,759	$22,050
Manufacturing, Planning, Constrn	39.8%	40.7%	19.5%	33.1%	46.0%	44.1%	0.344	$171,723	$86,895	$26,348	$19,636
Generalist	28.3%	46.7%	25.0%	50.0%	28.8%	0.0%	0.305	$74,823	-$14,425	$15,997	$9,285
Top 10%	18.0%	40.2%	41.8%	7.1%	23.5%	78.6%	0.676	$107,238	$19,374	$30,722	$24,081

Notes: This table describes the students with each specialty at NCEA level 2. Percentile score is a summary measure of students' grades at level 2 that accounts for the difficulty of the subjects they studied. Construction of the savings variables is described in the Data section.

More than two thirds of students overall attended school in a main urban area. This was least common among students who specialised in Agriculture, Forestry, and Fisheries, 63.8% of whom attended high school outside main urban areas, and most common among students who specialised in Social Sciences, only 20.1% of whom attended high school outside main urban areas.

As described in the Data section, all students are allocated to one or more specialties in which they gained relatively many credits and strong grades at level 2. Being allocated to multiple specialties means a student shows strong performance in multiple fields; this tends to be associated with high overall academic performance. This relationship is evident by the fact 78.6% of Top 10% students have multiple specialties. (Note Top 10% students are analysed as part of the Top 10% specialty only; students outside the top 10% of students are analysed as part of all the specialties to which they are allocated.) After Top 10% students, those who specialised in Business are most likely to have multiple specialties (58.7%), followed by those who specialised in Education (56.0%). At the other end of the spectrum, only 12.5% of students who specialised in Māori have multiple specialties, and 19.4% of students who specialised in Arts and Crafts. Generalists by definition have only one specialty.

By construction, Top 10% students have the highest median percentile score.[38] The specialty with the next highest median percentile score is Sciences, followed by Social Sciences. The specialty with the lowest score is Generalist, followed by Agriculture, Forestry, and Fisheries.

A recurring theme in these comparisons between students in different specialties is that students who specialised in Māori are outliers across a number of dimensions. This is most evident in the low proportion who report they are European as well as Māori and the high proportion who attend low decile schools. Some experts believe many Māori take Māori subjects at school as a safe choice because they don't have defined career aspirations. Te reo Māori courses may be easy for them if they are already te reo Māori speakers, and Māori-focussed courses in general may be comfortable because they allow them to stay with their peers and potentially study in a situation where they are not an ethnic minority. Other experts contest these students take Māori subjects because they are important to them personally. Both may be correct.

Although culturally invaluable, te reo Māori proficiency tends to be particularly valued in the labour market when it is combined with other skills. It is a significant aid in career

[38] Percentile score is a summary of academic achievement at a given level that accounts for the difficulty of the subjects taken. The percentile score used in this study is the score for level 2 credits at the end of the year in which the student gained NCEA level 2. Top 10% students are defined as the 10% of students with the highest percentile scores at this point.

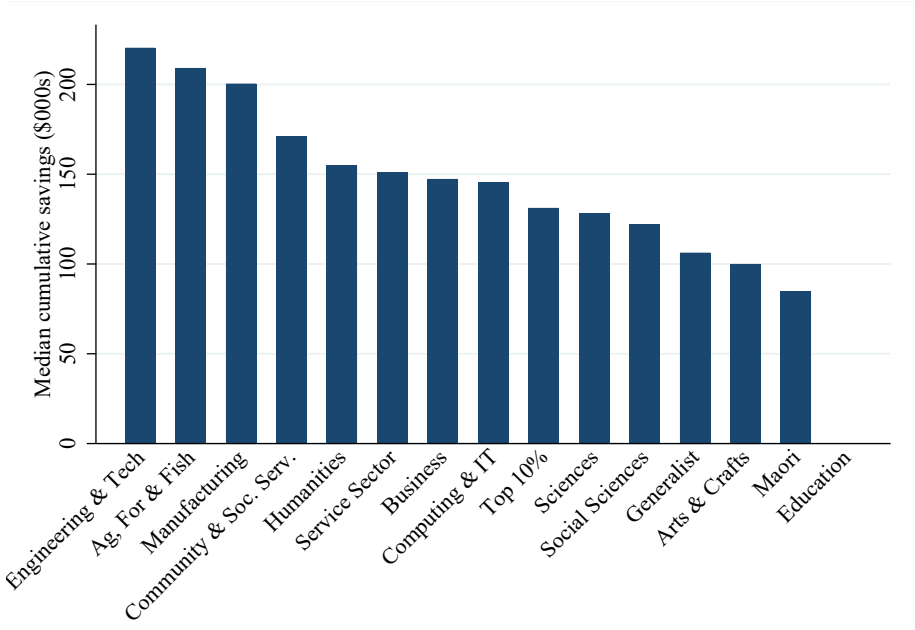
progression in sectors such as governance (including public policy), education, criminal justice, health, and social services (University of Canterbury, 2022).

The final four columns of Table 2 show median potential cumulative savings and median potential annual savings 12 years after NCEA level 2, calculated using two alternative sets of assumptions, described in the Data section. Because of the sensitivity of level of savings to the assumptions used, the values should not be taken too seriously. However, differences between individuals (which drive the differences between specialties) are relatively insensitive to the strongest of the assumptions required, so can be considered more informative. In both savings scenarios, the specialty with highest median cumulative savings is Engineering and Technology, followed by Manufacturing, Planning, and Construction. Notably, these are both male-dominated specialties. The specialty with lowest cumulative savings is Māori, followed by the female-dominated Education. In both savings scenarios, the specialty with highest median annual savings is the Top 10%, followed by Engineering and Technology. The two specialties with the lowest annual savings are Education and Māori. The biggest drivers of differences in these potential savings between specialties are when the person begins working full-time, and how much they earn while working. The cost of study in comparison plays only a minor role.

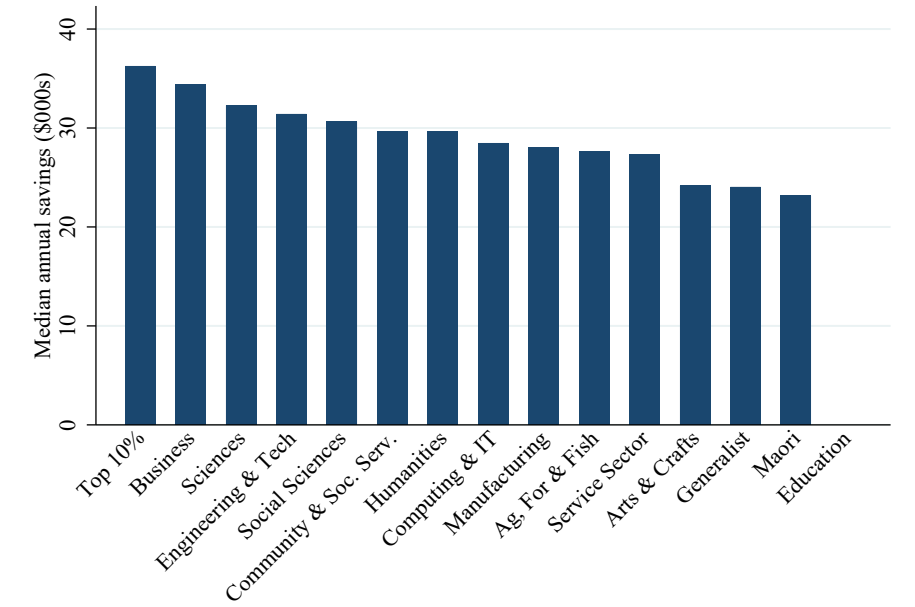
Figures 5 and 6 show how median cumulative and annual savings 12 years after NCEA level 2 vary by specialty separately for men and women. Figure 5 shows the most academically able male students (Top 10% specialty) have the highest annual savings 12 years after NCEA level 2, but below-median cumulative savings, likely due to the opportunity cost of pursuing a high level of education. Men who specialised in Engineering and Technology have the highest cumulative savings and fourth highest annual savings. Cumulative savings are also high for men who specialised in Agriculture, Forestry, and Fisheries or Manufacturing, but men in both these specialties have below-median annual savings. In contrast, men who specialised in Business have the second-highest annual savings, but mid-range cumulative savings, and men who specialised in Sciences have the third highest annual savings but below-median cumulative savings. This is again likely due to the opportunity cost associated with higher education. Men who specialised in Māori have the lowest cumulative and annual savings. Men who specialised in Arts and Crafts or were Generalists also have comparatively low cumulative and annual savings.

Figure 5: Men's savings after 12 years ranked by specialty

Panel A: Cumulative savings



Panel B: Annual savings



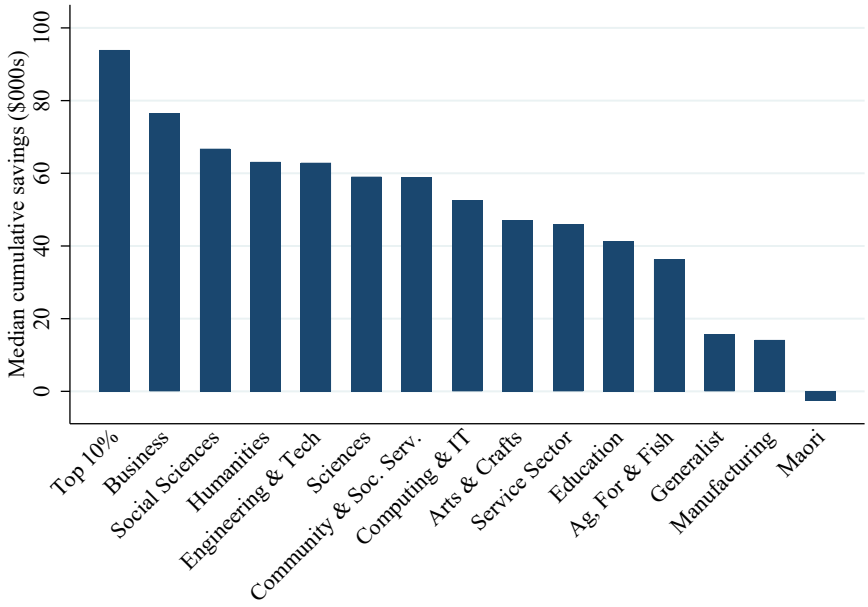
Notes: This figure shows the median cumulative (Panel A) and annual (Panel B) savings of men in each specialty 12 years after NCEA level 2. Data for Education are suppressed for confidentiality reasons.

Figure 6 show the most academically able women have both the highest median cumulative savings and the highest median annual savings after 12 years. Women who specialised at level 2 in Business, Social Sciences, or Humanities also have comparatively high cumulative and annual savings. At the other end of the spectrum, women who specialised in

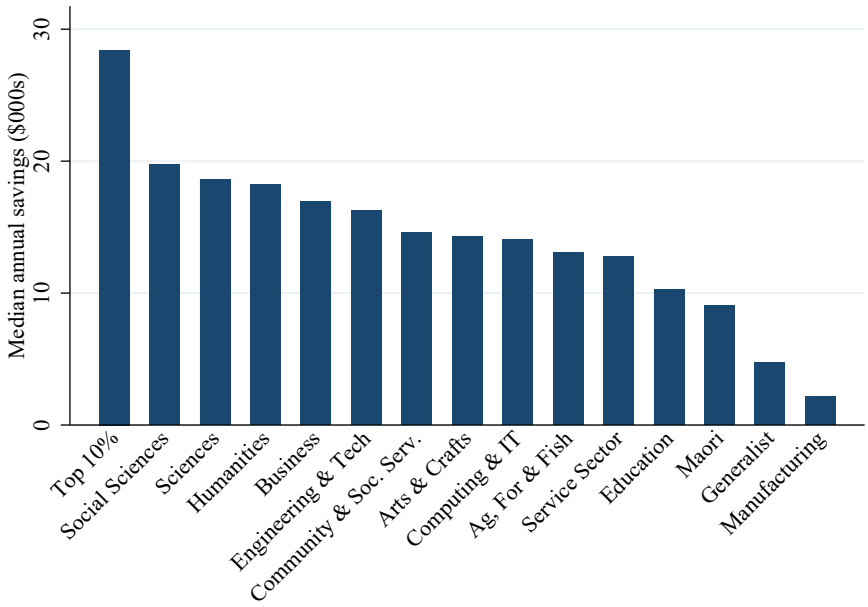
Māori or Manufacturing or who were Generalists tend to have comparatively low cumulative and annual savings.

Figure 6: Women's savings after 12 years ranked by specialty

Panel A: Cumulative savings



Panel B: Annual savings



Notes: This figure shows the median cumulative (Panel A) and annual (Panel B) savings of women in each specialty 12 years after NCEA level 2.

These figures show there is somewhat of a tendency for men for the specialties associated with high *cumulative* savings to be associated with low *annual* savings, whereas for women the

specialties associated with high *cumulative* savings tend also to be associated with high *annual* savings. One possibility is that for men specialties largely differ in the length of education students undertake. Specialties associated with long formal education have a high opportunity cost in terms of foregone earnings but tend to offer men higher earnings in the long term. These specialties are thus associated with low cumulative but high annual savings. In contrast, specialties in which men tend to leave education early allow men to start saving sooner but offer lower annual earnings and savings in the long run.

For women, the main difference between specialties may be different. In particular, it seems some specialties are associated with higher education and stronger engagement with the labour market, which leads to both higher cumulative and higher annual savings. Other specialties are associated with less education, lower employability, and more disengagement from the labour market. This results in low cumulative and annual savings. Thus, unlike for men, specialties for women with comparatively high cumulative savings tend to have comparatively high *annual* savings as well.

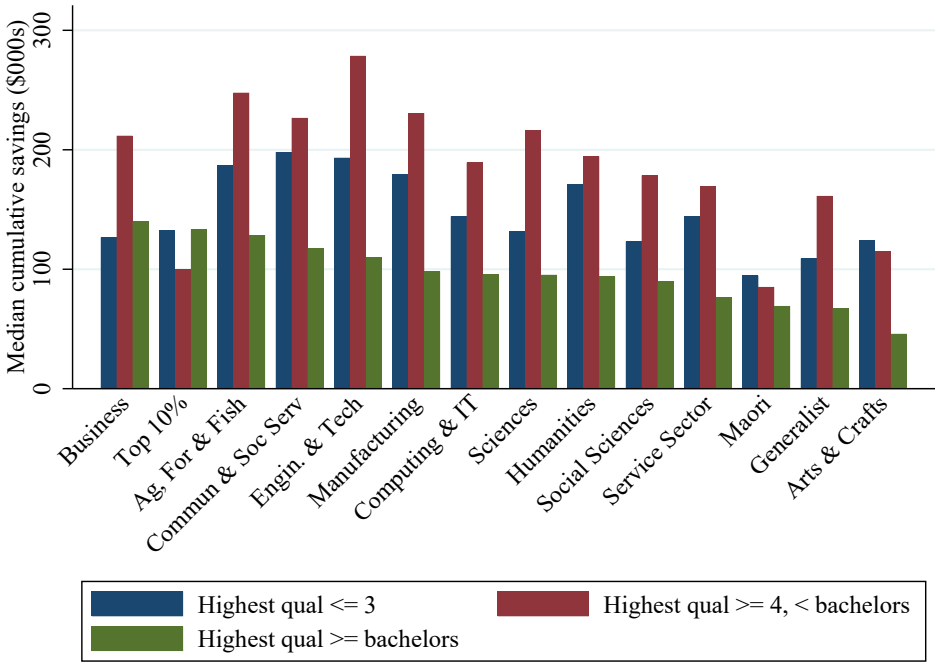
5.3 Comparisons of labour market outcomes by specialty and education level

This section compares outcomes across specialties, showing how cumulative and annual savings after 12 years differ for each gender by specialty and level of highest education. The findings on pathways that lead students in each specialty to strong labour market outcomes are briefly summarised in Appendix 7 and detailed in the separate specialty profiles. Common patterns across specialties and broader conclusions are discussed in Section 6. Due to data limitations and the disruptive impact of the Covid-19 pandemic, we examine students' outcomes for only 12 years after level 2. If we were able to observe students' savings over their whole lifetime, the pathways associated with labour market success may have differed somewhat. Throughout this report and in the separate specialty profiles, we refer to results that are significant at the 5% level as 'significant', and those significant at the 10% level as 'weakly significant' or 'borderline significant'. In general, we discuss only significant results, though we also comment on non-significant results when they contribute substantially to our overall understanding.

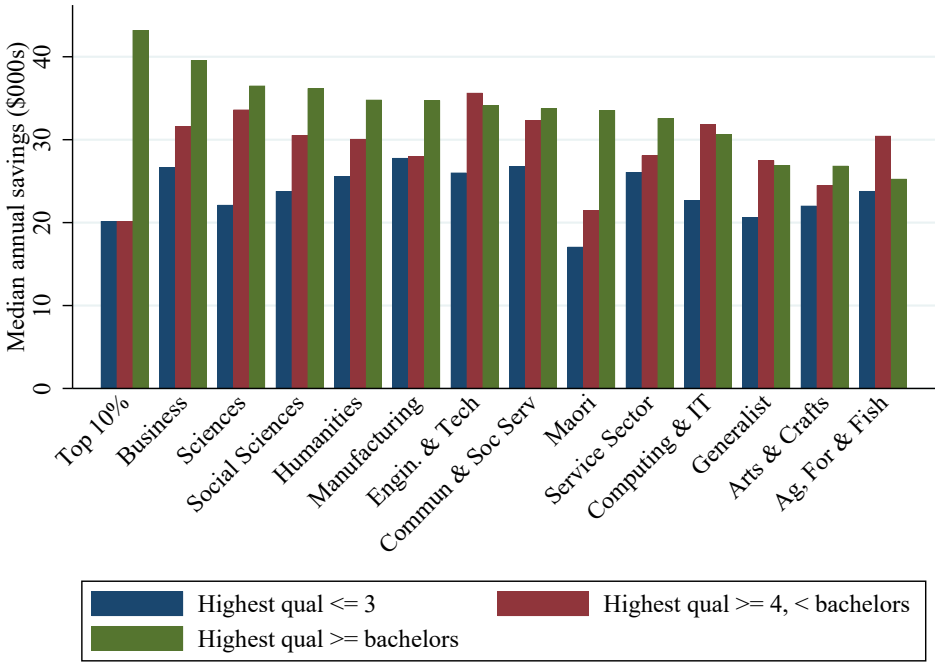
Figure 7 shows for men how median savings 12 years after NCEA level 2 vary by specialty and level of highest education. The figure does not control for any student characteristics, so differences in savings by education for students in each specialty reflect both the effects of the level of education and the types of students who choose to gain that education.

Figure 7: Men's savings by specialty and level of education

Panel A: Cumulative savings



Panel B: Annual savings



Notes: This figure shows the median cumulative (Panel A) and annual (Panel B) savings of men in each specialty with each highest level of education 12 years after NCEA level 2. Specialties are ordered by the savings of those with bachelor's degrees. Note the specialty Education is omitted for confidentiality reasons.

The figure shows in most specialties men with at least level 4 qualifications but without bachelor's degrees (those with 'intermediate level qualifications', many of which are vocational)

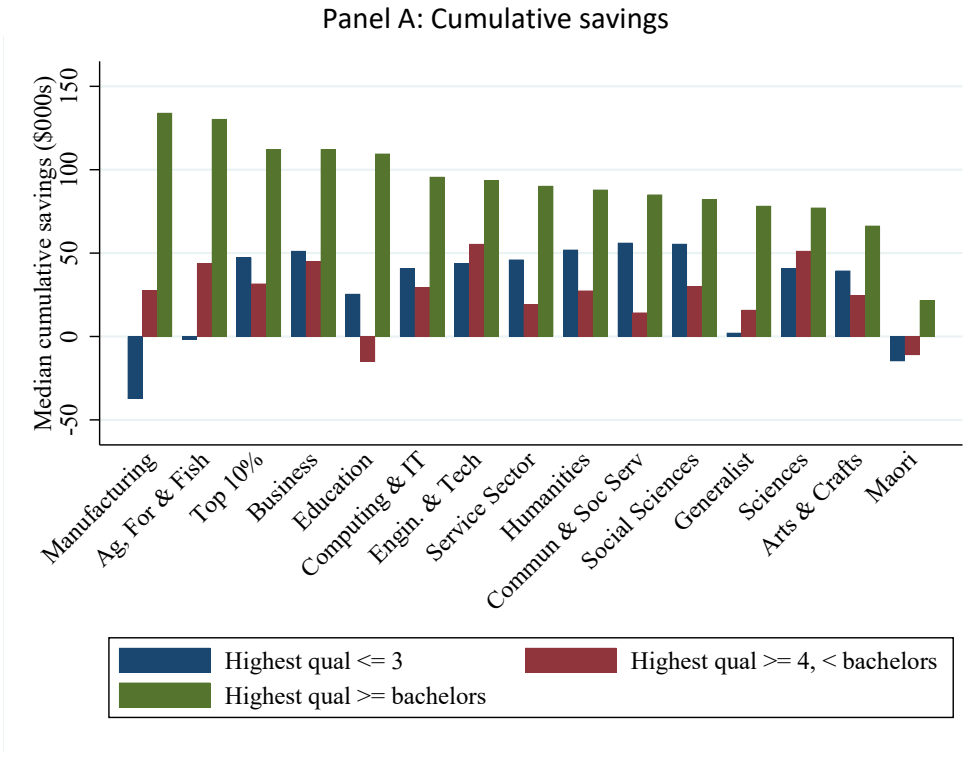
have higher cumulative savings than those with higher or lower qualifications. The exceptions to this rule are the Top 10% specialty (men with lower or higher qualifications have higher cumulative savings), Māori specialty (men with lower qualifications have higher cumulative savings), and Arts and Crafts specialty (men with lower qualifications have higher cumulative savings). However, in most specialties men with bachelor's degrees have the highest *annual* savings. This means that in subsequent years the cumulative savings of men with high level qualifications could surpass those of men with intermediate or low-level qualifications. The four exceptions to this rule are Engineering and Technology, Computing and IT, Generalists, and Agriculture, Forestry, and Fisheries. In each of these cases, men with intermediate level qualifications have the highest annual savings.

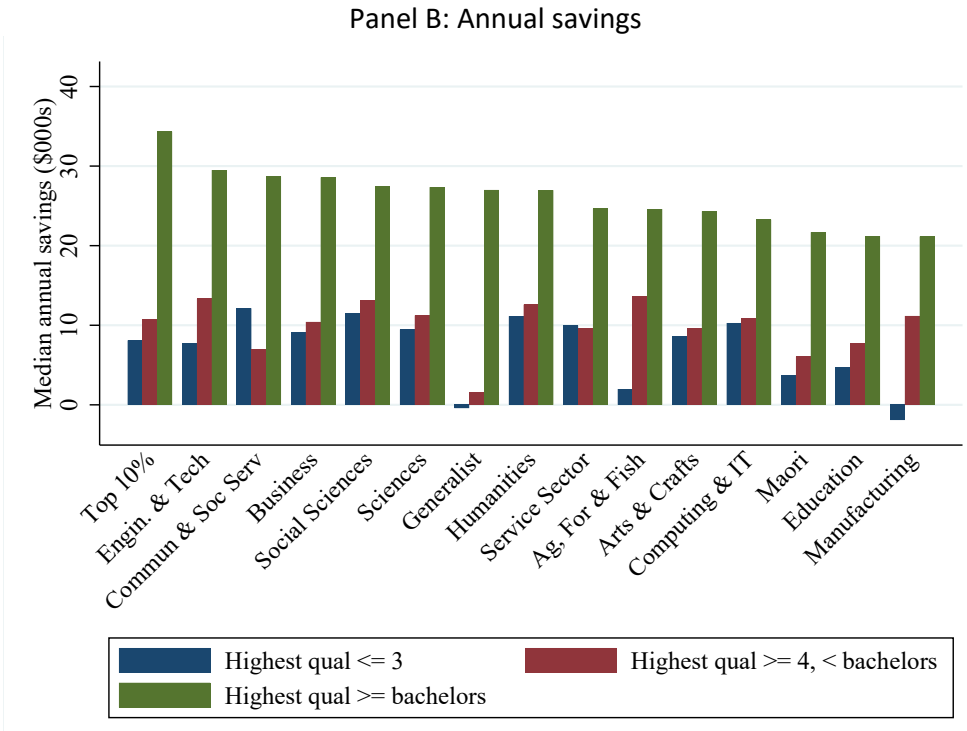
When comparing men with different specialties but the same level of highest qualification, we see a two- to three-fold variation in cumulative savings. Among men with degrees, those who specialised in Business have cumulative savings three times as high as those who specialised in Arts and Crafts. Among men with intermediate level qualifications, men who specialised in Engineering and Technology have cumulative savings three times as high as those who specialised in Māori. Among men with low level qualifications, men who specialised in Community and Social Services have cumulative savings twice as high as those who specialised in Māori.

Differences in the annual savings between men with the same level of qualifications but different specialties are less pronounced, but still sizeable. Among men with degrees, those in the Top 10% specialty have the highest annual savings and those who specialised in Agriculture, Forestry, and Fisheries have the lowest. Among men with intermediate qualifications, those who specialised in Engineering and Technology have the highest annual savings and those in the Top 10% specialty have the lowest. Among men with low level qualifications, those who specialised in Manufacturing, Planning and Construction have the highest annual savings and those who specialised in Māori have the lowest.

These comparisons between specialties suggest the optimal level of qualification for men may vary depending on the area in which they study, though such uncontrolled comparisons do not prove this.

Figure 8: Women's savings by specialty and level of education





Notes: This figure replicates Figure 7, but for women instead of men. It presents the median cumulative and annual savings of women in each specialty with each highest level of education 12 years after NCEA level 2.

Figure 8 shows the story for women is quite different. In every specialty, women with at least bachelor's degrees have the highest cumulative savings and the highest annual savings. Furthermore, in every specialty except Māori, women with bachelor's degrees have higher

cumulative savings than less qualified women in any other specialty. In every specialty including Māori, women with bachelor's degrees have higher *annual* savings than less qualified women in any other specialty.

When we compare the cumulative savings of women with bachelor's degrees across specialties, we see women who specialised in Manufacturing or Agriculture, Forestry, and Fisheries have the highest savings. However, these are both male-dominated specialties and the number of highly qualified women in each is small. Women with bachelor's degrees in the Top 10% specialty have the next highest cumulative savings and also the highest annual savings. The female bachelor's graduates with the lowest cumulative savings are those who specialised in Māori; they also have the third lowest annual savings of highly qualified women. The two specialties in which women with bachelor's degrees have the lowest annual savings are Education and Manufacturing.

Among women with intermediate level qualifications, those who specialised in Engineering and Technology have the highest cumulative savings and close to the highest annual savings, marginally behind the small number of women with intermediate level qualifications who specialised in Agriculture, Forestry, and Fisheries. Intermediate level qualifications are associated with the lowest, and in fact negative, cumulative savings for women who specialised in Education or Māori. These women also have some of the lowest annual savings, higher only than those of Generalists.

Recall these differences in outcomes between students with different level 2 specialties should not be interpreted as the causal effect of studying the specialty. Students with different specialties differ in many ways that could affect their labour market outcomes. In particular, the comparatively low savings of students, especially women, who specialised in Māori do not mean knowledge of te reo Māori and Māori culture are not valuable in the labour market. As shown previously, students in this specialty are disproportionately likely to attend low decile schools. Many may be disadvantaged in the labour market in various ways, such as living in areas with limited job opportunities and having low access to career information and inspiration. Additionally, the time period of the study may be too early for these students to have benefited from recent cultural shifts, which are thought to have increased labour market value of te reo ability.

5.4 Pathways to strong non-labour market outcomes

In this report, we focus primarily on labour market outcomes, partly for data availability reasons and partly because a certain level of financial resources tend to be required for an individual to

achieve desirable outcomes in other aspects of their life. However, many aspects of life other than financial resources are important. In this section, we pool students with all specialties and examine the pathways through education and life associated with various desirable outcomes measured in the 2018 Te Kupenga survey.[39] The dependent variables are described in detail in the Data section.

Tables 3A and 3B present regression results for men and women respectively where the dependent variables are Te Kupenga outcomes and the controls capture the students' backgrounds and levels of highest qualification. Although the regressions control for students' background characteristics, the coefficients should not be interpreted as causal relationships. For instance, if students who gain level 7 qualifications are found to have greater health, this could be because level 7 qualifications lead to pathways that are beneficial for health (a causal effect) or because the types of students who choose to gain this level of qualification would have better health regardless of their education (a selection effect). Partly due to the small sample size, many characteristics of students' educational pathways are not significantly correlated with their non-labour market outcomes. The following discussion of the results primarily focuses on the relationships that are statistically significant.

The tables show that for men background characteristics bear little correlation with non-labour market outcomes. The main exception is having more than one specialty, which is associated with 0.7 of a standard deviation lower te reo Māori skill and half a standard deviation higher health. Having multiple specialties is associated with higher health for women too, and also with higher income sufficiency. However, higher percentile scores for women, which capture academic attainment at NCEA level 2, are associated with greater te reo Māori proficiency but lower health. Higher school deciles are associated with lower te reo Māori proficiency for women.

Tables 3A and 3B provide little evidence that the level of highest qualification matters for non-labour market outcomes for either gender if the qualifications are not industry training qualifications. The exception is that women's health may be higher at higher qualification levels. However, industry training qualifications at level 3 and levels 5-6 appear positively associated with a range of outcomes for men, including life satisfaction, health, (absence of) loneliness, control over one's own life, and income sufficiency. For women, industry training qualifications are less associated with these outcomes.

[39] The Te Kupenga survey occurred 11 to 14 years after the students gained NCEA level 2.

Table 3A: Levels of qualification associated with strong non-labour market outcomes for men

Dependent variable:	Te reo skill	Life satisfaction	Health	Mental health	Freedom from loneliness	Control over own life	Income sufficiency
Age at NCEA level 2	-0.148	0.124	-0.256**	-0.201	0.120	0.143	0.039
	(0.174)	(0.150)	(0.119)	(0.145)	(0.141)	(0.149)	(0.123)
Percentile score (0-1)	1.898	0.846	0.398	0.243	1.277	1.123	0.943
	(1.176)	(1.086)	(1.068)	(1.034)	(0.979)	(1.049)	(0.894)
Multiple specialties	-0.709**	-0.002	0.548**	-0.298	0.068	-0.135	-0.304
	(0.280)	(0.291)	(0.259)	(0.326)	(0.263)	(0.299)	(0.267)
School decile	-0.082*	0.033	0.038	0.026	0.010	-0.074*	0.047
	(0.045)	(0.042)	(0.039)	(0.048)	(0.043)	(0.044)	(0.035)
School not in main urban area	0.255	0.244	-0.279	0.273	-0.050	0.091	-0.074
	(0.294)	(0.241)	(0.245)	(0.236)	(0.294)	(0.248)	(0.199)
Highest qualification gained within 10 years (omitted category: level 2):							
Level 3	0.331	-0.324	0.201	-0.217	0.013	-0.175	-0.043
	(0.304)	(0.266)	(0.264)	(0.278)	(0.289)	(0.277)	(0.267)
Level 4	0.749*	-0.552	-0.057	-0.215	-0.035	-0.278	-0.021
	(0.379)	(0.441)	(0.443)	(0.465)	(0.403)	(0.399)	(0.251)
Level 5 or 6	0.321	-0.690	-0.563	-0.442	-0.666	-0.017	-1.067**
	(0.728)	(0.441)	(0.478)	(0.417)	(0.801)	(0.424)	(0.432)
Level 7	0.237	-0.390	-0.031	0.012	0.005	0.007	0.073
	(0.306)	(0.277)	(0.255)	(0.344)	(0.302)	(0.270)	(0.296)
Level 8 to 10	-0.158	-0.145	-0.155	0.039	0.112	0.141	-0.334
	(0.391)	(0.420)	(0.322)	(0.425)	(0.301)	(0.454)	(0.354)
Highest industry training qualification gained within 10 years (omitted category: none):							
Level 2	0.250	-0.162	-0.506	0.384	0.268	0.281	-0.717*
	(0.540)	(0.351)	(0.362)	(0.452)	(0.288)	(0.383)	(0.361)
Level 3	-0.110	0.595*	-0.691	-0.013	0.611**	0.344	0.610**
	(0.424)	(0.334)	(0.492)	(0.334)	(0.250)	(0.312)	(0.289)
Level 4	-0.953***	0.485	-0.027	0.194	0.129	0.088	0.229
	(0.347)	(0.445)	(0.447)	(0.423)	(0.455)	(0.368)	(0.274)
Level 5 or 6	-0.992	1.466***	1.983***	0.734	1.537	1.154**	1.903***
	(0.746)	(0.464)	(0.594)	(0.467)	(0.957)	(0.446)	(0.492)
NCEA level 2 year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.236	0.138	0.240	0.120	0.181	0.140	0.286
Observations	105	105	105	105	105	105	105

Notes: This table presents the results of ordinary least squares regressions of non-labour market outcomes in 2018 for Māori men in all specialties. Dependent variables are given in the column headers. Higher dependent variable values denote more positive outcomes, and all variables are scaled to have standard deviations of 1. All regressions include dummies for missing school decile, missing percentile score, and missing school location. Standard errors are robust. Asterisks denote: * p<0.10, ** p<0.05, *** p<0.01.

Table 3B: Levels of qualification associated with strong non-labour market outcomes for women

Dependent variable:	Te reo skill	Life satisfaction	Health	Mental health	Freedom from loneliness	Control over own life	Income sufficiency
Age at NCEA level 2	-0.071	-0.021	0.059	0.036	-0.193*	-0.027	-0.033
	(0.091)	(0.122)	(0.113)	(0.107)	(0.107)	(0.108)	(0.117)
Percentile score (0-1)	2.285***	-0.381	-1.821***	-0.609	0.155	0.192	-0.168
	(0.768)	(0.742)	(0.607)	(0.579)	(0.604)	(0.878)	(0.700)
Multiple specialties	0.117	0.184	0.504***	0.254	-0.169	-0.180	0.416**
	(0.195)	(0.192)	(0.189)	(0.166)	(0.194)	(0.226)	(0.200)
School decile	-0.102***	-0.025	0.050	-0.005	0.021	-0.010	0.028
	(0.029)	(0.033)	(0.035)	(0.031)	(0.031)	(0.034)	(0.034)
School not in main urban area	0.136	-0.047	-0.241	-0.139	-0.122	-0.017	-0.165
	(0.160)	(0.189)	(0.171)	(0.177)	(0.199)	(0.184)	(0.180)
Highest qualification gained within 10 years (omitted category: level 2):							
Level 3	-0.212	-0.291	-0.135	-0.163	-0.049	0.149	-0.118
	(0.267)	(0.325)	(0.257)	(0.302)	(0.290)	(0.328)	(0.268)
Level 4	0.057	-0.114	0.213	0.234	-0.067	0.230	-0.087
	(0.268)	(0.288)	(0.325)	(0.279)	(0.248)	(0.301)	(0.319)
Level 5 or 6	-0.217	-0.218	0.449	0.116	-0.517	0.376	0.603
	(0.294)	(0.404)	(0.303)	(0.303)	(0.378)	(0.355)	(0.389)
Level 7	-0.170	0.205	0.486**	0.285	-0.115	0.501*	0.346
	(0.209)	(0.259)	(0.232)	(0.233)	(0.223)	(0.277)	(0.263)
Level 8 to 10	-0.176	-0.129	0.644*	-0.037	-0.211	-0.199	0.213
	(0.299)	(0.329)	(0.365)	(0.344)	(0.331)	(0.402)	(0.381)
Highest industry training qualification gained within 10 years (omitted category: none):							
Level 2	-0.275	-0.063	0.520	0.648	-0.814*	-0.682	-0.195
	(0.270)	(0.545)	(0.366)	(0.578)	(0.454)	(0.463)	(0.414)
Level 3	0.256	0.522	0.616**	0.021	-0.043	0.473	-0.398
	(0.343)	(0.348)	(0.294)	(0.380)	(0.372)	(0.320)	(0.281)
Level 4	-0.225	0.354	0.280	-0.056	0.504	-0.103	0.630
	(0.381)	(0.369)	(0.345)	(0.315)	(0.495)	(0.604)	(0.464)
Level 5 or 6	dropped	dropped	dropped	dropped	dropped	dropped	dropped
NCEA level 2 year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.197	0.078	0.187	0.075	0.077	0.106	0.166
Observations	183	183	183	183	183	183	183

Notes: This table presents the results of ordinary least squares regressions of non-labour market outcomes in 2018 for Māori women in all specialties. Dependent variables are given in the column headers. Higher dependent variable values denote more positive outcomes, and all variables are scaled to have standard deviations of 1. All regressions include dummies for missing school decile, missing percentile score, and missing school location. Standard errors are robust. Asterisks denote: * p<0.10, ** p<0.05, *** p<0.01.

Tables 4A and 4B present the results of similar regressions of Te Kupenga outcomes for men and women respectively where the control variables include fields of study at levels 3, 4 and above, and 7 and above. Again, the relationships shown in these regressions should not be interpreted as necessarily causal. The regressions do not control for level of highest qualification, so all field of study variables should be interpreted as comparisons with not studying at that level in that field, not as comparisons with studying at that level in a different field.

These tables show, as we might hope, studying Māori at level 3 is associated with substantially greater te reo Māori proficiency for both men and women, and significantly less loneliness and more control over one's life for men. Studying Māori is positively associated with less loneliness and more control over one's life for women too, but these correlations are not statistically significant. These correlations, though not necessarily causal, are consistent with the value of connection to one's culture even when it does not improve labour market outcomes. This finding aligns with several previous results from the literature. McCaull (2022) reports that knowing te reo Māori increases one's sense of belonging, improves linkage with ancestral marae, and helps maintain culture; while Fox, Neha, and Jose (2018) find that knowing te reo Māori improves cultural embeddedness, adaptive coping, and overall wellbeing.

In contrast, studying maths at level 3 is associated with some negative outcomes: lower mental health for women, more loneliness for both genders, and less control over one's life for both genders (though significantly for women only). The reason for this relationship is unclear; the relationship could be statistical noise. Unlike maths, science at level 3 is associated with higher mental health for women. Studying in the service sector (which covers a wide range of areas including tourism, hairdressing, hospitality, and driving) is associated with greater te reo Māori proficiency for men, but more loneliness and less control for women. The gender differences may relate to the different sub-fields within the service sector in which men and women study, but our sample size is too small to investigate this possibility. We can only speculate on why service sector study is associated with these negative outcomes for women. Factors such as low wages or anti-social work hours in industries such as hospitality may contribute.[40]

[40] Table 5B shows women with experience in Retail Trade or Accommodation and Food Services similarly tend to report feeling low control over their lives.

Table 4A: Fields of higher study associated with strong non-labour market outcomes for men

Dependent variable:	Te reo skill	Life satisfaction	Health	Mental health	Freedom from loneliness	Control over own life	Income sufficiency
Passed at least 14 credits at level 3 within 5 years in:							
English	-0.337	-0.542	-0.353	-0.522	-0.649	-0.364	-0.583*
	(0.412)	(0.384)	(0.403)	(0.316)	(0.415)	(0.272)	(0.334)
Maths	-0.001	0.006	-0.020	-0.211	-0.794*	-0.541	-0.587
	(0.356)	(0.301)	(0.377)	(0.377)	(0.432)	(0.390)	(0.369)
Māori	0.836**	0.429	-0.294	0.504	0.863**	0.585**	0.207
	(0.385)	(0.325)	(0.370)	(0.395)	(0.417)	(0.283)	(0.294)
Humanities	0.058	0.346	0.544*	0.292	0.460	0.271	0.446*
	(0.275)	(0.278)	(0.292)	(0.270)	(0.278)	(0.300)	(0.257)
Social Science	-0.011	0.179	0.017	0.455	0.241	0.392	0.363
	(0.347)	(0.228)	(0.284)	(0.292)	(0.265)	(0.250)	(0.275)
Science	-0.186	-0.090	0.042	0.054	0.371	0.263	0.621*
	(0.324)	(0.262)	(0.341)	(0.333)	(0.338)	(0.279)	(0.332)
Arts and Crafts	0.217	-0.135	0.108	-0.120	0.267	0.117	0.142
	(0.353)	(0.372)	(0.346)	(0.355)	(0.287)	(0.263)	(0.397)
Service Sector	0.608**	0.056	-0.216	-0.210	-0.264	-0.237	-0.312
	(0.284)	(0.271)	(0.301)	(0.314)	(0.304)	(0.286)	(0.272)
# of other fields	-0.311*	0.262	0.043	-0.139	0.413***	-0.296	0.184
	(0.176)	(0.185)	(0.210)	(0.198)	(0.155)	(0.193)	(0.162)
Passed at least 0.5 EFTS at level 4+ within 10 years in:							
Natural & Physical Sciences	0.266	0.260	0.050	0.656	0.004	0.198	-0.459
	(0.466)	(0.435)	(0.355)	(0.476)	(0.386)	(0.495)	(0.338)
Engineering & Related Technologies	-0.107	-0.054	0.125	-0.047	-0.469	0.372	-0.535
	(0.328)	(0.350)	(0.389)	(0.372)	(0.364)	(0.333)	(0.341)
Architecture & Building	0.312	-0.329	-0.046	0.460	-0.680*	0.669	-0.149
	(0.370)	(0.620)	(0.521)	(0.582)	(0.383)	(0.489)	(0.405)
Health	0.899*	-0.236	-0.695	0.068	0.264	-0.101	-0.425
	(0.534)	(0.517)	(0.682)	(0.425)	(0.498)	(0.324)	(0.488)
Education	1.580**	-0.773	0.690	-0.380	-0.086	0.395	0.315
	(0.656)	(0.879)	(0.596)	(0.458)	(0.560)	(0.397)	(0.459)
Management & Commerce	-0.173	-0.390	0.092	0.092	-0.257	0.159	-0.460
	(0.469)	(0.339)	(0.312)	(0.367)	(0.475)	(0.259)	(0.350)
Society & Culture	0.189	0.137	0.054	-0.107	-1.155**	-0.323	-0.165
	(0.571)	(0.382)	(0.479)	(0.388)	(0.550)	(0.249)	(0.457)
Creative Arts	1.260**	-0.631**	-1.072	-0.293	-0.974	-0.334	-0.602
	(0.546)	(0.303)	(0.713)	(0.429)	(0.667)	(0.457)	(0.620)
# of other fields	-0.541	-0.263	-0.333	0.015	0.257	0.222	0.163
	(0.368)	(0.528)	(0.575)	(0.680)	(0.578)	(0.732)	(0.425)
Passed at least 0.5 EFTS at level 7+ within 10 years in:							
Natural & Physical Sciences	0.159	-1.113**	-0.388	-1.414**	-0.155	-0.577	-0.236
	(0.498)	(0.461)	(0.421)	(0.564)	(0.582)	(0.508)	(0.672)
Engineering & Related Technologies	0.474	-0.666	-0.322	0.344	0.371	-0.089	0.307
	(0.709)	(0.458)	(0.559)	(0.508)	(0.552)	(0.596)	(0.490)
Architecture & Building	-0.350	1.251*	-0.758	0.049	0.687	-0.191	-0.066
	(0.486)	(0.651)	(0.781)	(0.696)	(0.540)	(0.703)	(0.612)
Health	-0.051	0.446	0.542	-0.590	0.311	1.307*	2.160***
	(0.962)	(0.693)	(0.929)	(0.840)	(0.792)	(0.664)	(0.692)
Education	-0.603	-0.053	-1.146*	-1.002*	-1.567**	-1.484***	-0.829
	(0.749)	(1.013)	(0.636)	(0.590)	(0.749)	(0.548)	(0.675)
Management & Commerce	-0.360	0.386	0.168	-0.086	1.352	0.559	0.916
	(0.670)	(0.454)	(0.690)	(0.571)	(0.854)	(0.361)	(0.673)
Society & Culture	0.343	-0.335	-0.153	0.285	0.845	0.661*	0.345
	(0.606)	(0.607)	(0.466)	(0.595)	(0.626)	(0.357)	(0.571)
Creative Arts	-1.705	-0.482	1.698*	0.434	1.732*	-0.497	-0.888
	(1.026)	(1.120)	(0.979)	(0.944)	(0.935)	(0.751)	(1.380)
# of other fields	-0.032	0.884	0.203	0.973	-0.921	1.034	0.196
	(0.476)	(0.801)	(0.739)	(1.150)	(0.834)	(0.859)	(0.551)
NCEA level 2 year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Background characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.523	0.280	0.320	0.276	0.443	0.369	0.368
Observations	105	105	105	105	105	105	105

Notes: This table presents the results of ordinary least squares regressions of non-labour market outcomes in 2018 for Māori men in all specialties. Dependent variables are given in the column headers. Higher dependent variable values denote more positive outcomes, and all variables are scaled to have standard deviations of 1. Background characteristics are the first five controls shown in Table 3A. Fields of study controlled for are the more common fields. Standard errors are robust. Asterisks denote: * p<0.10, ** p<0.05, *** p<0.01.

Table 4B: Fields of higher study associated with strong non-labour market outcomes for women

Dependent variable:	Te reo skill	Life satisfaction	Health	Mental health	Freedom from loneliness	Control over own life	Income sufficiency
Passed at least 14 credits at level 3 within 5 years in:							
English	-0.252	-0.150	-0.269	-0.123	0.041	-0.031	0.398
	(0.277)	(0.312)	(0.326)	(0.285)	(0.275)	(0.295)	(0.338)
Maths	0.275	-0.288	-0.298	-0.593**	-0.513*	-0.465*	0.222
	(0.251)	(0.265)	(0.293)	(0.286)	(0.278)	(0.275)	(0.309)
Māori	1.042***	0.231	-0.210	0.367	0.434	0.309	0.197
	(0.346)	(0.288)	(0.247)	(0.257)	(0.272)	(0.240)	(0.238)
Humanities	0.079	0.151	0.262	-0.080	-0.202	0.196	-0.396
	(0.298)	(0.311)	(0.340)	(0.294)	(0.247)	(0.297)	(0.326)
Social Science	-0.349**	-0.018	0.265	-0.220	-0.232	0.031	0.321
	(0.158)	(0.208)	(0.189)	(0.180)	(0.209)	(0.196)	(0.202)
Science	-0.288	-0.055	-0.043	0.612**	0.301	0.153	-0.181
	(0.235)	(0.265)	(0.279)	(0.270)	(0.264)	(0.279)	(0.305)
Arts and Crafts	0.092	0.252	0.096	0.116	-0.015	-0.134	-0.071
	(0.229)	(0.226)	(0.242)	(0.219)	(0.207)	(0.250)	(0.255)
Service Sector	0.036	-0.070	0.226	0.210	-0.348*	-0.515**	0.106
	(0.180)	(0.260)	(0.230)	(0.215)	(0.210)	(0.215)	(0.248)
# of other fields	-0.294**	0.008	-0.038	-0.087	-0.126	-0.221	-0.008
	(0.113)	(0.150)	(0.161)	(0.132)	(0.144)	(0.158)	(0.185)
Passed at least 0.5 EFTS at level 4+ within 10 years in:							
Natural & Physical Sciences	-0.259	-0.042	-0.145	-0.354	0.477	-0.122	0.289
	(0.322)	(0.296)	(0.298)	(0.315)	(0.302)	(0.267)	(0.295)
Engineering & Related Technologies	1.169*	-0.192	-0.248	-0.471	-0.069	-0.114	0.167
	(0.614)	(0.517)	(0.508)	(0.504)	(0.661)	(0.627)	(0.423)
Architecture & Building	-0.298	0.531	0.322	-0.682***	-0.349	-0.484	0.450
	(0.349)	(0.550)	(0.275)	(0.247)	(0.400)	(1.121)	(0.350)
Health	0.738**	0.578**	0.416*	-0.050	-0.059	0.438*	0.205
	(0.291)	(0.256)	(0.230)	(0.430)	(0.380)	(0.225)	(0.539)
Education	-0.370	-0.589	-0.246	-0.516*	-0.226	0.074	-0.869**
	(0.287)	(0.371)	(0.322)	(0.307)	(0.412)	(0.367)	(0.420)
Management & Commerce	-0.087	0.154	0.121	-0.329	-0.126	-0.084	-0.325
	(0.240)	(0.249)	(0.313)	(0.242)	(0.309)	(0.268)	(0.276)
Society & Culture	0.349*	0.014	-0.225	-0.012	-0.371	0.133	-0.215
	(0.182)	(0.221)	(0.191)	(0.190)	(0.231)	(0.232)	(0.241)
Creative Arts	-0.102	-0.787**	-0.169	0.209	-0.251	0.096	-0.043
	(0.235)	(0.323)	(0.272)	(0.221)	(0.363)	(0.332)	(0.293)
# of other fields	-0.055	0.062	0.053	0.779***	0.616**	0.803**	-0.151
	(0.419)	(0.308)	(0.577)	(0.265)	(0.282)	(0.359)	(0.368)
Passed at least 0.5 EFTS at level 7+ within 10 years in:							
Natural & Physical Sciences	0.333	-0.142	0.082	0.113	-0.741	0.398	-0.553
	(0.464)	(0.457)	(0.804)	(0.599)	(0.476)	(0.517)	(0.632)
Engineering & Related Technologies	dropped	dropped	dropped	dropped	dropped	dropped	dropped
Architecture & Building	dropped	dropped	dropped	dropped	dropped	dropped	dropped
Health	-0.845**	0.054	0.413	0.476	0.180	-0.221	-0.163
	(0.356)	(0.320)	(0.296)	(0.515)	(0.460)	(0.319)	(0.599)
Education	0.540	1.352***	0.592*	0.835**	0.494	0.657*	1.019**
	(0.369)	(0.376)	(0.345)	(0.352)	(0.453)	(0.383)	(0.471)
Management & Commerce	-0.164	0.283	0.555	0.733**	0.437	0.204	0.913**
	(0.340)	(0.340)	(0.457)	(0.341)	(0.482)	(0.368)	(0.407)
Society & Culture	-0.220	-0.203	0.021	0.046	0.299	-0.282	-0.014
	(0.295)	(0.273)	(0.270)	(0.239)	(0.283)	(0.270)	(0.295)
Creative Arts	-0.104	0.604	0.440	0.333	0.389	-0.096	0.207
	(0.303)	(0.384)	(0.336)	(0.306)	(0.473)	(0.424)	(0.348)
# of other fields	0.190	-0.361	0.694	0.543	0.454	0.922	-1.843*
	(0.838)	(1.045)	(1.109)	(0.868)	(0.699)	(0.851)	(0.978)
NCEA level 2 year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Background characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.425	0.200	0.237	0.202	0.169	0.196	0.213
Observations	183	183	183	183	183	183	183

Notes: This table presents the results of ordinary least squares regressions of non-labour market outcomes in 2018 for Māori women in all specialties. Dependent variables are given in the column headers. Higher dependent variable values denote more positive outcomes, and all variables are scaled to have standard deviations of 1. Background characteristics are the first five controls shown in Table 3A. Fields of study controlled for are the more common fields. Standard errors are robust. Asterisks denote: * p<0.10, ** p<0.05, *** p<0.01.

At levels 4 to 6, studying architecture and building is associated with low mental health for women, but not for men. Architecture and Building is a strongly male-dominated field of study, so wāhine Māori in this field may find themselves in a small minority. This could drive various issues and challenges that negatively affect women's mental health. Studying health at this level is associated with a range of positive outcomes for women, namely greater te reo Māori proficiency and life satisfaction, and weakly significantly greater health and control over one's life, and is associated with weakly greater te reo Māori proficiency for men. In recent years, substantial work has been done to improve the health sector's alignment with Māoritanga (Health Navigator, 2022). This may contribute to a greater sense of belonging experienced by Māori graduates of the field. Studying education at levels 4 to 6 is similarly associated with higher te reo Māori proficiency for men. For women, it is negatively associated with most outcomes, though only significantly with income sufficiency and borderline significantly with mental health. Creative arts at this level is associated with lower life satisfaction for both men and women, and higher te reo Māori proficiency for men.

At higher levels of study, the patterns of correlation are different. Studying natural and physical sciences at level 7 or above is associated with low life satisfaction and mental health for men, though not for women. For men, studying health at level 7 or above (which includes gaining a medical degree) is associated with income sufficiency 1.7 standard deviations higher than not studying health at level 4 or above, but, perhaps surprisingly, studying health at this level is not associated with higher income sufficiency for women. Studying education at level 7 or above tends to be associated with negative outcomes for men, particularly with high loneliness and low control over one's life. Because education is a strongly female-dominated field, tāne Māori in this area may find themselves a small minority, which could have negative effects. In contrast, studying education at level 7 or above is associated with neutral or weakly positive outcomes in most domains for women.

Tables 5A and 5B present the results for men and women of regressions of the same non-labour market outcomes on having children, time spent overseas, and work experience variables, while controlling for a range of aspects of students' backgrounds and education. Note these regressions have a large number of controls and relatively few observations. Their results should thus be interpreted with caution.

Table 5A: Life pathways associated with strong non-labour market outcomes for men

Dependent variable:	Te reo skill	Life satisfaction	Health	Mental health	Freedom from loneliness	Control over own life	Income sufficiency
Any children born in year relative to NCEA level 2:							
Year 5 or earlier	0.000	-0.265	0.136	-0.212	-0.730	0.305	-0.358
	(0.432)	(0.541)	(0.517)	(0.643)	(0.477)	(0.511)	(0.485)
Years 6 to 10	-0.080	0.643**	0.067	-0.054	0.742**	0.230	0.611*
	(0.325)	(0.289)	(0.430)	(0.313)	(0.282)	(0.306)	(0.302)
Years 11 and 12	-0.319	0.199	0.159	-0.139	0.106	0.350	-0.380
	(0.332)	(0.301)	(0.328)	(0.382)	(0.271)	(0.325)	(0.319)
Overseas at least 6 months in year relative to NCEA level 2:							
Any year 3 to 5	-0.058	0.038	-1.824**	-0.631	-1.208*	-0.084	0.311
	(0.768)	(0.599)	(0.807)	(0.727)	(0.629)	(0.892)	(0.569)
Any year 6 to 10	-0.258	-0.509	0.256	-0.697	-0.449	-0.686	0.078
	(0.580)	(0.442)	(0.489)	(0.611)	(0.464)	(0.628)	(0.540)
Year 11 or 12	0.002	0.535	0.239	0.429	0.381	0.945	0.217
	(0.897)	(0.648)	(0.713)	(0.848)	(0.745)	(0.854)	(0.663)
Years of work experience in years 1 to 5 after NCEA level 1 (omitted category: 0):							
1	-0.200	-0.563	0.077	0.693	-0.508	0.300	0.225
	(0.799)	(0.605)	(0.755)	(0.727)	(0.784)	(0.927)	(0.684)
2	-0.187	-0.968	-0.696	0.025	-1.197*	-0.314	-0.586
	(0.877)	(0.623)	(0.774)	(0.898)	(0.667)	(0.840)	(0.675)
3	-0.320	-0.359	0.014	0.508	0.663	0.359	-0.183
	(0.710)	(0.550)	(0.665)	(0.626)	(0.527)	(0.726)	(0.570)
4	-0.193	-0.082	0.283	0.532	-0.053	0.277	-0.028
	(0.649)	(0.489)	(0.624)	(0.638)	(0.491)	(0.666)	(0.579)
5	-0.209	-0.004	-0.128	0.435	0.055	0.490	-0.408
	(0.614)	(0.510)	(0.596)	(0.517)	(0.525)	(0.729)	(0.560)
Any work experience in years 1 to 5 in:							
Agriculture, Forestry, and Fishing	0.093	0.331	0.320	-0.049	-0.411	0.023	0.427
	(0.483)	(0.413)	(0.503)	(0.485)	(0.439)	(0.516)	(0.505)
Manufacturing	0.222	-0.229	-0.499	-0.300	-0.410	-0.717*	0.212
	(0.423)	(0.344)	(0.439)	(0.416)	(0.401)	(0.424)	(0.389)
Construction	0.674	0.213	0.356	0.211	0.207	0.180	0.376
	(0.504)	(0.431)	(0.638)	(0.513)	(0.446)	(0.515)	(0.396)
Retail Trade	-0.549	0.938***	0.224	0.159	0.441	0.314	0.361
	(0.429)	(0.310)	(0.442)	(0.439)	(0.403)	(0.411)	(0.383)
Accommodation & Food Services	0.146	-0.389	0.020	-0.495	0.029	-0.255	-0.111
	(0.470)	(0.448)	(0.413)	(0.510)	(0.420)	(0.471)	(0.374)
Professional, Scientific, and Technical Services	-0.306	-0.819*	-0.210	-0.696	0.002	-0.273	-0.281
	(0.532)	(0.439)	(0.564)	(0.518)	(0.525)	(0.422)	(0.541)
Administrative & Support Services	-0.661	-0.662	-0.856	-1.570**	-0.689	-0.708	-0.555
	(0.518)	(0.585)	(0.638)	(0.673)	(0.540)	(0.501)	(0.425)
Public Administration & Safety	0.375	-0.278	-0.033	-0.004	-0.800	-0.439	0.260
	(0.671)	(0.637)	(0.677)	(0.652)	(0.655)	(0.789)	(0.570)
Education & Training	-0.403	0.614	1.610*	1.880**	1.375*	0.093	0.416
	(0.990)	(0.673)	(0.883)	(0.868)	(0.689)	(0.897)	(0.850)
Health Care & Social Assistance	0.844	-1.677***	-0.697	0.374	-1.517**	-0.328	-0.770
	(0.920)	(0.616)	(0.708)	(0.779)	(0.700)	(0.646)	(0.780)
NCEA level 2 year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Background characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Level of highest qualification fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fields of study controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.647	0.653	0.562	0.564	0.703	0.589	0.573
Observations	105	105	105	105	105	105	105

Notes: This table presents the results of ordinary least squares regressions of non-labour market outcomes in 2018 for Māori men in all specialties. Dependent variables are given in the column headers. Higher dependent variable values denote more positive outcomes, and all variables are scaled to have standard deviations of 1. Background characteristics are the first five controls shown in Table 3A. Fields of study controls are those presented in Table 4A. Employment counts as work experience if it was for the highest paying employer in the year and at least $10,000 of wages were paid. Standard errors are robust. Asterisks denote: * p<0.10, ** p<0.05, *** p<0.01.

Table 5B: Life pathways associated with strong non-labour market outcomes for women

Dependent variable:	Te reo skill	Life satisfaction	Health	Mental health	Freedom from loneliness	Control over own life	Income sufficiency
Any children born in year relative to NCEA level 2:							
Year 5 or earlier	-0.016	0.781***	0.255	0.263	-0.035	0.479**	-0.113
	(0.168)	(0.219)	(0.211)	(0.216)	(0.244)	(0.234)	(0.258)
Years 6 to 10	0.276	-0.295*	-0.168	-0.549***	-0.238	-0.391**	-0.198
	(0.174)	(0.173)	(0.201)	(0.207)	(0.204)	(0.188)	(0.241)
Years 11 and 12	-0.155	0.154	0.239	0.245	0.266	0.129	-0.171
	(0.195)	(0.217)	(0.225)	(0.197)	(0.204)	(0.196)	(0.233)
Overseas at least 6 months in year relative to NCEA level 2:							
Any year 3 to 5	0.351	0.709*	-0.224	0.340	0.022	0.876**	0.115
	(0.344)	(0.406)	(0.450)	(0.345)	(0.504)	(0.368)	(0.407)
Any year 6 to 10	0.306	0.236	-0.022	-0.160	-0.241	-0.457*	-0.141
	(0.259)	(0.291)	(0.280)	(0.251)	(0.273)	(0.262)	(0.316)
Year 11 or 12	-1.316***	-0.149	0.927**	-0.032	-0.806	0.362	-0.175
	(0.435)	(0.541)	(0.366)	(0.550)	(0.493)	(0.412)	(0.357)
Years of work experience in years 1 to 5 after NCEA level 1 (omitted category: 0):							
1	-0.020	0.560	0.565*	0.752**	0.871***	0.870***	0.311
	(0.301)	(0.396)	(0.338)	(0.309)	(0.316)	(0.328)	(0.390)
2	-0.323	0.863*	0.561	0.909**	1.019**	1.080***	0.620
	(0.282)	(0.455)	(0.365)	(0.382)	(0.409)	(0.379)	(0.379)
3	0.076	0.782*	0.609	0.708*	0.580	1.270***	1.063***
	(0.291)	(0.408)	(0.382)	(0.379)	(0.426)	(0.422)	(0.397)
4	-0.057	0.889**	0.609	0.949**	0.910**	1.328***	0.990**
	(0.320)	(0.444)	(0.417)	(0.402)	(0.394)	(0.427)	(0.392)
5	-0.177	0.564	0.376	0.617*	0.535	1.333***	0.525
	(0.286)	(0.442)	(0.391)	(0.357)	(0.410)	(0.384)	(0.388)
Any work experience in years 1 to 5 in:							
Agriculture, Forestry, and Fishing	-0.024	-0.044	0.279	-0.614	-0.755*	-1.066**	-0.162
	(0.302)	(0.312)	(0.384)	(0.436)	(0.410)	(0.430)	(0.413)
Manufacturing	-0.128	0.088	0.767**	0.071	0.021	-0.298	-0.041
	(0.306)	(0.309)	(0.342)	(0.340)	(0.419)	(0.366)	(0.355)
Construction	-0.206	0.813	1.041	0.800	0.958	0.031	0.531
	(0.743)	(0.716)	(0.724)	(0.699)	(0.754)	(0.706)	(1.010)
Retail Trade	-0.004	-0.161	-0.221	-0.605**	-0.213	-0.568***	-0.254
	(0.186)	(0.214)	(0.204)	(0.237)	(0.247)	(0.216)	(0.248)
Accommodation & Food Services	-0.012	0.003	0.341	-0.178	-0.420	-0.658***	-0.249
	(0.234)	(0.263)	(0.269)	(0.274)	(0.322)	(0.247)	(0.292)
Professional, Scientific, and Technical Services	-0.344	0.413	0.349	0.371	0.022	0.492*	0.121
	(0.268)	(0.274)	(0.342)	(0.303)	(0.360)	(0.280)	(0.376)
Administrative & Support Services	-0.220	0.382	-0.192	0.046	0.687*	0.556	-0.266
	(0.301)	(0.338)	(0.393)	(0.366)	(0.364)	(0.440)	(0.381)
Public Administration & Safety	0.420	0.796*	0.563	0.295	-0.732	-0.207	0.661
	(0.360)	(0.427)	(0.376)	(0.474)	(0.476)	(0.440)	(0.420)
Education & Training	0.390	0.244	0.303	0.419*	0.307	0.230	-0.069
	(0.305)	(0.257)	(0.269)	(0.245)	(0.303)	(0.307)	(0.347)
Health Care & Social Assistance	0.166	0.413	0.401	0.324	-0.217	-0.646	-0.493
	(0.399)	(0.370)	(0.374)	(0.356)	(0.410)	(0.390)	(0.482)
NCEA level 2 year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Background characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Level of highest qualification fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fields of study controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.538	0.388	0.413	0.367	0.321	0.440	0.367
Observations	183	183	183	183	183	183	183

Notes: This table presents the results of ordinary least squares regressions of non-labour market outcomes in 2018 for Māori women in all specialties. Dependent variables are given in the column headers. Higher dependent variable values denote more positive outcomes, and all variables are scaled to have standard deviations of 1. Background characteristics are the first five controls shown in Table 3A. Fields of study controls are those presented in Table 4A. Employment counts as work experience if it was for the highest paying employer in the year and at least $10,000 of wages were paid. Standard errors are robust. Asterisks denote: * p<0.10, ** p<0.05, *** p<0.01.

Having children is related differently to the outcomes of men and women. Young children[41] are associated with higher life satisfaction, less loneliness, and weakly higher income sufficiency for men, but weakly lower life satisfaction and lower mental health and control over one's life for women. This gender difference likely reflects the different roles men and women on average play in the care of young children. Specifically, many women reduce their work or exit the labour market entirely while they have young children, whereas if anything men on average increase their work to compensate for their partners' reduced earnings (Sin et al., 2018). However, older children[42] are associated with higher life satisfaction and control over one's life for women.

The sample of students used in this study is restricted to those who were not overseas for six months or longer in the year of NCEA level 2 or either of the two following years. Tables 5A and 5B examine the correlation between travel in later years and non-labour market outcomes. The relationship between spending at least six months overseas in subsequent years and these outcomes shows no consistent pattern: the signs of the coefficients vary by gender and period when the travel occurred.

Finally, Tables 5A and 5B also control for aspects of students' work experience in the first five years after gaining NCEA level 2. In general, women who worked in Aotearoa at least one of these years have stronger outcomes across all the non-labour market domains (except te reo Māori proficiency) than women who did not work any of these years.[43] This pattern is not evident for men.

At the time of the Te Kupenga survey, students may not have still been working in the industries where they gained early experience, though likely in some cases they were. The relationship between industry work experience and outcomes may thus be driven by the contemporaneous effect of working in the industry on the outcomes, the effect of work experience in the industry on later work possibilities which in turn affect outcomes, or various non-causal mechanisms. Note because the regressions control for the number of years of work experience, coefficients on industry experience variables should be interpreted as differences in outcomes relative to similar individuals with the same amount of work experience, but whose experience was gained in different industries.

The relationships between outcomes and work experience in different industries vary substantially by gender. Experience in the male-dominated industry of agriculture, forestry, and

[41] 'Young children' are those born in years 6 to 10 relative to the year of NCEA level 2. Because the survey was conducted in years 11 to 14, the youngest such children were a year old at this time and the oldest such children were 8 years old.
[42] 'Older children' are those born in year 5 or earlier, so the youngest were 6 years old at the date of the survey.
[43] Only the highest paying job each year is considered for this analysis, and only if at least $10,000 of wages were paid by the highest paying employer.

fisheries is associated with low control over one's own life and somewhat high loneliness for women, though no significant undesirable outcomes for men. Retail trade experience too is more negative for women than for men: it is associated with low mental health and control over one's life for women, but with high life satisfaction for men. Accommodation and food services experience is also associated with low control over one's life for women only. Administrative and support services experience is associated with negative outcomes in all domains for men, though only significantly with low mental health. For women, its correlations with outcomes are less clear, with some being positive and some negative, and most being insignificant. Education and training experience tends to be associated with positive outcomes for men (significantly with mental health and borderline significantly with physical health and an absence of loneliness) and neutral or insignificantly positive outcomes for women. Finally, health care and social assistance experience is associated with low life satisfaction and high loneliness for men, but not for women.

6 Broad patterns and conclusions

In this research, we focussed on Māori students who successfully completed level 2 NCEA certificates between 2004 and 2007, and explored the pathways through subsequent education taken by these students that lead to labour market success. We examined how the successful pathways differed for students who exhibited different interests and aptitudes ('specialties') at level 2, as measured by the subjects they studied extensively and in which they received their strongest grades. While specialties are expected to largely align with students' interests and strengths, it should be noted a student may alternatively study a particular subject because they are advised to take it or they think it will be useful. The rationale for analysing students separately by specialty is that students with different natural inclinations and talents are likely to take different routes to labour market success. This research is also intended to inform advice on career paths given to Māori students, making a one-size-fits-all approach not optimal. Students are more likely to successfully complete higher qualifications and move into satisfying careers if they pursue study in areas they enjoy and are good at.

We conducted all our analysis separately for men and women because pathways through both education and employment are strongly gendered.

Our main outcomes of interest, which summarise students' labour market experiences, are the cumulative savings students could have acquired by 12 years after NCEA level 2 and the annual savings they could be making at this time. Due to data limitations and the disruptive impact of the Covid-19 pandemic, we examined students' outcomes for only 12 years after level

2. If we were able to observe students' savings over their whole lifetime, the pathways associated with labour market success may have differed somewhat. In particular, pathways that lead to low cumulative but high annual savings after 12 years would likely look more financially attractive if we were to examine them after a longer period of time.

To identify successful pathways, we regressed outcomes on students' pathways while controlling for a range of background characteristics, including their academic performance at level 2. However, it should be noted we were not able to fully control for all differences in students' backgrounds and abilities that might affect their labour market outcomes. The relationships between pathways and outcomes we identified should thus be considered suggestive of causality rather than strictly causal.

Although we focussed on labour market outcomes, we acknowledge many other types of outcomes are important too. For the sample of students for whom these data were available, we also examined the educational pathways associated with desirable non-labour market outcomes.

The remainder of this section lays out and discusses in turn some of the salient patterns that emerged in our analysis by specialty (see Appendix 7), and discusses similarities and differences in findings by specialty.

6.1 Men have stronger labour market outcomes than women

Our primary focus was not comparing the labour market outcomes of Māori men and women, but our findings did reveal very large gender savings gaps. In every specialty, women's savings lagged behind those of men, particularly among individuals with lower levels of education. Differences in the educational pathways taken by men and women with the same specialty contributed to these savings gaps, but explained only a fraction of them.

6.2 Specialties do not define subsequent educational pathways

One important finding from this research is that aptitudes at level 2, or specialties, did not define students' educational destinies. Students in all specialties went on to higher study and training in a diverse range of fields, and there was considerable overlap in the destinations of students with different specialties. However, level 2 specialties did have predictive power for the subsequent routes students took. For instance, 22% of men who specialised in Sciences at level 2 studied Natural and Physical Sciences at level 4 or above, compared with 6% of men who specialised in Humanities. As another example, 32% of women who specialised in Education at level 2 studied Education at level 4 or above, compared with 11% of women who specialised in Business.

This suggests students at level 2 should not feel tied to a specific educational destination based solely on the subjects where they are currently experiencing success. Rather, they should remain aware they can build competency in new areas and set themselves on different career trajectories.

6.3 Bachelor's level qualifications benefit women more than men

In our sample, as observed in the population of Aotearoa as a whole, men achieved lower levels of education on average than did women. We found the same result within nearly every specialty. The single exception was Business: men who specialised in business at level 2 tended to become more educated than women who specialised in business, with nearly 50% of men but only around 35% of women achieving a qualification at level 7 or higher.

This greater educational attainment of women was accompanied by a distinct gender difference in the labour market returns to higher education. In nearly every specialty, women who achieved a qualification at level 7 (bachelor's level) or above had stronger average labour market outcomes than women with similar backgrounds with lower qualifications. The one possible exception was Engineering and Technology. Women who specialised in this field tended to do better in the labour market if they gained industry training qualifications at level 4 to 6 than if they gained a level 7 qualification, and both did better than less qualified women.

The difference in non-labour market outcomes between women with level 7 qualifications and less educated women was less evident. Women with level 7 qualifications reported being healthier than did women with only level 2 qualifications, but those with industry training qualifications or other level 5 or 6 qualifications also reported high health. Women with degree-level qualifications also reported having weakly more control over their lives than those with only level 2 qualifications, while women with intermediate-level qualifications generally fell between the two.

In contrast, the labour market benefits of higher qualifications for men in most specialties were unclear. Compared with men with level 4 to 6 qualifications, those with level 7 qualifications tended to have similar or somewhat higher annual savings 12 years after NCEA level 2, but dramatically lower cumulative savings. These lower cumulative savings resulted partly from tertiary fees, but mostly because higher, more academic study caused a delay of several years in entering full-time work. Although more-educated men in some specialties might eventually catch up with their less-educated peers in terms of cumulative savings, men in other specialties may never catch up. Much of this difference between specialties in the financial return to a degree is likely driven by differences in the subjects in which the degrees are taken.

The conclusion for men should thus not be that degrees are not financially worthwhile, but that only degrees in certain fields can be expected to provide a financial return, and this return may take many years to be realised.[44]

The main exception to this low benefit to higher qualifications for men was the Top 10% specialty, which consisted of the students who were in the top 10% academically at level 2. Men in this specialty with at least a level 7 qualification had higher annual and cumulative savings than similar men with lower-level qualifications by 12 years after NCEA level 2. Men who specialised in Social Sciences were also somewhat of an exception. Although men in this specialty with level 7 or above qualifications had lower cumulative savings after 12 years than such men with level 4 to 6 qualifications, they had substantially higher annual savings and were projected to catch up with their less qualified peers in terms of cumulative savings after a few more years. Students who specialised in Social Sciences tended to be quite academically able. These results on men in the Top 10% and Social Sciences specialty thus suggest the benefits of degree-level qualifications for men are higher among more academically able students. However, we reiterate the caveat that we observed students for only 12 years after NCEA level 2, and higher qualifications tend to appear more favourable at longer time horizons.

When pooling men from all specialties, we found no evidence degree-level qualifications were associated with stronger non-labour market outcomes along any of the dimensions we studied, though our sample size and thus statistical power here were low.

6.4 Vocational training yields strong labour market outcomes for men

Another recurring theme that emerged across all specialties was the high labour market returns to vocational training for men. We saw this both in terms of men who undertook industry training and those who studied Engineering and Related Technologies at level 4 or above. In essentially every specialty, men who gained an industry training qualification at level 4 or above had strong labour market outcomes compared with their similar peers. In some specialties, even low-level industry training qualifications or industry training that did not result in a qualification were associated with strong outcomes.

However, the popularity of the vocational pathway varied substantially by specialty, and this pathway seemed to be more common among less academically-inclined students. The specialty most associated with industry training qualifications was Engineering and Technology: 31% of men in this specialty gained an industry training qualification at level 4 or above, and in

[44] However, even degrees in fields that offer low or negative financial returns in the long run may provide benefits outside the labour market.

total 57% did some industry training. Men who specialised in Manufacturing, Planning, and Construction were similarly likely to do industry training (28% gained a qualification at level 4 or above; 57% did any industry training). Men who specialised in Agriculture, Forestry, and Fisheries were fairly likely to gain an industry training qualification at level 4 or above (20%) and were more likely than men in any other specialty to do some industry training (61%). At the other end of the spectrum, men who were high academic achievers (those in the Top 10% specialty) were least likely to gain an industry training qualification at level 4 or above (5%) or do any industry training (17%). Men who specialised in Social Sciences were also relatively unlikely to take this pathway (9% and 27%).

In every specialty, men who studied Engineering and Related Technologies at level 4 or above also tended to do well compared with similar peers in their specialty. This field of study was somewhat less common than industry training. It was most commonly pursued by men who specialised at level 2 in Engineering and Technology (33%) or Sciences (20%) and by Top 10% students (19%), and least commonly pursued by men who specialised at this level in Māori (7%) or Arts and Crafts (8%). Engineering and Related Technologies study includes vocational pathways at levels 6 and below, as well as more academic engineering degrees. A pattern that arose in many specialties was that men who gained a degree or higher in Engineering and Related Technologies, when compared with similar men who gained a lower-level qualification in the field, tended to have higher annual but lower cumulative savings 12 years after NCEA level 2.

In our regressions that explored non-labour market outcomes, we found industry training qualifications for men tended to be associated with a range of positive outcomes, though these were statistically significant only for those with a level 3 or 5-6 highest industry training qualification. In contrast, study in Engineering and Related Technologies was not significantly associated with strong non-labour market outcomes.

6.5 Vocational training yields strong labour market outcomes for women in some specialties, but few women pursue it

Compared with the clear and consistent benefit for men of industry training qualifications, the industry training story for women was much murkier. Industry training qualifications appeared to yield strong labour market outcomes only for women in specific specialties, and even in these specialties such qualifications were pursued by a relatively low proportion of women. Differences between specialties in labour market returns to industry training qualifications could have been driven by differences in the fields in which women took these qualifications, but we did not explore this possibility empirically. Women in specialties such as Humanities, Social Sciences, and Community and Social Services appeared to gain little to no labour market benefit

from industry training, whereas those in specialties including Sciences, Computing and IT, and Engineering and Technology appeared to gain considerable benefit.

However, the proportion of women who gained an industry training qualification was universally low across specialties: in no specialty with a sizeable number of women did more than 5% gain such a qualification at level 4 or above. This finding was particularly striking in the specialty Engineering and Technology, where a very high proportion of men did industry training and nearly a third gained an industry training qualification at level 4 or above. This suggests industry training was a good fit interest-wise for many students in the specialty. Furthermore, these men and the few women in the specialty who pursued industry training had very strong labour market outcomes.

The story with women studying Engineering and Related Technologies at levels 4 and above is similar: the specialty from which the highest proportion of women pursued such study was Engineering and Technology, yet only 5% of women in this specialty did so, compared with 33% of men.

The obvious questions are why so few women in specialties such as Engineering and Technology take the vocational training route, and whether many women's outcomes could be improved by removing barriers they face to industry training and encouraging them down this pathway.

Previous studies on women in the engineering and trades industries suggest a number of possible explanations for this gender disparity. The first reason is a lack of external influence and encouragement for women into the industry. Ministry of Women's Affairs (2012) find women were less likely than men to know about engineering as a viable career option, and less likely to be directed into engineering, even if their subject choices and interests aligned with the industry.[45] This absence of encouragement could have been for several reasons, including gender discrimination or merely oversight on the part of those giving career advice. In the context of gender segregation in the trades, New Zealand Council for Educational Research (2008) note that "gender stereotypes and dominant hetero-normative discourse continue to have a major influence on young people as they imagine and try out possible selves". Career advice may reinforce existing stereotypes or may actively work to dismantle them.

A second barrier for women may be hostile work environments. Jackson (2021) finds women in such industries often felt culturally adrift, harassed, and separated from informal business networks. Some women reported feeling isolated both by and from their male teammates due to their gender, while other women reported being undermined due to

[45] For instance, if they were interested in science or maths.

protective attitudes adopted by men who were unsure how to work with women, hindering their progress (McDonald and Ryan, n.d). These findings are corroborated by the Ministry of Women's Affairs (2012), who find many women reported difficulty dealing with men's attitudes towards women.[46] Further, this workplace culture appears connected to the retention of women in the industry (Ministry of Women's Affairs, 2012). The lack of female workers in these areas leads to an absence of strong female role models and unclear career paths, which decrease retention rates of women in a negative feedback loop (Jackson, 2021).

A third barrier for women interested in the trades are the social norms of the labour market and attitudes of employers towards employees' family commitments. Careers in these industries are often inflexible, with much career advancement based on hours worked (Jackson, 2021). However, many women who have children take considerable time away from the workforce and may return to work part time. The structure of career advancement thus means childbearing can be very detrimental to women's long-term career progression. Men are much less affected because they are much less likely to be the primary caregiver for their children.

None of this prior research speaks specifically to wāhine Māori, but women who are also an ethnic minority in these industries can be expected to experience the same issues and likely more (Bhatia, 2022).

Despite the challenges faced by women in such industries, our findings showed wāhine Māori from some specialties who chose vocational pathways had very strong labour market outcomes. We didn't find evidence wāhine Māori overall who did industry training had particularly strong non-labour market outcomes. However, our small sample size meant we had limited power to find significant relationships here.

Based on the available evidence, it seems there could be a benefit from career guidance that is free from gender stereotypes, and encourages female school students with relevant interests into educational routes such as engineering and trades. Ministry of Women's Affairs (2012) find that for women who were directed into engineering, parental and teacher support were key to their success. Initiatives that ensure these support mechanisms are in place could increase the number of women taking these pathways. However, shifts to the formal and informal culture of the industries may be necessary before a large number of women can fully flourish in these industries.

[46] Problematic attitudes include men being uncomfortable having female colleagues, and men perceiving women to be less capable of doing the job.

6.6 Some popular fields of higher study yield little financial benefit

Society and Culture and Creative Arts were both relatively popular fields of higher study for both genders in most specialties, but in most cases students who studied in these fields seemed to gain little labour market benefit from it. Among men, Society and Culture at level 4 or above was most commonly studied by students in the Top 10% (43%), students who specialised in Social Sciences (41%), students who specialised in Business (39%), and students who specialised in Māori (37%). Among women, it was mostly commonly studied by Top 10% students (55%), students who specialised in Māori (49%), and students who specialised in Social Sciences (45%). Creative Arts at level 4 or above was mostly commonly studied by students who specialised in Arts and Crafts (35% of such men and 29% of such women).

Although in general these fields were not associated with strong labour market outcomes for men or women, some individuals with qualifications in these fields did well, particularly if their qualifications were at bachelor's level or above. It should also be noted recent years seem to have seen a cultural shift, with increased demand in the labour market for employees who are knowledgeable of tikanga Māori and te reo Māori. The timing of the data used may mean this is not reflected in our findings.

Despite the general lack of labour market benefits it gave, study in Society and Culture and Creative Arts could have offered non-financial benefits, such as connection to one's culture, self-enrichment, or enjoyment. On the other hand, it was not clear students who studied either of these fields had strong *non-labour market* outcomes. Our regressions showed only that men who studied Creative Arts at levels 4 to 6 tended to have greater te reo Māori skill but worse health than similar men who did not. The relationships between studying Creative Arts and other non-labour market outcomes were insignificant.

Another possibility is these fields of study, which generally are not designed to prepare students for one specific career, were often taken by students who had been told they needed higher qualifications to get a good job and who may have viewed these fields as an easy option. They may not have had a particular career path in mind and may not have been especially committed to their study, which could have limited the benefit they gained from it.

Overall, while students may have non-financial reasons for pursuing higher level study in Society and Culture or Creative Arts, they should be aware before making this choice that the labour market benefits it offers may be quite limited.

6.7 Not all STEM study leads to strong job prospects

The New Zealand government announced in May 2021 a $3 million boost to Science, Technology, Engineering, and Mathematics (STEM) education, with the Ministry of Education heavily promoting STEM education to Māori with reference to mātauranga Māori, and creating scholarships for women in STEM fields (Wood, 2021). The policy was designed to address a perceived skills shortage in STEM while also increasing New Zealand GDP, as STEM jobs are generally considered to be secure, pay well, and don't necessarily require university education (Callaghan Innovation, 2022).

Although we found students, especially men, who studied STEM subjects such as Engineering and Related Technologies at level 4 and above tended to have strong labour market outcomes, this was not the case for all STEM subjects. In particular, students who studied Natural and Physical Sciences at level 4 or above or Information Technology at levels 4 to 6 tended to have labour market outcomes comparable to or weaker than otherwise similar students who did not study at this level in any field.

Physical Sciences is a relatively gender-balanced field of study. The level 2 specialties most associated with Physical Sciences study at level 4 or above are the Top 10% specialty (30% of the men and 24% of the women in the specialty study Physical Sciences), followed by Sciences (22% of men and 19% of women) and Social Sciences (11% of men and 8% of women). Many Physical Science subjects are traditionally viewed as difficult, consistent with this field tending to attract the more academically able students. Students may enter this field for a range of non-financial reasons, such as being fascinated by the subject or enjoying the intellectual stimulation, but they should be aware it will not necessarily substantially improve their labour market outcomes.

In contrast, Information Technology is strongly male-dominated as a field of higher study. Men are most likely to study Information Technology at level 4 or above if they specialised at level 2 in Computing and IT (14% of such men), Business (10%), or Sciences (9%). This study may be beneficial at bachelor's level or above, but seems to offer little labour market benefit if studied at a lower level. As with Physical Sciences, students entering this field should be aware it is not necessarily an easy ticket to a high-paying job.

6.8 Degrees in Management and Commerce are good for men and women in most specialties

As discussed previously, degree-level qualifications on average seemed to have substantial financial benefits for women in all specialties, but uncertain benefits for men in most specialties. However, the benefits for savings of such higher qualifications varied substantially by the field in

which they were gained, with some fields offering clear benefits even for men. We previously noted that Society and Culture, Creative Arts, and Physical Science degrees offered little financial benefit to men and women in most specialties. In stark contrast to this were degrees in Management and Commerce. These were associated with comparatively strong savings for women in essentially all specialties and for men in many specialties, particularly the more academically-focussed specialties such as Top 10%, Humanities, Social Sciences, and Sciences. Such degrees were most commonly gained by men and women who specialised in Business (15% of such women, 28% of such men) and Top 10% students (13% of women, 15% of men).

As a limited-entry field with stringent entry requirements, Health was studied at the degree level only by a small proportion of women, mostly commonly by Top 10% women (15%) and those who specialised in Sciences (12%). Women who gained degrees in Health tended to have very strong labour market outcomes regardless of their level 2 specialty. Another type of degree associated with strong savings for women in several specialties was Education. Women from some of the less academic specialties, namely Education, the Service Sector, Māori, and Generalists tended to do comparatively well if they completed such a degree. These degrees were most commonly gained by women who specialised in Education (22%), Community and Social Services (11%), or Māori (10%). However, we found no significant evidence women who specialised in Community and Social Services benefited from degrees in Education.

Men in many specialties who gained a degree in Engineering and Related Technologies tended to do well in the labour market. However, when compared with similar men who gained level 4 to 6 qualifications in the same field, these men often paid a considerable penalty in terms of cumulative savings for the gain they got in annual savings. These degrees were most commonly earned by Top 10% men (12%) and men who specialised in Sciences (5%).

6.9 Concluding remarks

This research showed wāhine Māori, regardless of their interests at school, can expect to maximise their success in the labour market by getting at least a bachelor's degree, but the field of the degree matters, with some degrees offering minimal financial benefits. Alternatively, vocational routes can be financially rewarding for women with certain interests and aptitudes, although many trade industries could still be more welcoming to women.

Men in most specialties have very strong outcomes if they take a vocational route through industry training, and this may be more financially rewarding on average than getting a degree over the 12-year time horizon we examine. However, more academically able men clearly benefit more from degrees than from the alternatives, and degrees in some fields are more

financially rewarding than degrees in others. Furthermore, over a longer time horizon, degrees will look more financially favourable relative to vocational pathways because they tend to be associated with a delay in entering full-time work, but higher annual earnings. Our findings should thus not be considered discouragement for Māori men from pursuing degree-level qualifications.

Our research focused solely on Māori rather than comparing them with other ethnicities, so it did not address the question of whether financial returns to degrees are lower for Māori men than for Pākehā men, though previous research suggests this could be the case. It may therefore be relevant to ask whether, beyond encouraging Māori men to earn degrees in fields that offer higher returns, anything can or should be done to improve the gains they get from higher education.

The educational and career choices of young Māori are affected by many considerations other than financial return. An important consideration may be the extent to which a pathway fits with their identity. Anecdotal evidence suggests some career choices, such as business or sciences, are perceived as 'hard' or 'cold' and are thus unattractive options for students with strong Māori values and identity. In contrast, fields perceived as 'soft' or 'caring' (e.g. health, teaching, social services) may be more attractive for such students. We leave for future research the question of how Māori identity affects educational and career choices and what role policy might play in ensuring Māori don't have to choose between their identity and maintaining a comfortable standard of living.

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Appendix

Appendix 1 – Overseas earnings estimates

While the IDI provides information on when New Zealanders are overseas, derived from passport swipes at the border, these data are silent on several matters important for this study. Specifically, we have essentially no information about where individuals are or what they are doing while they are overseas. We don't know whether they are studying and, if so, what they are studying and how much it is costing. We also don't know whether they are working and, if so, how much they are earning, and if they have any children. One way to deal with this lack of data would be to exclude all individuals who go overseas for a substantial period from our analysis. However, a high proportion of our target population spent a substantial amount of time overseas in the 12 years after gaining NCEA level 2. Dropping all such individuals would cause material sample selection, due to the non-random nature of overseas travel, and would also dramatically reduce our sample size.

Thus, to mitigate this issue, we exclude only the more extreme cases, and estimate overseas earnings for the others. Specifically, we exclude students who fall into any of three categories.

1. Those who were overseas for more than six months in the year they gained NCEA level 2 or either of the following two years. These students are likely to have undertaken further study that would not be captured by the Ministry of Education data.
2. Students who were overseas more than six months in each of eight or more years from the year of NCEA level 2 completion until 12 years later. Imputing the overseas income of these students would require unreasonably strong assumptions.
3. Students who are observed to go overseas for at least five full and one partial consecutive year in the first 12 years after NCEA level 2 and are not observed to return within the observation period.
4. Students whose overseas income cannot be imputed through any of the imputation rules detailed below. The main cause of this is they were overseas for a substantial period but were not working before leaving and were working upon return, or vice versa. Because we choose not to make any assumptions about how much of their time overseas was spent working, their overseas income cannot be estimated.

In total, these rules caused us to drop somewhat over 20% of the sample, leaving a base population of 17,847.

For students who spend time overseas but are not dropped, we apply in order the following imputation rules for their overseas earnings. We assume students overseas can earn 1.5 times what they would earn in Aotearoa, based on a crude comparison between wages in Aotearoa and in Australia, a major emigrant destination.

- If a student is overseas for less than a quarter of the year, we assume they are on holiday and thus overseas wages are zero.
- If a student is away for 25 to 75% of the year, we assume their overseas monthly wages are 1.5 times their domestic monthly wages in the same year.
- If a student is overseas for more than 75% of the year in any year three or more years after completing NCEA level 2, spends at least 75% of each of the previous two years in Aotearoa, and spends at least 75% of each of the following two years in Aotearoa, we linearly interpolate wages in the year spent mostly overseas using the wages in the years on either side. We then scale to account for the fraction of the year spent overseas, and multiply by our overseas multiplier, 1.5. We do not impute if the student's pre- or post-wage is zero.
- If a student goes overseas, but their Aotearoa earnings are at least 80% of their previous earnings, we assume they have zero overseas earnings because they are still working in Aotearoa.
- If students are out of Aotearoa at least 75% of the year for up to five consecutive years, plus potentially one partial year at each end of this period, earn positive wages in Aotearoa the year before going overseas and the year after returning, and if the year before leaving is no earlier than the second year after NCEA level 2, we linearly interpolate their wages while overseas based on their Aotearoa wages and multiply by our overseas multiplier, 1.5.
- If a student is overseas for more than 75% of a year, in Aotearoa more than 75% of each of the year before and the year after, and has zero earnings the years before and after, we assume they earn zero while overseas.
- If a student is overseas for more than 75% of a year and in Aotearoa for half a year or more in either of the two years before and either of the two years after, and earns zero in the two years before and after, we assume they earn zero while overseas.
- If a student goes overseas five years or more after NCEA level 2 and works before leaving New Zealand, we impute their overseas earnings for up to five full years overseas, based on the average growth rates of the earnings of those who stayed in Aotearoa, with wage values scaled up by the overseas multiplier.

- If a student is overseas for more than 75% of a year but not more than 90%, and earnings in Aotearoa are positive, we impute their overseas earnings proportionately.

Appendix 2 – Assigning students to specialties

Students are categorised into one or more specialties based on their performance in the NCEA level 2 credits they have attempted by the time they first achieve an NCEA level 2 certificate. The following rules are applied to assign students to specialties.

1. Students who did not pass at least 16 credits in any one field are categorised as Generalists.
2. A student who passed 16 or more credits in only one field has that field as their specialty.
3. If a student passed 16 or more credits in multiple fields, the rules determining whether each is considered a specialty vary depending on whether the field is dominated by achievement standards or by unit standards. (See below for which fields fall into which category.)
    a) If the student attained 16 or more achievement standard credits in a field dominated by achievement standards, and the student was on at least the 75th percentile in terms of grades among students attempting at least 16 achievement standard credits in the field, the field is considered a specialty.
    b) If the student attained 16 or more credits in a field dominated by unit standards, and the number of credits they attained in the field is on at least the 75th percentile of credits passed in the field among students who attempted any credits in the field, the field is considered a specialty.
    c) Where students passed at least 16 credits in multiple fields and meet either criterion 3a or 3b for any field, all fields in which they meet neither 3a nor 3b are not specialties.
4. If a student passed at least 16 credits in multiple fields, but has not had any specialties assigned via rule 3, we calculate for each field in which they passed at least 16 credits the ratio of the number of credits they passed in the field to the 75th percentile of this among all students who took credits in the field. For each student, their field with the highest ratio and any other field with a ratio within 20% of their highest ratio are *potential* specialties.
5. A student with just one potential specialty under rule 4 has that field as their specialty.
6. If a student has multiple potential specialties that are achievement standard-dominated fields under rule 4, only the one of these in which they achieved the highest grade is a potential specialty.

7. If a student has multiple potential specialties that are unit standard-dominated fields under rule 4, only the one in which they passed the highest number of credits is a potential specialty.
8. If a student has just one potential specialty based on rules 4-7, that field is their specialty.
9. If a student has one potential specialty based on rule 6 and one based on rule 7, the potential specialty in which they have the higher grade is their specialty. Ties are broken in favour of the achievement standard-dominated field.

Fields dominated by achievement standards are Māori, Humanities, Social Sciences, Sciences, and Arts and Crafts. Fields dominated by unit standards are Computing and IT, Business, Agriculture, Forestry, and Fisheries, Community and Social Services, Education, Service Sector, Engineering and Technology, and Manufacturing, Planning, and Construction.

Note the tiny field Law & Security was combined with Community and Social Services, Manufacturing was combined with Planning and Construction, and Health was combined with Service Sector (because most Health courses at level 2 related to food safety).

Grades are calculated based on all standards and alternatively based on achievement standards only. In both cases, standards are used in the calculation if they are at NCEA level 2 and were attempted in or before the year the student gained NCEA level 2. Calculations are as follows:

- Grade in achievement standards (used in 3a): These are credit-weighted. Not attained = 0, attained = 1, merit = 2, and excellence = 3.
- Grade in all standards (used in 6 and 9): These are credit weighted. For achievement standards, not attained = 0, attained = 1, merit = 2, and excellence = 3. For unit standards, attained = 1 and not attained is omitted because data on these are very incomplete.

Appendix 3 – Subfields contributing to level 2 specialties

Specialty	**Subfields**
Māori	Whakairo, Reo Māori, Te Mātauranga Māori me te Whakangungu, , Ngā Mahi ā te Whare Pora, Mana Wāhine, Tikanga, General Education Māori, Hauora, Māori Performing Arts, Ngā Mahi ā te Rēhia, Whenua, Funeral Services Māori, Seafood Māori, Tourism Māori, Reo Māori Media, Māori Business and Management, Environment Māori, Marae Catering, Te Ara Nunumi - Bereavement Pathways Māori, Manaaki Marae - Marae Hospitality, Mau Rākau, Te Marautanga o Aotearoa.
Humanities	Communication Skills, Christian Theology, Christian Ministries, Religious Studies, English, Women's Perspectives, Languages, Health and Physical Education, International Languages For Industry, Pacific Studies, Sports Education, Christian Studies.
Social Sciences	Social Science Studies, Economic Theory and Practice.
Sciences	Mathematics, Statistics and Probability, Science, Home and Life Sciences, Environment.
Arts & Crafts	Graphic Arts, Photography, Art, Film and Electronic Media, Photographic Imaging, Music, Dance, Craft, Drama, Performing Arts General, Film and Television, Performance Production, Electronic Media, Professional Acting, Visual Arts, Niue Arts and Crafts, Tongan Arts and Crafts.
Computing & IT	Computer Programming, Information Processing, Information Technology, Computing.
Business	Accounting, Business Administration, Financial Management, Information Management, Management, Marketing, Office Systems, Public Relations, Insurance, Public Sector Services, Not for Profit Systems and Structures, Business Operations and Development, Business Environment.
Agriculture, Forestry & Fisheries	Land Skills, Agriculture, Conservation, Forestry, Horticulture, Pest Management, Solid Wood Processing, Equine, Animal Care and Handling, Pork Production, Wool Harvesting, Seafood, Rural Contracting, Mahi Hi Ika, Poultry Production, Sports Turf, Greyhound Racing Industry, Primary Sector.
Community & Social Services and Law and security	Human Services, Fire Fighting, Journalism, Fitness, Sport, Diving, Community Support, Social Services, Civil Defence, Community Recreation, Outdoor Recreation, Ski, Fire and Rescue Services, Career Practice, Community and Workplace Fire and Emergency Management, Snowsport, Specialist Rescue, Civil Defence Emergency Management, Health, Disability, and Aged Support, Recreation and Sport, Justice Administration, Compliance and Law Enforcement, Security, Offender Management, Biosecurity, Police, Defence, Cadet Forces, Public Sector Compliance.

Education	Adult Education and Training, Educational Administration, Special Education, Generic Education and Training, Early Childhood Education and Care, Pacific Islands Early Childhood Education.
Service Sector and Health	Service Sector Skills, Driving, Hairdressing, Tourism, Transport Studies, Distribution, Cleaning and Caretaking, Commercial Road Transport, Lifting Equipment, Maritime, Beauty Services, Cranes, Real Estate, Hospitality, Funeral Services, Aviation, Stevedoring and Ports Industry, Retail and Wholesale, Storekeeping and Warehousing, Call Centres, Rail Transport, Logistics, Retail, Distribution, and Sales, Contact Centres, Resource Recovery, Solid Waste, Financial Services, Zero Waste, Health Studies, Health Administration, Public Health, Emergency Services, Natural and Traditional Health and Healing, Occupational Health and Safety, Mental Health, Pharmacy.
Engineering & Technology	Design, Aeronautical Engineering, Electrical Engineering, Electronics, Mechanical Engineering, Telecommunications, Roading Technology, Motor Industry, Industrial Measurement and Control, Electronics Technology, Highway Construction and Maintenance, Civil Plant Operation and Management, Civil Works and Services, Pavement Surfacing, Electricity Supply, Petrochemical Industry, Extractive Industries, Technology, Gas Industry, Civil Engineering, Blaster Coating, Water Industry, Electronic Engineering, Hot Dip Galvanizing, Drilling Industry, Metalliferous Mining, Explosive Atmospheres, Infrastructure Civil Engineering, Infrastructure Works.
Manufacturing, Planning, & Construction	Clothing Manufacture, Food Processing, Furniture Trades, Glass and Glazing, Outdoor Fabric Products, Plastics Processing Technology, Printing, Textiles Manufacture, Joinery, Dairy Manufacturing, Paperboard Case Manufacturing, Wood Panels Manufacturing, Footwear and Leather Trades, Manufacturing Skills, Pulp and Paper Manufacturing, Meat Processing, Industrial Machine Knitting, Energy and Chemical Plant, Food and Related Products Processing, Steel Manufacturing, Leather Manufacturing, Solid Wood Processing, Boating Industries, Furniture, Meat Inspection Services, Cablemaking, Supply Chain Management, Wood Processing Technology, Coatings, Inks, and Adhesives, Pharmaceutical and Allied Products, Fibreboard Packaging, Solid Wood Manufacturing, Wood Fibre Manufacturing, Wood Handling and Distribution, Wood Manufacturing - Generic Skills, Industrial Textile Fabrication, Animal Product Examination Services, Baking Yeasts Manufacturing, Composites, Fellmongery and Leather Processing, Construction Trades, Painting and Decorating, Plumbing, Gasfitting and Drainlaying, Surveying, Construction Trade Skills, Construction, Masonry, Concrete, Decorative Fixtures and Finishes.

Appendix 4 – Calculation of percentile scores

Comparison of academic performance across unit standardised courses is fairly straightforward as achievement is measured on a pass/fail scale. This means academic performance can be measured by the quantity of credits obtained. In the case of academic standardised courses, however, credits can be obtained at various levels; achieved, merit, and excellence. Thus comparing quantity of credits obtained is less informative. To compare such credits, we turn to Ussher (2008).

Ussher (2008) analyse various academic measures (including cumulative score,[47] grade point average,[48] and expected percentile[49]) to determine which best captures quality (and quantity) of academic performance. They find grade point average and expected percentiles capture quality well, and total credits achieved at merit or excellence and cumulative score captures both quality and quantity aspects of academic achievement. Noting that academic performance in school is correlated with higher rates of tertiary study, they run simple regressions of each outcome with various controls to determine which has the most explanatory power in predicting students transitions to tertiary education. Controls include geographic access, school roll size, peer influence, gender, ethnic group, years at secondary, school decile, school authority and school gender. They conclude that expected percentile score is most informative due to one distinguishing feature: it captures relative performance in each standard rather than absolute performance, thus it adjusts for the fact some standards are more difficult than others.

Hence, in this research we chose to use expected percentile scores as a measure of the quality of achievement standard credits. Specifically, we use the expected percentile score created by the Ministry of Education based on level 2 NCEA grades for students in the year in which the student gained NCEA level 2. We also use these percentile scores to define the top academically performing students. Top 10% students are defined as the 10% of students with the highest percentile scores in our sample.

[47] Cumulative scores were calculated by assigning a score based on achievement for each credit. 0 was assigned for 'not achieved', 2 assigned for 'achieved', 3 for 'merit' and 4 for 'excellence'. For each standard, the student's result value was multiplied by number of credits set for that standard. This generates a raw score for each achievement standard. A student's raw scores for all achievement standards were then added to obtain the cumulative score.

[48] The grade point average was introduced by the New Zealand Qualifications Authority (NZQA) to indicate a student's average performance across a group of achievement standards (NZQA 2005). The grade point average was calculated by dividing the cumulative score for a student by the maximum possible score (the maximum possible score was all excellence results).

[49] The expected percentile was developed for analysing NCEA results by Michael Johnston at NZQA. This measure was calculated from the results distribution of all achievement standards, including the percentage and cumulative percentage for each result. From the cumulative percentages the expected percentile of each result was calculated.

Appendix 5 – Calculation of tertiary fees

The IDI contains data on student fees charged by tertiary institutions that report to the Ministry of Education, which we use to capture the direct financial cost of study.

Domestic student fees are reported on a student-course basis. We add the course fee, compulsory course cost, and other fee components for each course and sum over all courses taken by the student at the education provider in the year to create a total domestic fee.

Tertiary institutes may report international student fees to the Ministry of Education at the student-course level, student-year level, or both. To avoid double-counting, we add up fees reported at the student-course level to the student-institute-year level and take the maximum of this sum and international fees reported by the provider at the student-year level.

Because international students may have both domestic fee and international fee fields populated, to avoid double-counting we take the maximum of domestic and international fees for each student-provider-year. We cap this value at $20,000 in real 2020 terms to limit the impact of data errors. We chose this as an annual cap for two reasons. First, it is a reasonable estimate of maximum course fees in a year (Collier, 2021). Second, in our data 99% of annual fees are below this level. Any fees above this level become $20,000.

Finally, we sum these provider-level fees over providers to give a total for each student in each year.

Appendix 6 – Subfields contributing to tertiary fields of study

Fields of study and qualification at the tertiary level are based on the New Zealand Standard Classification of Education (NZSCED), detailed here.

Field	**Sub-Fields**	**Detailed Sub-Fields**
Natural and Physical Sciences	Mathematical Sciences, Physics and Astronomy, Chemical Sciences, Earth Sciences, Biological Sciences, Other Natural and Physical Sciences	Mathematics, Statistics, Mathematical Sciences not elsewhere classified, Physics, Astronomy, Organic Chemistry, Inorganic Chemistry, Chemical Sciences not elsewhere classified, Atmospheric Sciences, Geology, Geophysics, Geochemistry, Soil Science, Hydrology, Oceanography, Earth Sciences not elsewhere classified, Biochemistry and Cell Biology, Botany, Ecology and Evolution, Marine Science, Genetics, Microbiology, Human Biology, Zoology, Neuroscience, Biological Sciences not elsewhere classified, Medical Science, Forensic Science, Food Science and Biotechnology, Pharmacology, Laboratory Technology, Natural and Physical Sciences not elsewhere classified.
Information Technology	Computer Science, Information Systems, Other Information Technology	Formal Language Theory, Computer Applications and Programming, Computational Theory, Compiler Construction, Algorithms, Data Structures, Networks and Communications, Multimedia Computing Science, Operating Systems, Artificial Intelligence, Computer Science not elsewhere classified, Conceptual Modelling, Database Management, Systems Analysis and Design, Decision Support Systems, Information Systems not elsewhere classified, Security Science, Information Technology not elsewhere classified.
Engineering and Related Technologies	Manufacturing, Engineering and Technology, Process and Resources Engineering, Automotive Engineering and Technology, Mechanical and Industrial Engineering and Technology, Civil	Manufacturing Engineering, Printing, Textile Making, Garment Making, Plastics Processing Technology, Footwear Making, Wood Machining and Turning, Cabinet Making, Furniture Upholstery and Renovation, Furniture Polishing, Manufacturing Engineering and Technology not elsewhere classified, Chemical Engineering, Mining and Resources Engineering, Wood Based Manufacturing, Materials Engineering, Ceramics, Industrial Glass and Rubber Manufacturing, Food (excluding Seafood) Processing Technology, Seafood Processing, Process and Resources Engineering not elsewhere classified, Automotive Engineering, Vehicle Mechanics, Automotive Electrics and Electronics, Automotive Vehicle Refinishing, Automotive Body Construction, Panel Beating, Upholstery and Vehicle Trimming, Automotive Vehicle Operations, Automotive Engineering and Technology not elsewhere classified, Mechanical Engineering, Industrial Engineering, Toolmaking, Metal Fitting,

	Engineering, Geomatic Engineering, Electrical and Electronic Engineering and Technology, Aerospace Engineering and Technology, Maritime Engineering and Technology, Other Engineering and Related Technologies	Turning and Machining, Sheetmetal Working, Boiler-making and Welding, Metal Casting and Pattern Making, Precision Metalworking, Plant and Machine Operations, Mechanical and Industrial Engineering & Technology not elsewhere classified, Construction Engineering, Structural Engineering, Building Services Engineering, Water and Sanitary Engineering, Transport Engineering, Road Construction, Geotechnical Engineering, Ocean Engineering, Civil Engineering not elsewhere classified, Surveying, Mapping Science, Geomatic Engineering not elsewhere classified, Electrical Engineering, Electronic Engineering, Computer Engineering, Communications Technologies, Communications Equipment Installation and Maintenance, Power Line Installation and Maintenance, Electrical Fitting, Electrical Mechanics, Refrigeration, Heating and Air Conditioning, Electronic Equipment Servicing, Electrical and Electronic Engineering and Technology not elsewhere classified, Aerospace Engineering, Aircraft Maintenance Engineering, Aircraft Operation, Air Traffic Control, Aerospace Engineering and Technology not elsewhere classified, Maritime Engineering, Marine Construction, Marine Craft Operation, Maritime Engineering and Technology not elsewhere classified, Environmental Engineering, Orthotics and Prosthetics, Biomedical Engineering, Fire Technology and Rescue Services, Rail Operations, Cleaning, Engineering and Related Technologies not elsewhere classified.
Architecture and Building	Architecture and Urban Environment, Building	Architecture, Urban Design and Regional Planning, Landscape Architecture, Interior and Environmental Design, Architecture and Urban Environment not elsewhere classified, Building Science and Technology, Building Construction Management, Building Surveying (Inspection), Building Construction Economics (including Quantity Surveying), Bricklaying and Stonemasonry, Carpentry and Joinery, Ceiling, Wall and Floor Fixing, Roof Fixing, Plastering, Furnishing Installation, Floor Coverings, Glazing, Painting, Decorating, Sign Writing and Other Finishes, Plumbing, Gas fitting and Drain laying, Scaffolding and Rigging, Building not elsewhere classified.
Agriculture, Environmental and Related Studies	Agriculture, Horticulture and Viticulture, Forestry Studies, Fisheries Studies, Environmental Studies, Other Agriculture,	Agricultural Science, Wool and Fibre Science, Beekeeping, Animal Husbandry, Crop Production, Equine Trades, Wool and Fibre Harvesting, General Land Skills, Agriculture not elsewhere classified, Horticulture, Viticulture, Forestry Studies, Solid Wood Processing, Aquaculture, Seafood Harvesting (Fishing), Fisheries Studies not elsewhere classified, Land, Parks and Wildlife Management,

	Environmental and Related Studies	Environmental Sustainability, Environmental Studies not elsewhere classified, Pest and Weed Control, Agriculture, Environmental and Related Studies not elsewhere classified.
Health	Medical Studies, Nursing, Pharmacy, Dental Studies, Optical Science, Veterinary Studies, Public Health, Radiography, Rehabilitation Therapies, Complementary Therapies, Other Health	General Medicine, Surgery, Psychiatry, Obstetrics and Gynaecology, Paediatrics, Anaesthesiology, Pathology, Radiology, Internal Medicine, General Practice Medicine, Medical Studies not elsewhere classified, Nursing, Midwifery, Health Care Assistant, Nursing not elsewhere classified, Pharmacy, Dentistry, Dental Hygiene and Therapy, Dental Technology, Dental Studies not elsewhere classified, Optometry, Optical Technology, Optical Science not elsewhere classified, Veterinary Science, Veterinary Assisting, Veterinary Studies not elsewhere classified, Occupational Health and Safety, Environmental Health, Hauora (Māori Health), Health Education, Promotion, Counselling, Community Health, Epidemiology, Public Health not elsewhere classified, Medical Imaging Technology (Radiography) and Radiation Therapy, Physiotherapy, Occupational Therapy, Chiropractic and Osteopathy, Speech Pathology, Audiology, Massage Therapy, Podiatry, Rehabilitation Therapies not elsewhere classified, Naturopathy and Homeopathy, Acupuncture, Traditional Chinese Medicine, Complementary Therapies not elsewhere classified, Nutrition and Dietetics, Human Movement and Sports Science, Paramedical Studies, First Aid, Health not elsewhere classified.
Education	Teacher Education, Curriculum and Education Studies, Other Education	Teacher Education: Early Childhood (Pre-Service), Teacher Education: Primary (Pre-Service), Teacher Education: Secondary (Pre-Service), Teacher Education: Tertiary, Teacher Education: General (Pre-Service), Teacher Education: Special Education, English Language Teaching(ESOL/EFL), Te Mātauranga Māori me te Whakangungu (Māori Education), Bilingual Early Childhood Teacher Training (Pre-Service), Immersion Early Childhood Teacher Training (Pre-Service), Bilingual Primary Teacher Training (Pre-Service), Immersion Primary Teacher Training (Pre-Service), Bilingual Secondary Teacher Training (Pre-Service), Immersion Secondary Teacher Training (Pre-Service), Teacher Professional Development, Teacher Education not elsewhere classified, Curriculum Studies, Education Studies, Education not elsewhere classified.
Management and Commerce	Accountancy, Business and Management, Sales and Marketing,	Accounting, Accountancy not elsewhere classified, Business Management, Human Resource Management, Personal Management Training, Organisation Management, Industrial Relations, International Business, Education Administration, Public and Health Care Administration, Project

	Tourism, Office Administration, Banking, Finance and Related Fields, Other Management and Commerce	Management, Quality Management, Hospitality Management, Racing and Gaming Management, Farm Management and Agribusiness, Tourism Management, Business and Management not elsewhere classified, Sales, Real Estate, Marketing, Advertising, Public Relations, Sales and Marketing not elsewhere classified, Tourism Studies, General Office Administration, Text and Information Processing, Office Administration not elsewhere classified, Banking and Finance, Insurance and Actuarial Studies, Investment and Securities, Banking, Finance and Related Fields not elsewhere classified, Purchasing, Warehousing and Distribution, Valuation, e-Commerce, Management and Commerce not elsewhere classified.
Society and Culture	Political Science and Policy Studies, Studies in Human Society, Human Welfare Studies and Services, Behavioural Science, Law, Justice and Law Enforcement, Librarianship, Information Management and Curatorial Studies, Language and Literature, Philosophy and Religious Studies, Economics and Econometrics, Sport and Recreation, Other Society and Culture	Political Science, Policy Studies, Sociology, Anthropology, History, Art History, Archaeology, Classics, Human Geography, Tikanga - Māori Customs, Women's Studies, Studies in Human Society not elsewhere classified, Social Work, Children's Services, Nannying and Early Childhood Care, Youth Work, Support for the Older Person, Care for People with Disabilities, Community Client Care, Counselling, Welfare Studies, Human Welfare Studies and Services not elsewhere classified, Psychology, Behavioural Science not elsewhere classified, Business and Commercial Law, Constitutional Law, Criminal Law, Family Law, International Law, Taxation Law, Legal Practice, Law not elsewhere classified, Justice Administration, Legal Studies, Police Studies, Justice and Law Enforcement not elsewhere classified, Librarianship and Information Management, Curatorial Studies, English Language, Te Reo Māori, Foreign Languages, English for Speakers of Other Languages, Translating and Interpreting, Linguistics, Literature, Language and Literature not elsewhere classified, Philosophy, Religious Studies, Economics, Econometrics, Sport and Recreation Activities, Sports Coaching, Playing, Officiating and Instructing, Sport and Recreation not elsewhere classified, Community, Whanau, Family and Consumer Studies, Cultural Studies, Criminology, Security Services, Society and Culture not elsewhere classified.

Creative Arts	Performing Arts, Visual Arts and Crafts, Graphic and Design Studies, Communication and Media Studies, Other Creative Arts	Music, Drama and Theatre Studies, Dance, Ngā mahi a rēhia (Māori Performing Arts), Performing Arts not elsewhere classified, Fine Arts, Photography, Crafts, Mana Whakairo (Māori Carving), Jewellery Making, Floristry, Visual Arts and Crafts not elsewhere classified, Graphic Arts and Design Studies, Textile Design, Fashion Design, Ngā Mahi a te Whare Pora (Māori Weaving), Graphic and Design Studies not elsewhere classified, Audio Visual Studies, Journalism, Communication and Media Studies, Written Communication, Verbal Communication, Multimedia studies, Communication and Media Studies not elsewhere classified, Creative Arts not elsewhere classified.
Food, Hospitality and Personal Services	Food and Hospitality, Personal Services	Hospitality, Food and Beverage Service, Butchery, Baking and Pastry Making, Cookery, Food Hygiene, Food and Hospitality not elsewhere classified, Beauty Therapy, Hairdressing, Personal Services not elsewhere classified.
Mixed Field Programmes	General Education Programmes, Social Skills Programmes, Employment Skills Programmes, Other Mixed Field Programmes	General Primary and Secondary Education, Literacy and Numeracy Programmes, Learning Skills Programmes, General Education Programmes not elsewhere classified, Social and Interpersonal Skills Programmes, Life Skills, Family/Whānau Education, Social Skills Programmes not elsewhere classified, Career Development Programmes, Job Search Skills Programmes, Work Practices Programmes, Employment Skills Programmes not elsewhere classified, Mixed Field Programmes not elsewhere classified.

Appendix 7 – Summary of results by specialty

This section summarises for each of the 15 specialties the pathways through education that are associated with strong labour market outcomes. It focuses within each specialty in turn, summarising the pathways of the men and women who perform better in the labour market when compared with their same-gender peers in the specialty. Details of the analysis that led to the results for each specialty presented here, and a fuller discussion of the findings, are in the specialty profiles, published separately. Note the relationships described here are not necessarily causal.

Māori

Māori students who specialised in Māori are defined as students who showed strong results in NCEA level 2 standards in subjects such as te reo Māori, tikanga, and Māori performing arts. These students display an enormous gender savings gap, with women having much lower cumulative and annual savings than men 12 years after NCEA level 2. This gap suggests a lot of such women don't perform paid work, or work a low number of hours for pay.[50]

Over 50% of men and over 60% of women who specialised in Māori at level 2 gain qualifications at level 4 or above. Women do well if they gain level 7 qualifications, and even better if they gain level 8 or higher qualifications. An alternative option associated with strong outcomes for women is an industry training qualification at level 3 or 4. For men, level 7 qualifications are not so clearly beneficial, though level 8 or higher qualifications yield the highest cumulative and annual savings. As for women, a less academic option associated with very strong labour market outcomes is a level 3 or 4 industry training qualification.

Society and Culture and Creative Arts are two fields of study that could naturally build off the skills students gain studying Māori language and culture at level 2. Both are pursued by a sizeable proportion of men and women. For men, neither field is associated with strong savings, but Creative Arts in particular is associated with weak savings, especially if the man completes a qualification or studies at level 7 or above. In contrast, Creative Arts leads to stronger outcomes for women than does Society and Culture, though neither is in general particularly beneficial for savings. The exception is that women who gain a qualification at level 7 or above in one of these fields, especially in Creative Arts, tend to have strong outcomes.

Men who specialised in Māori who study Engineering and Related Technologies tend to do well in the labour market. Although few men pass a significant number of courses in this field at

[50] In addition, many are likely to be working for a low hourly wage.

level 4 or higher, the field is associated with strong outcomes even at lower levels. Men who are not academically inclined but want to maximise their savings might find Engineering and Related Technologies a good field to study even at level 2 or 3. Women often do well if they study Education at level 7 or above.

Many men gain early work experience in the Construction industry, the Public Administration and Safety industry, or the Education and Training industry. All three tend to lead to strong outcomes. The more common industries in which women gain work experience tend to be associated with weak labour market outcomes. Experience in the Public Administration and Safety industry is less common for women than for men, but is associated with strong outcomes for those who get it.

Humanities

Māori students who specialised in Humanities are defined as students who showed strong results in NCEA level 2 standards in subjects such as English, languages (other than te reo Māori), and health and physical education. These students have a strong tendency to gain high level qualifications, particularly if they are women. Although women in this specialty clearly perform better in the labour market if they gain bachelor's level or higher qualifications, the financial benefit to men of higher qualifications is less clear. Industry training qualifications are very financially rewarding for men, especially at higher levels. Men with such qualifications at level 4 or above have higher cumulative and annual savings after 12 years than do the best-performing men without industry training qualifications (those with qualifications at level 8 or above). In contrast, industry training qualifications appear to have only weak benefits for women, who have the strongest outcomes if they gain a level 7 qualification.

The most common field of higher study for both men and women is Society and Culture, which tends to be associated with weak labour market outcomes.

Men perform best if they gain a qualification in Engineering and Related Technologies at level 4 or above. Those with such qualifications at the bachelor's level have even higher annual savings, but lower cumulative savings. Study at any level in Management and Commerce is associated with strong annual savings for men. However, study in Health or Education at levels 4 to 6 tends to lead to weak outcomes.

Women perform very well if they study Management and Commerce at level 7 or above, or Engineering and Related Technologies at any level, though both of these are relatively rare. The 7% of women who gain a qualification in Health at level 7 or above (which includes medical degrees) also do very well in the labour market. Notably, these three fields that are associated with the strongest outcomes for women are at best weakly related to the specialty Humanities,

and not all students with this specialty may have the background or interest to pursue any of the three.

Those who gain early work experience in central government tend to enjoy subsequent success in the labour market, and this is particularly true for women. Women also tend to do well if they get work experience in the Public Administration and Safety industry or the Education and Training industry. No specific industries are associated with very strong labour market trajectories for men, but experience in Construction or Manufacturing tends to be associated with stronger outcomes than does experience in Retail Trade.

Social Sciences

Students who specialised in Social Sciences are defined as students who showed strong results in NCEA level 2 standards in social science studies or economic theory and practice. They are very likely to be European as well as Māori, are relatively likely to attend a high decile school, and tend to be quite academically able. They are likely to complete tertiary education: the highest qualification of nearly 35% of men and 40% of women is a level 7 qualification, and at least 10% of each gender gain even higher qualifications.

Women in this specialty do best in the labour market if their highest qualifications are level 7 or above, particularly if they are level 8 or above. The story for men is less clear. Those with level 7 or higher qualifications tend to have somewhat high annual savings after 12 years, but their cumulative savings may not catch up with those of men with level 4 or 6 qualifications for 15 or more years after NCEA level 2. In the long term, those with level 8 or higher qualifications may do best. Industry training qualifications at level 4 or higher tend to be associated with strong outcomes for men (though not for women), but only 9% of men gain such qualifications. Practical fields may not hold huge appeal for these more academically-inclined students, or it may be that they are not encouraged into such fields.

Two common fields of higher study for both genders are Society and Culture and Creative Arts. In general, such study is associated with weak outcomes. The exception is qualifications in Creative Arts at bachelor's level and above for men, which are associated with strong annual savings and decent cumulative savings. Men and women who gain bachelor's degrees or higher in Management and Commerce tend to do fairly well, but men who study Natural and Physical Sciences do poorly, especially if they study at higher levels. Men and women who study Health at levels 4 to 6 tend to have weak outcomes. Only 7% of women study health at level 7 or higher, though most of these complete their qualifications. These women have very strong outcomes. Although most women who specialise in Social Sciences will not have the background or ability to get into medical school, those who do are likely to do well in the labour market. Relatively few

men study Engineering and Technology or Architecture and Building, but those who do tend to achieve both high cumulative and annual savings.

The 8% of men with early work experience who ever work in the Professional, Scientific, and Technical Services industry tend to do well, as do women who gain experience in the Public Administration & Safety industry (9% of women with work experience) or the Education and Training industry (10%).

Sciences

Māori students who specialised in Sciences are defined as students who showed strong results in NCEA level 2 standards in subjects such as mathematics, statistics and probability, and physical sciences. Seventy percent of these students go on to gain a qualification at level 4 or above. Such qualifications seem to benefit both men and women in the labour market, but qualifications at level 7 and above have clear benefits only for women. For men, they have a high opportunity cost, and the increase in annual earnings they give is not necessarily large enough to compensate. For men, industry training at level 4 or above yields strong labour market outcomes. Women who do industry training at level 3 or higher also tend to do well compared with similar students without this training.

In terms of field of study, qualifications in Engineering and Related Technologies at level 4 and above lead to exceptionally high cumulative and annual savings for the 17% of men and tiny number of women who gain them. If they are at level 7 or higher, they are associated with even higher annual savings, but lower cumulative savings for men.

Higher study in Natural and Physical Sciences is a natural extension of Sciences in school, but tends to lead to weak outcomes, particularly for men and if the study is below level 7. Qualifications at level 7 or higher in Health or in Management and Commerce are associated with strong annual savings for both genders, though Health yields low cumulative savings for men.

Early work experience in Central Government seems to set women on a path that leads to higher annual savings later on, but benefits men only through higher cumulative savings. However, experience in Professional, Scientific, and Technical Services for the 8% of men with work experience who gain it is linked with higher annual savings years later. The most common industries for early work experience, Retail Trade and Accommodation and Food Services, are both dominated by women and are associated with low annual and cumulative savings.

Arts and Crafts

Māori students who specialised in Arts and Crafts are defined as students who showed strong results in NCEA level 2 standards in subjects such as art, music, and drama. Many such students

pursue tertiary qualifications. Qualifications at level 7 and above provide dubious labour market benefit to men, but tend to be associated with stronger outcomes for women than are lower level qualifications, even after accounting for the opportunity cost of higher education and when comparing students with similar backgrounds. For men, industry training at level 3 or 4 is a popular pathway and is associated with strong outcomes regardless of whether it results in a formal qualification.

The most common fields of higher study for both men and women are Creative Arts and Society and Culture. Neither is associated with particularly strong labour market outcomes (the exception being that women who gain a qualification in Society and Culture at level 7 or above tend to do well).

Engineering and Related Technologies seems to be a beneficial field for men to study at any level, and Health and Management and Commerce at levels 7 and above seem beneficial for women. However, not all students who specialise in Arts and Crafts may have the background for these fields. Finally, those who gain early work experience in the industry of Public Administration and Safety tend to enjoy subsequent success in the labour market, and this is especially true for women.

Computing and Information Technology

Māori students who specialised in Computing and IT are defined as students who showed strong results in NCEA level 2 standards in computing, computer programming, information processing, or information technology. Many such students finish their formal education with only a level 2, 3, or 4 qualification, though a quarter to a fifth gain a bachelor's level qualification and about 4% a postgraduate qualification. Women who gain higher qualifications seem to benefit from them, with those who complete a bachelor's degree having stronger savings than those with lower qualifications, and those with higher degrees having even stronger savings. In contrast, men seem to do best with level 4 qualifications. Although the few men who gain level 9 or 10 qualifications have slightly higher annual savings after 12 years, their cumulative savings are so much lower they may take another decade or longer to catch up.

Industry training is relatively common for men and less common for women, but both genders do well from it. In regressions that control for student background, higher level industry training qualifications are associated with higher cumulative and annual savings. Men with industry training qualifications at level 4 or above and women with such qualifications at level 5 or 6 have higher cumulative and annual savings than similar students with postgraduate degrees.

The field of higher study associated with the strongest outcomes for men is Engineering and Related Technologies, in which 12% of men gain a qualification at level 4 or above.

Outcomes of students in this field are even stronger if they complete a qualification. Management and Commerce is another common field for men, but is beneficial only for those who gain a qualification at bachelor's level or above. Two common fields of study for men associated with weak outcomes are Society and Culture and Information Technology. While Society and Culture tends to lead to weak savings in general, Information Technology does only if studied at levels 4 to 6, not if studied at higher levels.

Many fields are associated with strong outcomes for women if studied at level 7 or above. Management and Commerce, Information Technology, and Health are all associated with strong or very strong outcomes when studied at this level, but with weak outcomes when studied at levels 4 to 6. Engineering and Related Technologies is seldom studied by women, but those who do study it at any level have very strong outcomes. In contrast, the more common fields of Society and Culture and Creative Arts tend to lead to weak outcomes regardless of level of study.

It is perhaps surprising how few students who specialise in Computing at IT at level 2 go on to study Information Technology at level 4 or above. However, the study of Information Technology does not seem to lead to strong outcomes except for the few women who study it at level 7 or above. At this level it is likely to require moderate mathematical background, which may be a barrier for many students in this specialty: only 31% of men and 25% of women pass at least 14 credits of mathematics at level 2. The generally low returns to studying Information Technology mean it may not be a fruitful route to try to encourage more students from this specialty into.

Finally, men who gain early work experience in the Professional, Scientific, and Technical Services industry tend to enjoy success in the labour market, as do women who gain experience in central government, the Public Administration and Safety industry, or the Education and Training industry.

Business

Māori students who specialised in Business are defined as students who showed strong results in NCEA level 2 standards in subjects such as accounting, marketing, and financial management. The Business specialty is unusual in that it is the only specialty in which men on average achieve higher qualifications than women. However, women appear to benefit comparatively more from gaining qualifications at level 7 or above than do men. On average, qualifications at bachelor's level or above may not pay off financially for men compared with qualifications at levels 4 to 6. For women, such higher level qualifications are strongly associated with stronger performance in the labour market, even when controlling for students' background characteristics.

One of the reasons level 4 to 6 qualifications are comparatively lucrative for men is that a non-trivial proportion of men gain industry qualifications at this level, and these qualifications have a higher payoff in the labour market than even level 8 qualifications. Women are less likely than men to do industry training, and for them it seems not to offer the same labour market benefits. This could be because women tend to do industry training in different industries to men, but we do not explore this possibility here.

Management and Commerce, a natural extension of the Business specialty, is men's most common field of study at level 4 or above, but is not associated with particularly strong outcomes. However, men do tend to do well if they study the popular field of Engineering and Related Technologies at this level. Qualifications in Society and Culture at levels 4 to 6, study in Natural and Physical Sciences or Health at level 4 or above, and Education study at levels 4 to 6 that doesn't lead to a qualification are all associated with weak labour market outcomes for men.

Management and Commerce is also a common field of higher study for women. While at levels 4 to 6 this study benefits them only insignificantly, if they study the field at level 7 or above their outcomes tend to be substantially stronger. Qualifications in Society and Culture, and study in Education below level 7 are associated with weak outcomes for women. However, the relatively small proportions of women who study Health or Engineering and Technology at bachelor's level or above tend to do well.

For both genders, early career work experience in central government or in the Public Administration and Safety industry appears beneficial, as does Wholesale Trade experience for men. However, none of the most common industries where students gain work experience are particularly associated with labour market success.

Agriculture, Forestry, and Fisheries

Māori students who specialised in Agriculture, Forestry, and Fisheries are defined as students who showed strong results in NCEA level 2 standards in subjects such as agriculture, horticulture, and animal care and handling. Too few women specialised in this field at level 2 for us to draw conclusions about them, so our results here focus on men. We do note, however, that wāhine Māori in this area may find themselves a small minority, which could have negative effects. Most men in this specialty gain highest qualifications at level 2, 3 or 4. Although men who attain higher levels of qualification have stronger labour market outcomes, this seems mostly to be because they have background characteristics that mean they would do better regardless of their qualifications. In regressions that control for student background, no level of non-industry training qualification offers men a substantially or significantly higher probability of being a top

saver than just a level 2 qualification. The labour market returns to industry training at level 4 or above are slightly higher than to other sorts of qualifications, but are still modest in size and statistically insignificant.

The generally very low labour market returns to qualifications for men who specialised in Agriculture, Forestry, and Fisheries could have a number of possible explanations. One possibility is that too many men are gaining qualifications in fields that offer low earnings potential. For instance, men who get a qualification in Society and Culture at level 4 and above have lower cumulative and annual savings than men with no qualification at level 4 or above. However, comparing the savings of men who specialised in Agriculture, Forestry, and Fisheries with those of men in other specialties suggests another explanation. Twelve years after NCEA level 2, the median man in this specialty has cumulative savings of just over $200,000, which is higher than in most other specialties, and annual savings in the ballpark of most other specialties. Thus it is possible men in this specialty manage to do fairly well in the labour market primarily by pursuing practical types of careers and learning on the job, even though they may not have high levels of formal qualifications. Their two most common industries for early work experience, Agriculture, Forestry, and Fishing and Construction, are both very practical industries. However, we examine students' outcomes for only 12 years after NCEA level 2, and it is possible the low levels of qualifications gained by most of these men limit the long term growth potential of their earnings.

A substantial proportion of men who specialised in Agriculture, Forestry, and Fisheries go on to study Agriculture, Environmental, and Related Studies at higher levels. At levels 4 to 6, this seems to have little impact on their outcomes relative to leaving education, but the low proportion of men who study this field at level 7 or above have very weak outcomes.

Despite these overall patterns, higher study in some fields does seem to yield men labour market benefits. Level 4 to 6 qualifications in Engineering and Related Technologies are particularly associated with a greater likelihood of being a top saver, and such qualifications in Architecture and Building may also be beneficial.

Community and Social Services

Māori students who specialised in Community and Social Services are defined as students who showed strong results in NCEA level 2 standards in subjects such as journalism, disability and aged support, and recreation and sport. Many such students end their education with only a level 2, 3, or 4 qualification, but 20% of men and 30% of women gain a bachelor's level qualification. This higher qualification provides women with a substantial labour market advantage, but men who gain qualifications at level 7 or above pay a high opportunity cost of

the study and barely increase their earnings, meaning this investment may not pay off financially in the long term. However, many men undertake industry training, and if they gain such a qualification at level 3 or above they tend to experience considerable labour market success. This is even more true if their industry training qualification is at level 4 or above. Women who do industry training appear to benefit little, possibly because they train in different fields to men.

The most common field of higher study for both men and women is Society and Culture, but this appears to provide little labour market benefit to either gender compared with leaving education after level 3.

Men tend to do very well if they study Engineering and Related Technologies at levels 4 to 6 (though not if they study it at higher levels), and fairly well if they study Management and Commerce at level 7 or above. The common field of Architecture and Building does not obviously improve men's labour market outcomes.

Management and Commerce at level 7 or above may also benefit women, though the evidence for this is weak statistically due to the small sample. In contrast, women who study Education or Creative Arts at levels 4 to 6 are more likely to have poor outcomes. Finally, women who gain early work experience in central government or the Public Administration and Safety industry tend to enjoy subsequent success in the labour market.

Education

Māori students who specialised in Education are defined as students who showed strong results in NCEA level 2 standards in subjects such as early childhood education and care. Education is the most female-dominated specialty and consists almost solely of women. We thus discuss results only for women. A third of women in this specialty gain level 7 qualifications, but highest qualifications at levels 2 to 4 are also common. Women who get level 7 or above qualifications experience substantially more success than similar women with lower level qualifications. Among those with lower qualifications, women with only level 3 do better than those with level 4 to 6. Few women pursue industry training, but those who gain industry training qualifications at level 2 or 3 experience strong outcomes.

Among women who gain a qualification at level 4 or above, nearly half get such a qualification in Education. Women who study Education at level 4 to 6, like those who study the other common fields of Society and Culture and Management and Commerce at this level, have somewhat comparatively weak outcomes. However, those who complete bachelor's degrees in any of these three fields tend to do decently. Although the number of women in these fields is

too low for us to say with any certainty, bachelor's level qualifications in Health or Creative Arts also may be financially rewarding.

Women who get early career work experience for central government or in the Administrative and Support Services industry tend to do well, but experience in the Education and Training industry is associated with somewhat low cumulative savings.

Service Sector

Māori students who specialised in Service Sector skills are defined as students who showed strong results in NCEA level 2 standards in subjects such as hospitality, tourism, driving, and hairdressing. Many such students end their education with a highest qualification at level 2, 3, or 4. Less than 15% of men and less than 20% of women gain a bachelor's degree or higher qualification. Men with level 4 qualifications have the strongest savings. Compared with them, the few men with level 8 qualifications have fractionally higher annual savings, but their cumulative savings are so much lower that they may never catch up. Women with level 7 qualifications have higher cumulative and annual savings than women with lower qualifications, even controlling for their backgrounds, and the few with level 8 qualifications have even higher cumulative and annual savings.

Industry training is a common route for men, particularly at low levels. This is associated with strong outcomes even at level 2, though the higher is the level of industry training, the higher are cumulative and annual savings, even when comparing similar students. Industry training is less common for women, and is associated with strong outcomes only if it is at level 4 or above. Whether level 4 industry training or a bachelor's or higher degree is associated with stronger outcomes for women is uncertain. Twelve years after NCEA level 2, women with the industry training qualification have higher cumulative but lower annual savings than women with higher qualifications, even in the regressions that compare similar students. In later years, the cumulative savings of women with industry training qualifications at level 4 or above may well be overtaken by those women with degrees or higher qualifications.

Society and Culture is a common field of study at level 4 or above for both genders. For men, it is associated with weak savings at both levels 4 to 6 and 7 and above, regardless of whether a qualification is completed. For women it is associated with weak savings only at levels 4 to 6.

The most common field of study for men, Management and Commerce, is associated with strong annual savings (that will compensate in future for the average cumulative savings) if men study it at level 7 or above. Men also tend to have strong outcomes if they study Engineering and Related Technologies at level 4 or above.

Women tend to do relatively well if they study either of the relatively common fields of Management and Commerce or Education at level 7 or above. Few women study Health at level 7, but those who do have very strong cumulative and annual savings.

Retail Trade and Accommodation and Food Services, the two most common industries in which men and women gain early career work experience, are both associated with generally weak savings. Work experience in Construction or Manufacturing is associated with stronger savings for men. The small proportion of women who get experience in the Public Administration and Safety industry tend to enjoy subsequent success in the labour market.

Engineering and Technology

Māori students who specialised in Engineering and Technology are defined as students who showed strong results in NCEA level 2 standards in subjects such as electronics, roading technology, and the motor industry. Men and women in this specialty take very different subsequent pathways. Thirty-seven percent of men and only 15% of women gain highest qualifications at level 4, whereas 31% of women and only 12% of men gain highest qualifications at level 7. A high proportion of men study Engineering and Related Technologies, whereas women tend to study a range of more academic subjects. Thirty percent of men gain a qualification in Engineering and Related Technologies at level 4 or above, whereas less than 3% of women do.

The pathway that leads men with this specialty to successful labour market outcomes is clear. Industry training qualifications at level 5 or 6 offer the highest cumulative and annual savings of any type and level of qualification, followed by industry training qualifications at level 4. Men who gain bachelor's degrees or higher qualifications don't do nearly as well on average. They pay a high opportunity cost of their time in education and don't end up with higher annual savings. However, they may gain non-financial benefits, such an enjoying the more academic study or the types of jobs it can lead to. In terms of field of study, men who gain qualifications in Engineering and Related Technologies have the strongest outcomes on balance. Most such men have qualifications at levels 4 to 6; the few who have higher qualifications have (insignificantly) higher annual savings, but much lower cumulative savings. In the long term the higher level of qualifications could pay off, but this is not certain.

Because Engineering and Technology is a very male-dominated specialty even at level 2, the sample of women we have to study is small. From this small sample, a tiny proportion follow the route that is lucrative for men, of industry training qualifications at level 4 to 6, likely in Engineering and Related Technologies. The few women who take this path, like the men, have very strong cumulative and annual savings. The women who gain bachelor's degrees or higher

qualifications have high annual savings (though still lower than those of women with level 4 or higher industry training qualifications), but low cumulative savings. This is especially true for those with qualifications at level 8 or above. On average, women with at least bachelor's degrees have higher cumulative and annual savings 12 years after NCEA level 2 than do women with level 4 to 6 qualifications, but most level 4 to 6 qualifications are not industry training qualifications. The small sample of women makes it difficult to say too much about the other fields of study with which women do well, but Management and Commerce and Health at levels 7 and above appear to offer strong outcomes.

The 28% of men with any early work experience who ever work in the Construction industry tend to do well, as do women who get experience in the Professional, Scientific, and Technical Services industry.

The high proportion of men in this specialty who pursue industry training or Engineering and Related Technologies suggests these are feasible paths for students with the interests and aptitudes that tend to go with the specialty. Furthermore, they are very financially rewarding. It is therefore relevant to ask why so few women in the specialty follow them. We discuss possible reasons in the conclusions section.

Manufacturing, Planning, and Construction

Māori students who specialised in Manufacturing, Planning, and Construction are defined as students who showed strong results in NCEA level 2 standards in subjects such as joinery, construction trades, and textiles manufacture. Very few women have this specialty, so this analysis focuses on men. However, the low number of women in the specialty may mean wāhine Māori in this area are usually a small minority in their fields of study and work, which could have negative effects. Few of these men gain qualifications above level 4, and highest qualifications at levels 2, 3, and 4 are all common. Non-industry training qualifications below level 8 generally don't seem to improve men's labour market outcomes when compared with level 2 non-industry training qualifications. Qualifications at level 8 and above are associated with very strong outcomes, but very few men attain such qualifications, and most men in the specialty are unlikely to have the academic background or interest for this level of study. However, 35% of men gain an industry training qualification at level 3 or above, and this is associated with comparatively strong outcomes.

Men who study Architecture and Building, the most common field for higher study, at levels 4 to 6 tend to do relatively well in the labour market, as do men who study the other common field, Engineering and Related Technologies. The latter is particularly the case for men who gain a qualification in the field at bachelor's level or above. However, men who study

Society and Culture, particularly at level 7 and above, have worse outcomes than similar men who leave education after level 3.

Construction and Manufacturing, the two most common industries in which men gain early work experience, are both associated with moderate savings, though Construction may be a little more beneficial. The two next most common fields, Agriculture, Forestry, and Fishing, and Retail Trade, are both associated with somewhat weaker savings, and experience in Accommodation and Food Services is linked to very weak outcomes.

Generalist

Māori students who were Generalists are defined as students who gained credits in a broad range of subjects at NCEA level 2, but who did not specialise in any particular subject area. These students, who at level 2 may have been disengaged with education or undecided on where their interests lay, tend to achieve low levels of qualification. Around 40% of these men and women do not gain any qualification above level 2, only around 10% of each gender gain level 7, and essentially none gain qualifications above level 7. Accordingly, they have low median cumulative savings, around $100,000 for men 12 years after NCEA level 2 and $10,000 for women. However, some students who are Generalists do very well in the labour market. The 80th percentile of men's cumulative savings at 12 years is around $275,000 and the 80th percentile of women's is about $175,000.

The data available for this small specialty are limited, but those that are available suggest men have the highest probability of being top savers if they gain a level 4 qualification. Men tend to do comparatively well if they do industry training, even at a low level, if their highest qualification (regardless of level) is in Engineering and Related Technologies, or if they attend an industry training organisation. Experience in the Construction industry appears valuable for men.

In contrast, women have the highest probability of doing well in the labour market if they gain a level 7 qualification. As a less academic alternative to a level 7 qualification, industry training seems to be associated with comparatively strong outcomes for women, though fewer women than men take this path. Women who attend university are more likely to do well in the labour market than are women who don't, and women who attend an institute of technology of polytechnic are less likely to do well. There is weak evidence that women who study Education tend to do well, and to some extent also women who study Management and Commerce.

Top 10%

Māori students who are in the top 10% specialty are defined as students whose level 2 percentile scores (a summary measure of grades) at the end of the year they gained NCEA level 2 were in the top 10% of students in our sample. Many Māori students who are in the top 10%

academically at level 2 pursue tertiary qualifications, including at the postgraduate level (above level 7), and they gain bachelor's or higher degrees in a wide range of fields. On average, bachelor's degrees pay off in terms of savings for both men and women, though the benefit for men takes more years to materialise. Both men and women with level 4 industry training qualifications also have relatively strong outcomes, though few men and even fewer women pursue this route, suggesting it may not generally appeal to these relatively academically-inclined students.

Higher level study on average benefits men's and women's savings, but this is not true of study in all fields. In fact, although most post-school study likely offers non-financial benefits, much of it seems not to improve students' savings outcomes. For instance, study at level 4 and above is common in Society and Culture (the most common field for higher study for both genders, but more common for women), Natural and Physical Sciences, Creative Arts, and Education (which is dominated by women), but in none of these fields offers any clear savings benefit to either gender over leaving education after level 3.

However, qualifications in Management and Commerce or Health at the bachelor's level or above are also common, and these offer stronger savings outcomes in the long term than does leaving education without any qualification above level 3. In addition, Engineering and Related Technology, which is a common field of study for men but not women, offers strong savings whether studied at levels 4 to 6 or at level 7 and above.

Finally, both men and women who gain early work experience in the industry of Professional, Scientific, and Technical Services tend to enjoy subsequent success in the labour market.