Evolving Educational Expectations for New Zealand Youth:

Evidence from the Christchurch Health and Development Study

REPORT TO THE LABOUR MARKET POLICY GROUP

NEW ZEALAND DEPARTMENT OF LABOUR

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Table of Contents

Executive Summary

The purpose of this research project is to learn more about the formation of educational expectations by young people and their parents in New Zealand. This research topic has not been widely studied overseas, and no published study to date has examined this issue in this country. This is somewhat surprising given that educational attainment is considered to be one of the key determinants of long-term labour market success. How do these educational expectations of teenagers and their parents evolve over time? Do they become increasingly more accurate in terms of eventual educational attainment? What personal, family and school characteristics best predict the level of these educational expectations?

The Christchurch Health and Development Study (CHDS) provides data on the level of education that young people are expected to complete when these subjects were between the ages of 13 and 16. These reports are available from both teenagers and their parents. In addition, the CHDS provides detailed information on the personal and family backgrounds, cognitive abilities and academic performances, in-school work histories and eventual educational attainment for these subjects.

We find that approximately one-third of the 777 young people in our sample expected at ages 13 through 16 to attend university. This is slightly lower than the proportion of these same individuals who actually did attend university, but slightly higher than the proportion who received a university qualification by age 25. Similar proportions of parents expected their children to attend university, and there is no evidence of any systematic increase or decrease in these expectations over this age range. The accuracy of the expectations formed by subjects and their parents increased steadily over this four-year period in terms of the actual educational attainment of the subjects by age 25. There also appears to be a 'convergence' in these expectations between children and parents (i.e., the estimated correlation coefficients between these independent assessments rise through age 16).

One of the more striking findings in the descriptive statistics from this study is that young people from more 'disadvantaged' backgrounds tend to revise downward their expectations of educational attainment between the ages of 13 and 16. For example, children raised in families that received social welfare benefits *decreased* their expectations of attending university from ages 13 to 16. Children raised in families that never received social welfare benefits *increased* their expectations of attending university over the same age range. This widening gap in the educational expectations between the two groups is validated by actual outcomes on university attendance through age 25. Similar results were found for groups sorted by ethnicity, parental qualifications, family income and scholastic aptitude. Evidence suggests that background characteristics that are related to eventual educational attainment are increasingly incorporated into the expectations formed between the ages of 13 and 16.

Regression analysis is used to look at the 'partial' effects of factors influencing the formation of these educational expectations, while holding other measured characteristics constant. Although the background covariates in these regressions are capable of explaining up to one-third of the variation in educational expectations, none of the individual factors stand out as critically important in this process at every age. Yet, indicators of youth academic abilities (teacher reports on classroom performance, scholastic ability test scores) generally have a positive influence on educational expectations. Parental qualifications and enrolment histories in private schooling are generally associated with higher educational expectations.

Contact with deviant peers, the young person's own conduct problems and truancy history significantly reduce educational expectations only at age 16.

Although there is a strong positive association between average family income and both the educational expectations and eventual educational attainment of children, this relationship disappears once we hold other background factors constant in our regressions. This suggests that any 'income effects' largely operate indirectly through other factors like early academic achievement and enrollment in private primary and secondary schools. The CHDS also provides information on the mean living standards of families. We find that young people raised in families with higher living standards (as assessed by interviewers) are more likely to attend university and receive a university qualification by age 25. This alternative dimension of the family's financial situation does not appear to be fully incorporated into these earlier educational expectations.

There is no evidence in these regressions that early in-school work has any measurable effects over the formation of educational expectations by youth or their parents. Although in-school work has no effect on the probability of attending university, it is found to have a negative impact on the probability of receiving a university qualification by age 25. This last result should be interpreted with caution, since results from another study show that in-school work has no measurable effects on earlier academic achievement (performance on School Certificate exams and the probability of receiving University Bursary).

Regressions on the probability of young people expecting to attend university were re-estimated with the full set of background variables and the expectations formed by parents at the same age. It was anticipated that parental expectations would 'internalise' the influences of many of these background factors and weaken their estimated effects. This is true of academic ability and classroom performance, but not of private schooling. Holding current parental expectations and other factors constant, young people from private schools were more likely to expect to attend university. This provides further evidence that the effects of private schooling are genuine, and not associated with factors specific to the family that would have otherwise resulted in both private schooling and higher educational expectations.

A few factors are found to significantly influence actual educational attainment, but not earlier educational expectations. Although Maori and Pacific Island subjects were just as likely to attend university, they were substantially less likely to receive a university qualification by age 25. The estimated coefficients on these dummy variables for ethnicity were never negative and significant in the regressions on educational expectations for both young people and their parents. The effects of ethnicity on educational attainment were not anticipated by subjects and their families in this sample. Similar results were found for young people raised in families that received social welfare benefits. Once other factors are held constant, this welfare history has no measurable impact on educational expectations, but does influence the probability of actually receiving a university qualification.

Finally, even after other background factors are held constant, early educational expectations of young people and their parents are found to be positively and significantly related to actual educational outcomes by age 25. This suggests that these expectations capture something in educational decisions that cannot be measured even with the detailed information available from a study like the CHDS that follows subjects continuously since birth.

1. Introduction

Relatively little attention has been paid empirically to the formation of the expectations for educational attainment. Yet, human capital and signalling models provide a broad theoretical foundation for this process. Individuals and their families have an incentive to continue to acquire formal education as long as the expected rate of return from this activity exceeds the relevant market interest rate.

The emphasis in the empirical literature on the economics of education has been on realised educational attainment and its consequences for labour market and other outcomes. We would expect that educational expectations evolve gradually as children age due to constantly updated information on the capacity of these young people to succeed academically, and the ability of families to afford the direct and indirect costs of this education.

The goal of this study is to increase our understanding over how youth and their parents form these educational expectations, and how these expectations are related to eventual educational attainment and subsequent labour market outcomes. One of the issues that we want to explore is the relationship between in-school work and educational expectations. Does in-school work have any influence over the formation of expectations for school or post-school qualifications?

One of the keys to this econometric analysis is the availability of longitudinal data on both the expectations of youth and their parents over the eventual educational attainment of the subjects of the Christchurch Health and Development Study (CHDS). We have multiple observations on expectations for both school and post-school qualifications between the ages of 13 and 16. This may be a critical period in the formation of educational expectations. We want to link these expectations to the personal characteristics and academic histories of these youth, and the wealth of information on their family backgrounds.

2. A Brief Literature Review

The economics literature on the formation of educational expectations (with or without links to in-school work) is relatively thin. Most of the research in this area has focussed on expectations of attending tertiary education or completing a university degree. What follows is a brief overview of the studies in this area.

Manski and Wise (1983) examined the possible determinants of the probability of attending university. They found that both family income and parental education are consistently the two most important factors in explaining differences in educational attainment. In terms of university attendance, parental education appears to be relatively more important than family income.[1]

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[1] Yet, Reynolds and Pemberton (2001) claim that the early analysis of data from the 1997 NLSY shows that wealth is less important for educational expectations than for actual educational attainment (footnote 2 on p.708). It may be that educational expectations do not fully incorporate the constraints imposed by financial considerations that will eventually influence actual educational attainment.

Hanson (1994), in a sociological study, used data from the High School and Beyond (HSB) longitudinal study to examine the determinants of "lost talent" among young people in the US. These were individuals whose actual educational attainment fell short of their earlier educational expectations. She conjectured that this lost talent might be systematically related to gender, ethnicity and socioeconomic status. The author found substantial differences between educational expectations (as late as the senior year in high school) and educational qualifications many years later. She found that males are relatively more likely to have unrealised educational expectations. Whites are more likely than both blacks and Hispanics to experience lost talent. Youth from lower socioeconomic groups are more likely to have actual educational attainment fall short of earlier expectations.

Haveman and Wolfe (1995) summarised the literature on determinants of various aspects of child attainments. Although they did not specifically address educational expectations in their review, the authors did mention in their conclusions to this study that one of the *"… more pressing data needs in this area …"* is for information on the formation of *"… parental expectations for children."* (p.1874).

Burkam and Lee (1998) used the High School and Beyond data to examine educational participation. Although their primary motivation for this study was on the effects of various forms of attrition from panel studies for regressions analysis, they did briefly examine the educational expectations of youth. For example, they found that youth who attrite from the HSB had, on average, lower educational expectations. Very few covariates were included in their regression analysis. Attrition from this panel tended to result in an overestimate of the effects of socio-economic status and an underestimate of the effect of gender on educational expectations.

O'Brien and Jones (1999) took advantage of survey and time-use data from what they described as a "working-class" British community to examine the interrelationship between family life and educational attainment. The authors found substantial disparity between educational expectations at age 14 and the eventual educational attainment of youth. They concluded that many children who aspired to go on to university never achieved the grades necessary to enter university. Some of the interpretations placed on their results are suspect. For example, they concluded that educational expectations *" … appeared to be powerful influential factors, particularly in promoting high grades"* (p.614). Since they had relatively limited controls for personal and family background differences, it is possible that unobserved heterogeneity might also account for this relationship. Unobserved personal and family background factors may influence both educational expectations and subsequent classroom performance, and preclude the need to assert a causal relationship between these two outcomes.

Reynolds and Pemberton (2001) used data from two different National Longitudinal Studies of Youth in the US (NLSY79 and NLSY97) to estimate the determinants of the propensities that 15 and 16 year-olds will expect to attend university. The motivation for this study is the fact that the expectations of university participation have increased substantially over the last few decades. For example, in their samples, 39% of youth in 1979 expected to receive a university degree. By 1997, this figure had increased to 71%. Probit models were estimated on these discrete outcomes. The explanatory variables were restricted to gender, ethnicity, family structure (e.g., single parent, number of siblings), parental education, family income, and the local unemployment rate. The authors found that the effects of ethnicity and family

income on university expectations seemed to weaken over time. Females became more likely than males to expect a university degree. Their evidence suggests that family structure has become relatively more important over time. For example, living in a single-parent family had a larger detrimental effect on the expectation of receiving a university degree in 1997 than in 1979. The authors concluded that family income appears to influence educational expectations primarily indirectly, through school peers, teacher quality and past academic performance.

Zax and Rees (2002) had access to a relatively unique dataset for estimating the long-term effects of educational expectations on labour market outcomes. The Wisconsin Longitudinal Study (WSL) originally surveyed over 10,000 high school seniors in the state of Wisconsin in 1957. Follow-up surveys occurred in 1964, 1975 and 1993 when these respondents were aged 25, 36 and 54, respectively. The authors ran regressions on annual labour market earnings for the years 1974 and 1992 against personal, family, school and peer characteristics at age 18. They also included indicators of whether or not the respondent planned to go on to university as a senior, whether or not parents had encouraged college enrolment, and the proportion of high school friends who planned on attending university. Estimated coefficients on all three of these latter covariates were found to be positive and significantly related to earnings at later ages. The three estimated effects, on average, increased earnings by more than 18%. The main conclusion of the authors was that previous research had overstated the effects of IQ on later economic success by not including these other control variables. The estimated effects of IQ decline substantially with the inclusion of these other variables measured at age 18. Yet, the interpretation on the estimated effects of educational expectations is unclear. This variable most likely captures the effects of unmeasured factors from both before age 18 (e.g., motivation and early school performance) and after age 18 (e.g., actual university attendance, subsequent human capital formation and labour market experience).

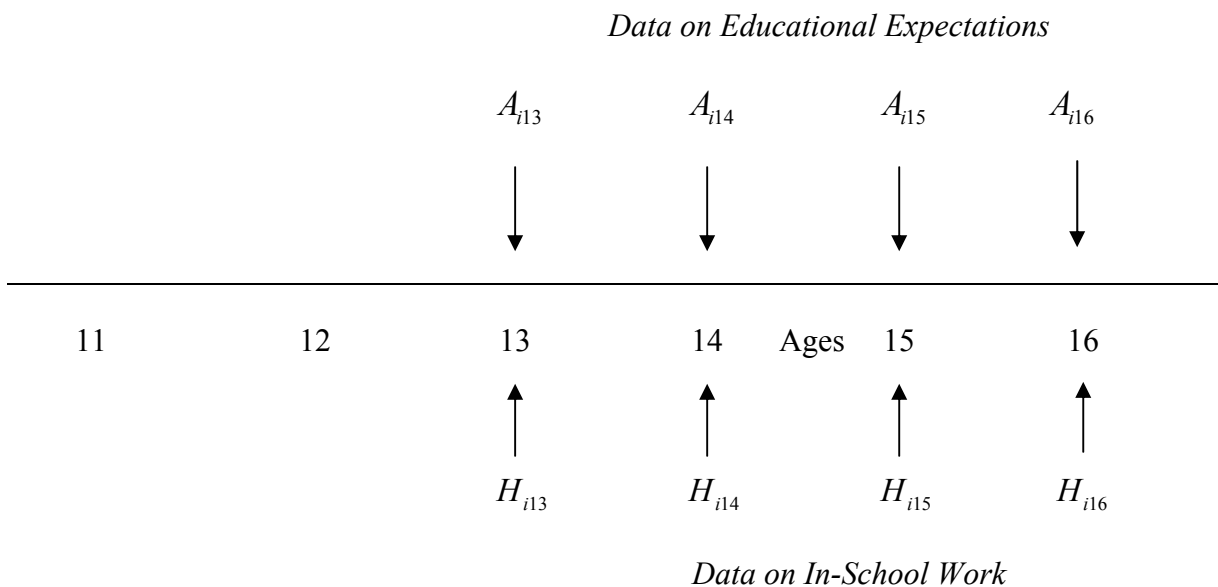### 3. The Data on Educational Expectations in the CHDS

The Christchurch Health and Development Study (CHDS) is longitudinal study of over 1,200 children born in hospitals in the Christchurch area between April and August 1977. The unit of observation is the child or subject of this study. The parents or custodial adults in the households in which these subjects resided were surveyed annually from birth until age 16. The subjects themselves were interviewed each year between the ages 13 and 16. The latest interviews with these respondents took place at ages 18, 21 and 25.

Compared to other longitudinal studies, attrition has been relatively negligible in the CHDS. Interviews were conducted with 1,003 individuals at age 25. This represents nearly 80% of the original 1,263 subjects at birth. The CHDS is not designed to be representative of all young people born in New Zealand in 1977. It is geographically restricted to those born in the Canterbury region in that year. A majority of these subjects were still living in this geographic area at ages 21 and 25. As a consequence, the results generated from these data should not necessarily be extrapolated to the general New Zealand population. In particular, the CHDS tends to under-represent Maori and Pacific Islanders populations in the country.

Because of temporary or permanent absences from this panel and missing data from key variables that will be used in the present study, our sample will consist of 604 subjects. The

most important element in this sample restriction is that data on educational expectations for young people were only solicited for young people resident in the Canterbury region between the ages of 13 and 16. We also restrict our sample to young people who were enrolled in school at the time of these four interviews. This is done to insure that the responses to the questions on educational expectations and employment outcomes come from individuals who had not completed their education at the time of the survey. This restriction on being enrolled in school does not eliminate any respondents from the surveys before age 16. Twenty-eight individuals were dropped from our sample because they were out of school around the time of their 16th birthdays.

The data available on educational expectations and in-school work of CHDS subjects are depicted in the following diagram.

Data on Educational Expectations

		A_{i13}	A_{i14}	A_{i15}	A_{i16}
		↓	↓	↓	↓

11	12	13	14 Ages	15	16
		↑	↑	↑	↑
		H_{i13}	H_{i14}	H_{i15}	H_{i16}

Data on In-School Work

Youth were asked about their expected educational attainment at interviews around the time of their 13th, 14th, 15th and 16th birthdays (denoted as A_{i13}, …, A_{i16}). Parents were asked similar questions on their own expectations for the eventual educational attainment of their CHDS child in separate interviews at ages 13, 14 and 16.

Data on the current work status of these subjects were solicited from both youth and their parents at these four surveys (denoted as H_{i13}, …, H_{i16}). We know whether or not these young people were working for pay at the time of the survey, and their usual weekly hours of work. Since the interviews were conducted between April and September of each year, these work outcomes are likely to be associated with weeks during the academic year and are therefore referred to as evidence of 'in-school work'.

3.1 Descriptive Statistics

From ages 13 through 16, CHDS subjects resident in the Canterbury region were asked a series of questions about their academic and career aspirations. The following question was designed to capture the respondent's educational expectations at age 13:

B.1	Do you expect that you will:	Yes	Maybe	No	Don't Know
(i)	Leave school at 15 years				
(ii)	Leave school after sitting one or more School Certificate subjects				
(iii)	Enter the 6th Form				
(iv)	Enter the 7th Form				
(v)	Go to Polytechnic after leaving school				
(vi)	Go to University after leaving school				

Identical questions were asked at ages 14 and 15. At age 16, question (i) was changed to "Leave school at 16 years", and questions (ii) and (iii) were changed to "Leave school *after* 6th Form" and "Leave school *after* 7th Form", respectively. The interviewer ticked one box (yes, maybe, no or don't know) associated with each of the possible levels of educational attainment. The responses to these questions potentially provide a great deal of information on the changing educational expectations of these subjects over this period.

Table 1 displays sample means and correlation coefficients for the expectations of obtaining 'minimal' school qualifications. We had originally planned on focusing on the expectations that subjects would leave school at age 15. Since very few respondents reported that they expected to leave school without qualifications, however, we altered this 'low achievement' standard.[2] A dummy variable was created from the responses to these questions on the educational expectations of youth at ages 13 through 16. It equals one if the subject reported that they expected to obtain no more than 6th Form education (i.e., they did *not* respond 'yes' when asked if they planned on entering (or leaving) 7th Form, or going to either a polytechnic or university); zero otherwise.

The proportions of youth in our sample who expected to obtain no more than a 6th Form education declined from 29.0% at age 13 to 18.2% at age 15, before rising slightly to 20.2% at age 16 (see the last column of Table 1 for these sample means). Estimated pair-wise correlation coefficients are also reported in this table for the expectations of low educational achievement. For example, the correlation between expecting to complete no more than a 6th Form education at ages 13 and 14 is 0.373. The correlation declines to 0.197 when we compare the same expectations between the ages of 13 and 16.

Two observations can be made from the data displayed in Table 1. Firstly, there appears to be quite a bit of 'churning' in who expects to leave education early. Even though all of these estimated coefficients are significantly different from zero at better than a 1% level, they are all below 0.500. Youth who expect to drop out of education early at one age do not always

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2 Of the 604 youth in our sample, 4, 2 and 2 subjects, respectively, said that they expected to leave school at age 15 in the surveys at ages 13, 14 and 15. More individuals (13, 10 and 9 at ages 13, 14 and 15) expected to leave school after sitting School Certificate. Yet, these rates of low educational expectations were thought to be too small for meaningful analysis. It should be noted that these results are *not* greatly affected by excluding the 28 subjects who were not enrolled in school at age 16. Even with the inclusion of the dropouts at age 16, fewer than 3% of our sample expected to leave school before or immediately after sitting School Certificate exams at ages 13, 14 and 15.

have the same expectation at another age. Secondly, the correlation weakens as the gap increases between observations. The mean of the estimated correlations in adjacent years is 0.410. The mean falls to 0.312 with a gap of two years, and to 0.197 with a gap of three years. This suggests that something is occurring over these teenage years to alter the expectations of low educational attainment.

Table 1

Sample Means and Correlation Coefficients Associated with
Youth Expecting at Ages 13 to 16 to Complete No More than a 6th Form Education

	Pearson Correlation Coefficients				Sample Means
	Age 13	Age 14	Age 15	Age 16	
Age 13	1.000	---	---	---	0.290
Age 14	0.373***	1.000	---	---	0.209
Age 15	0.294***	0.497***	1.000	---	0.182
Age 16	0.197***	0.330***	0.361***	1.000	0.202
No Qualification by Age 25	0.107***	0.080*	0.120***	0.214***	0.071
No Qualification Beyond 6th Form by Age 25	0.203***	0.255***	0.306***	0.325***	0.522

* *Significantly different from zero at a 10% level, using a two-tailed test.*
** *Significantly different from zero at a 5% level, using a two-tailed test.*
*** *Significantly different from zero at a 1% level, using a two-tailed test.*

Notes: Data on youth educational expectations are taken from young person surveys in the CHDS at ages 13 through 16. The sample size is 604. The binary variable used in this table equals one if the subject did not answer 'yes' to questions on attending Seventh Form, Polytechnic or University; zero otherwise. Data on the absence of formal qualifications were taken from the surveys with these same subjects at ages 18, 21 and 25.

One of the advantages of the CHDS is that we can compare these early expectations of low educational achievement against actual outcomes in later years. By age 25 we have information all school and post-school qualifications from at least three interviews. About one out of every fourteen of the individuals in our sample (7.1%) had not received any formal school or post-school qualification by age 25. More than one-half (52.2%) had not received any school or post-school qualification beyond 6th Form (i.e., no Bursary or tertiary qualification of any kind). Thus, we would have to conclude that young people in this sample tend to substantially underestimate the probability of completing no more than a 6th Form education.

Table 1 also provides evidence that these expectations of low educational achievement become increasingly accurate as these subjects increase in age. The estimated correlation coefficients between these expectations and the absence of a qualification beyond 6th Form

increase steadily from 0.203 at age 13 to 0.325 at age 16. By this gauge, the accuracy of these expectations of low educational achievement improves with age.

Table 2
Sample Means and Correlation Coefficients Associated with
Youth Expecting at Ages 13 to 16 to Eventually Attend University

	Pearson Correlation Coefficients				Sample Means
	Age 13	Age 14	Age 15	Age 16	
Age 13	1.000	---	---	---	0.313
Age 14	0.424***	1.000	---	---	0.300
Age 15	0.415***	0.455***	1.000	---	0.313
Age 16	0.341***	0.358***	0.500***	1.000	0.338
University Qualification by Age 25	0.245***	0.282***	0.334***	0.368***	0.263
Attended University by Age 25	0.283***	0.319***	0.370***	0.397***	0.417

* *Significantly different from zero at a 10% level, using a two-tailed test.*
** *Significantly different from zero at a 5% level, using a two-tailed test.*
*** *Significantly different from zero at a 1% level, using a two-tailed test.*

Notes: Data on youth educational expectations are taken from young person surveys in the CHDS at ages 13 through 16. The sample size is 604. The binary variable used in this table equals one if the young person answered 'yes' to the question: 'Do you expect to go to University after leaving school?'; zero otherwise. Data on receiving a university certificate, diploma or degree (either undergraduate or postgraduate) are taken from surveys with these same subjects at ages 18, 21 and 25. Data on university attendance are taken from both contemporaneous and retrospective sources of enrolment histories during the same interviews.

Table 2 looks at the other end of the spectrum for educational expectations. A dummy variable is given a value of one if the subject at age 13 through 16 answers "yes" to the question: "Do you expect to go to university after leaving school?" Approximately 31.3% of youth in our sample expect at age 13 that they will attend university. This figure rises only slightly to 33.8% by age 16. As in Table 1, all of the estimated correlation coefficients on expectations at different ages are positive and significantly different from zero at better than a 1% level. Yet, none of these correlations are greater than 0.500, and they tend to decrease in magnitude as the gap in ages between interviews widens.

Compared to the proportions expecting to attend university, fewer individuals receive a university qualification (defined here as a certificate, diploma or degree), while more individuals attend university at some point by age 25. While no more than 33.8% of individuals expect the attend university by age 16, 41.7% actually do attend university by the end of our observation period with CHDS data. Thus, we conclude that these subjects tend to slightly underestimate their chances of attending university by age 25.

The accuracy over the expectations of attending university appears to improve with age. At age 13, the estimated correlation of expecting to attend university and actually attending university by age 25 is 0.283. This relationship strengthens steadily, reaching 0.397 at age 16. The estimated correlation coefficients between these expectations of attending university and receiving a university qualification by age 25 also increase steadily with age. The correlations increase from 0.245 at age 13 to 0.368 at age 16.

Table 3 looks at the expectations formed by parents over whether or not their CHDS child will attend university. Questions similar to those asked of youth were also asked of parents at the time of the 13, 14 and 16-year surveys. These questions were *not* asked of parents at the 15-year interview. Note that the sample with valid observations for these statistics is larger among parents (*n*=777) than among youth (*n*=604). This is primarily due to the fact that the CHDS solicited information on the educational expectations of parents even if they were living outside the Canterbury region over these years. Again, the sample is restricted to parents whose children were enrolled in school at the time of the interviews at ages 13 through 16.

Table 3
Sample Means and Correlation Coefficients Associated with
Parents Expecting at Ages 13 to 16 that their Son or Daughter
will Eventually Attend University

	Pearson Correlation Coefficients			Sample Means
	Age 13	Age 14	Age 16	
Age 13	1.000	---	---	0.347
Age 14	0.610***	1.000	---	0.355
Age 16	0.427***	0.579***	1.000	0.332
University Qualification by Age 25	0.372***	0.408***	0.427***	0.282
Attended University by Age 25	0.364***	0.381***	0.414***	0.438

* *Significantly different from zero at a 10% level, using a two-tailed test.*
** *Significantly different from zero at a 5% level, using a two-tailed test.*
*** *Significantly different from zero at a 1% level, using a two-tailed test.*

Notes: Data on parental educational expectations for the CHDS child are taken from parents' surveys at ages 13 through 16. The sample size is 777. The binary variable used in this table equals one if the parent answered 'yes' to the question: 'Do you expect your child to go to University after leaving school?'; zero otherwise. Data on the eventual attainment of a university certificate, diploma or degree (either undergraduate or postgraduate) are taken from surveys with these same subjects at ages 18, 21 and 25. Data on university attendance come from both contemporaneous and retrospective data of enrolment histories taken from the same interviews.

Approximately one-third of the parents in this sample expected their children to attend
university when these subjects were between the ages of 13 and 16. The estimated
correlation coefficients for these expectations at different ages are consistently higher among
parents than they are among their offspring. For example, the correlation between the
expectations of attending university at ages 13 and 14 are 0.610 for parents (Table 3) and
0.424 for children (Table 2). Compared to children, parents display less volatility in these
expectations over the same years.

Like the children, the accuracy of the expectations of attending university formed by parents
appears to improve with age. The estimated correlations between the expectations and the
actual outcome of receiving a university qualification increase steadily from 0.372 at age 13
to 0.427 at age 16.   Similarly, the correlations between these expectations and the outcome
of attending university increase steadily from 0.364 at age 13 to 0.414 at age 16. It is also
clear in comparing the results in Tables 2 and 3 that the expectations of parents are relatively
more accurate than those formed by their children. Holding age constant, the estimated
correlations associated with actual university outcomes by age 25 are consistently higher for
parents than for children.

Similar proportions of parents and their offspring expect that the latter will attend university.
Averaged over the same ages of 13, 14 and 16, slightly less than one-third of subjects
(31.7%) expect to attend university, while slightly more than one-third of parents (34.5%)
have similar expectations.

Table 4
Comparisons of University Expectations at Ages 13 to 16
Between Youth and their Parents

	Pearson Correlation Coefficients		
	Age 13 Youth	Age 14 Youth	Age 16 Youth
Age 13 Parents	0.381***	0.375***	0.374***
Age 14 Parents	0.359***	0.416***	0.421***
Age 16 Parents	0.396***	0.344***	0.523***

* Significantly different from zero at a 10% level, using a two-tailed test.
** Significantly different from zero at a 5% level, using a two-tailed test.
*** Significantly different from zero at a 1% level, using a two-tailed test.

*Notes: Restricting the sample to include valid observations from both youth and their parents reduces the
sample size to 604. See the notes at the bottoms of Tables 2 and 3 for further information on sample and
variable definitions.*

How closely do these expectations over attending university correspond within the family? Do parents and their children have similar expectations? Table 4 compares the expectations of university attendance by parents and their children at the same ages. The sample is restricted to the 604 observations with valid information from both parents and subjects. Although the estimated correlation coefficients are positive and significantly different from zero in every case, some differences remain within the family over these expectations of higher educational attainment. There is fairly strong evidence that the correlations between university expectations of parents and their children become stronger over time (see the shaded diagonal in Table 4). The correlations rise steadily from 0.381 at age 13 to 0.523 at age 16.

Table 5 focuses on the evolving educational expectations of youth from ages 13 through 16. The proportions expecting to attend university at each age are reported conditional on a number of demographic characteristics that do not vary in the CHDS over the ages when these expectations were formed. Some of these variables are measured at a single point in time, while others are taken from several interviews up to the interview at age 13. The Appendix to this report contains a complete description of these personal and family background variables, which will later serve as regressors in our econometric analysis.

Maori or Pacific Islanders *reduce* their expectations of university attendance by an average of 11.8 percentage points between ages 13 and 16. Over the same age range, the expectation of university attendance by non-Maori and non-Pacific Islanders *increases* by 4.5 percentage points. The results on ethnicity should be interpreted with some caution in the CHDS, since there are only 78 Maori or Pacific Island youth in our sample. Yet, these changes in expectations of attending university over time are consistent with a lower probability of actually attending university by age 25 among Maori or Pacific Islanders (27.6%) compared to other ethnic groups (43.8%). The gap between the ethnic groups is even larger in terms of actually obtaining a university qualification (7.9% for Maori or Pacific Islanders and 29.0% for other ethnicities). This suggests that approximately one-quarter of Maori or Pacific Islanders who attend university receive a university qualification by age 25. Yet, nearly two-thirds of non-Maori and non-Pacific Islanders who attend university eventually receive a qualification.

The proportions of youth expecting to attend university increase with the qualifications of their parents. However, the biggest jump in these expectations over time occurs among youth whose parents had a post-school qualification. They increase from ages 13 to 16 by 13.2 and 14.2 percentage points for the post-school qualifications of mothers and fathers, respectively. These expectations may evolve as young people acquire a better understanding of the both academic and financial requirements associated with university attendance, which may be related to their parents having a post-school qualification. As suggested by the last two columns in Table 5, the changes in university expectations between ages of 13 and 16 seem to reflect increasingly more accurate assessments of the likelihood of attending university and receiving a qualification. It's worth noting that subjects with qualified parents are much more likely to receive a qualification if they attend university (i.e., they have higher 'success' or lower 'dropout' rates).

Table 5
Youth Expecting at Ages 13 to 16 to Eventually Attend University
By Various Time-Invariant Personal and Family Characteristics

Demographic Characteristics	Proportion of Youth Expecting to Attend University:					University Qualification by Age 25	Attended University by Age 25
	Age 13	Age 14	Age 15	Age 16	Mean All Ages		
Youth Gender:							
Male (*n*=299)	0.311	0.304	0.298	0.331	0.311	0.241	0.405
Female (*n*=305)	0.315	0.295	0.328	0.344	0.320	0.285	0.430
Youth Ethnicity:							
Maori or Pacific Islander (*n*=78)	0.342	0.276	0.316	0.224	0.289	0.079	0.276
Other (*n*=528)	0.309	0.303	0.313	0.354	0.320	0.290	0.438
Mother Highest Qualification:							
None (*n*=296)	0.240	0.243	0.236	0.250	0.242	0.149	0.284
School Qualification (*n*=179)	0.374	0.307	0.341	0.346	0.342	0.257	0.436
Post-School Qualification (*n*=129)	0.395	0.419	0.450	0.527	0.448	0.535	0.698
Father Highest Qualification:							
None (*n*=299)	0.217	0.227	0.214	0.227	0.222	0.134	0.271
School Qualification (*n*=192)	0.375	0.323	0.344	0.354	0.350	0.286	0.474
Post-School Qualification (*n*=113)	0.460	0.451	0.522	0.602	0.509	0.566	0.708
Family Benefit Status – Ages 1 to 13:							
Never Received Benefit (*n*=409)	0.308	0.342	0.340	0.377	0.342	0.335	0.474
Sometimes Received Benefit (*n*=195)	0.323	0.210	0.256	0.256	0.262	0.113	0.297
Family Mean Income – Ages 1 to 13:							
Income Below Median (*n*=302)	0.252	0.209	0.228	0.242	0.233	0.146	0.288
Income Above Median (*n*=302)	0.374	0.391	0.397	0.434	0.399	0.381	0.546
Youth Mean IQ – Ages 8 and 9:							
IQ Below Median (*n*=304)	0.214	0.204	0.181	0.197	0.199	0.122	0.247
IQ Above Median (*n*=300)	0.413	0.397	0.447	0.480	0.434	0.407	0.590
Youth Mean GPA – Ages 7 to 12:							
GPA Below 3.5 (*n*=312)	0.176	0.173	0.170	0.183	0.175	0.093	0.247
GPA Above 3.5 (*n*=292)	0.459	0.435	0.466	0.503	0.466	0.445	0.599
Youth TOSCA Score – Age 13:							
Below Median (*n*=296)	0.182	0.176	0.149	0.159	0.166	0.084	0.213
Above Median (*n*=308)	0.438	0.419	0.471	0.510	0.459	0.435	0.614
Youth Conduct Problems – Ages 7 to 13:							
Below Median (*n*=303)	0.337	0.343	0.360	0.403	0.361	0.380	0.525
Above Median (*n*=301)	0.289	0.256	0.266	0.272	0.271	0.146	0.309

Notes: The sample size is 604. See the notes at the bottom of Table 2 for further information on sample and variable definitions. A complete list of the explanatory variables and definitions can be found in the Appendix to this report.

Subjects who lived in families that received social welfare benefits by age 13, saw their expectations of attending university *decline* from 32.3% to 25.6% on average between ages 13 and 16. Those who lived in families that never received social welfare benefits by age 13, saw their expectations of attending university *increase* from 30.8% to 37.7% over the same ages.

Even when academic performance or aptitude is measured by age 13 (i.e., constant over the age range when these expectations are recorded), the association between these factors and the expectations of attending university grows stronger after age 13. For example, young people with a Grade Point Average (GPA) in reading, writing, spelling and mathematics below 3.5 (midway between a C and B) increased their expectations of university attendance by an average of only 0.7 percentage points between ages 13 and 16. Youth with a GPA above 3.5 increased their expectations of university attendance by 4.4 percentage points over the same ages.

The Test of Scholastic Aptitude (TOSCA) was administered by the CHDS to the subjects in this study. It's designed to measure the aptitudes necessary for success in high school. Young people scoring above the median were approximately twice as likely as those scoring below the median to expect at age 13 that they would eventually attend university. Compared to this same reference group, youth scoring above the median were more than three times as likely to expect to attend university by age 16. From ages 13 to 16, the expectations of attending university *decreased* by 2.3 percentage points for those below the median, but *increased* by 7.2 percentage points for those above the median.

Reports were taken at ages 7, 11 and 13 from parents and teachers on various 'conduct problems' of the subject (see the Appendix for further details on this overall variable). A score above the median indicates more numerous conduct problems. These individuals are less likely to attend university and receive a qualification than their counterparts. They also have declining expectations of attending university, while their counterparts have a rising expectation of attending university.

Overall, Table 5 shows that time-invariant personal and family characteristics are not only related to the levels of expectations of attending university, but also related to the changes in these expectations over ages 13 to 16. Furthermore, these patterns are consistent with the actual outcomes in terms of both eventually attending university and receiving a university qualification.

Table 6 reports similar descriptive statistics for the time-varying variables that are used in this analysis. These are measures of personal and family backgrounds that were updated in the CHDS through age 16. Subjects who lived with a single parent at some point between ages 1 and 16 tended to have lower expectations of attending university, and these expectations *fell* by 3.3 percentage points from ages 13 to 16. Youth who never lived with a single parent *increased* their expectations of attending university by 5.0 percentage points over the same age range. They were also much more likely to actually attend university and receive a qualification by age 25. It is noteworthy that approximately one-third of youth from single-parented families who attended university received a qualification by age 25, while more than two-thirds of youth who never lived with a single parent and attended university received a qualification by the same age.

Table 6
Youth Expecting at Ages 13 to 16 to Eventually Attend University
By Various Time-Varying Personal and Family Characteristics

Demographic Characteristics	Proportion of Youth Expecting to Attend University:				Mean All Ages	University Qualification by Age 25	Attended University by Age 25
	Age 13	Age 14	Age 15	Age 16			
Lived with a Single Parent – Ages 1 to 16:							
At Some Age (*n*=185)	0.292	0.227	0.205	0.259	0.246	0.092	0.270
Never (*n*=419)	0.322	0.332	0.360	0.372	0.347	0.339	0.482
Lived with a Step-Parent – Ages 1 to 16:							
At Some Age (*n*=109)	0.275	0.202	0.183	0.239	0.225	0.101	0.257
Never (*n*=495)	0.321	0.321	0.341	0.360	0.336	0.299	0.453
Attended Private School – Ages 7 to 16:							
At Some Age (*n*=179)	0.408	0.385	0.453	0.464	0.427	0.380	0.564
Never (*n*=425)	0.273	0.264	0.254	0.285	0.269	0.214	0.355
Top Class in Cohort – Ages 7 to 16:							
At Some Age (*n*=170)	0.412	0.376	0.465	0.465	0.429	0.418	0.582
Never (*n*=434)	0.274	0.270	0.253	0.288	0.271	0.203	0.353
Truancy History – Ages 12 and 16:							
Truant at Some Age (*n*=213)	0.300	0.244	0.244	0.281	0.268	0.103	0.272
Never (*n*=391)	0.320	0.330	0.350	0.368	0.342	0.350	0.496
Work History – Ages 7 to 12:							
In-school Work at Some Age (*n*=351)	0.291	0.313	0.296	0.305	0.301	0.222	0.370
Never (*n*=253)	0.344	0.281	0.336	0.383	0.336	0.320	0.482

Notes: The sample size is 604. See the notes at the bottom of Table 2 for further information on sample and variable definitions. A complete list of the explanatory variables and definitions can be found in the Appendix to this report.

Similar results on youth expectations of attending university can be found with regard to those who lived with a step-parent by age 16. They are less likely to expect to attend university, these expectations decline on average between ages 13 and 16, and these expectations are validated by actual outcomes through age 25.

Youth who attended private schools by age 16 have higher expectations of attending university, and these expectations are consistent with actual outcomes on university attendance and the receipt of a university qualification by age 25. Similar findings are taken from information on whether the subject was in the top class level within his or her cohort.[3]

Subjects who were truant between ages 12 and 16 had expectations of university attendance

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3 There are three categories in this designation of class level in the CHDS. For example, at age 12 the subject could be in Standard 4 (or a special class), Form 1 or Form 2. Very few individuals in our sample (less than 1%) were in the bottom classes, and between 20% and 25% were in the top class in the cohort. This is the only information on academic performance other than enrolments and formal qualifications beyond age 12.

that *fell* by an average of 3.2 percentage points between ages 13 and 16. Youth who were never truant had expectations that *rose* by 4.8 percentage points over the same age range. Subjects with a truancy history were also relatively less likely to attend university, to receive a qualification, and to receive a qualification if they did attend university.

Finally, youth who never worked at the time of one of the surveys between ages 13 and 16 were, on average, more likely to expect to attend university during these years, and more likely to actually attend and receive a qualification by age 25 than those who worked in at least one of these years. However, there is little evidence to suggest that the changes in university expectations over this four-year period were systematically different between these groups. It would also be difficult to attach any causal interpretation behind these statistical relationships at this point, since in-school work may itself be a function of educational expectations and other background factors.

4. Regression Results

Descriptive statistics in the previous section provided some insight into the simple relationships between youth expectations of attending university and various personal and family background factors. Regression analysis is used in this section to estimate the partial effects that these covariates have in forming these expectations. Separate regressions are estimated at ages 13 through 16 to allow these effects to vary with age.

Table 7 displays our first set of regression results. The dependent variable is binary. It takes on a value of one if the young person answers "yes" to the question: "Do you expect to attend university after leaving school?"; zero otherwise. Maximum likelihood probit is used to estimate the determinants of these underlying probabilities. The estimated parameters reported in this table are the partial derivatives associated with these explanatory variables, which have a clear and meaningful economic interpretation.

There seems to be a general increase in the overall explanatory power of these regressions from age 13 through 16. Although a conventional R^2 statistic cannot be computed under Probit estimation, a 'pseudo' R^2 statistic can approximate the explanatory power of the model.[4] The Pseudo R^2 statistics increase from 0.211 and 0.165 at ages 13 and 14, to 0.247 and 0.252 at ages 15 and 16, respectively. This suggests that our ability to forecast youth expectations of attending university with essentially the same covariates improves with the respondent's age.[5]

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4 See the notes at the bottom of Table 7 for the relevant formula and associated reference to the Estrella Pseudo R^2 Statistic.

5 This is a general regression specification that allows the coefficients on all background variables to fully interact with the age of the subject. It is possible that at least some of these effects on expectation formation may not vary over this age range. In regressions results not reported in this paper, the four years of data were pooled and both restricted and unrestricted versions of this regression were estimated. The null hypothesis that all of the coefficients on these background variables are identical across the four ages can be rejected at a 1% level. Given that the results from the descriptive analysis that suggest that these educational expectations evolve for groups demarcated by many of these covariates, it was decided that only this very general specification of the regression model would be reported.

Table 7
Estimated Determinants of the Probabilities of Youth
Expecting at Ages 13 to 16 to Eventually Attend University

	Dependent Variable Equals One if Youth Expects to Attend University at:			
Independent Variables	Age 13	Age 14	Age 15	Age 16
Constant	-1.957*** (0.408)	-0.995** (0.398)	-0.641 (0.401)	-0.722* (0.424)
Female	-0.056 (0.045)	-0.056 (0.043)	0.005 (0.045)	-0.047 (0.046)
Maori or Pacific Islander	0.107 (0.069)	0.060 (0.067)	0.149** (0.071)	-0.043 (0.065)
School Qualification Mother	0.098* (0.052)	0.007 (0.049)	0.033 (0.051)	0.021 (0.052)
Post-School Qualification Mother	-0.001 (0.058)	-0.000 (0.056)	-0.002 (0.057)	0.041 (0.061)
School Qualification Father	0.083* (0.050)	0.016 (0.047)	0.058 (0.049)	0.031 (0.050)
Post-School Qualification Father	0.057 (0.068)	0.015 (0.065)	0.134* (0.073)	0.143** (0.073)
Number of Older Siblings	0.056** (0.023)	0.021 (0.022)	-0.019 (0.023)	0.019 (0.024)
Number of Younger Siblings	0.017 (0.024)	0.008 (0.025)	-0.037 (0.026)	-0.028 (0.026)
Proportion Years Part-Time Work Mother	0.054 (0.082)	0.015 (0.079)	-0.028 (0.082)	-0.053 (0.086)
Proportion Years Full-Time Work Mother	-0.077 (0.125)	0.064 (0.119)	-0.030 (0.126)	-0.141 (0.131)
Proportion Years Part-Time Work Father	0.911* (0.480)	0.236 (0.446)	0.031 (0.470)	0.829* (0.497)
Proportion Years Full-Time Work Father	0.252 (0.235)	-0.030 (0.237)	0.094 (0.231)	0.312 (0.252)
Mean Depression Score Mother	0.049** (0.021)	0.019 (0.021)	0.041* (0.022)	0.039* (0.023)
Proportion Years Family on Benefit	0.238 (0.184)	0.013 (0.188)	0.269 (0.186)	0.081 (0.195)
Mean Real Family Income	0.022 (0.036)	0.032 (0.035)	0.006 (0.035)	0.031 (0.037)
Mean Family Living Standards	0.147** (0.067)	0.090 (0.066)	0.084 (0.068)	0.034 (0.071)
Mean IQ Test Score	-0.004 (0.036)	-0.028 (0.036)	0.011 (0.037)	-0.014 (0.038)
Scholastic Ability Test Score	0.065 (0.044)	0.101** (0.044)	0.179*** (0.044)	0.148*** (0.046)

Table 7 Continued

Mean Grade Point Average	0.151*** (0.047)	0.100** (0.047)	-0.013 (0.047)	0.068 (0.049)
Mean Class Size	0.012** (0.005)	0.005 (0.005)	0.003 (0.005)	-0.004 (0.005)
Association with Deviant Peers	0.010 (0.021)	0.018 (0.020)	0.010 (0.022)	-0.002 (0.024)
Mean Conduct Problem Score	0.020 (0.024)	-0.030 (0.025)	-0.024 (0.026)	-0.048* (0.028)
Proportion of Years with Single Parent	0.268 (0.238)	-0.075 (0.239)	-0.174 (0.229)	0.265 (0.237)
Proportion of Years with Step-Parent	0.114 (0.119)	0.072 (0.115)	0.074 (0.116)	0.123 (0.122)
Proportion of Years in Private School	0.093 (0.063)	0.152** (0.064)	0.222*** (0.065)	0.131* (0.069)
Proportion of Years in Top Class in Cohort	0.028 (0.052)	-0.046 (0.051)	0.022 (0.051)	-0.018 (0.054)
Mean Truancy Episodes	-0.097 (0.164)	-0.015 (0.027)	-0.006 (0.009)	-0.009 (0.008)
Mean Weekly Work Hours	-0.006 (0.009)	0.008 (0.011)	-0.007 (0.013)	-0.004 (0.011)
Pseudo R^2	0.211	0.165	0.247	0.252

* *Significantly different from zero at a 10% level, using a two-tailed test.*
** *Significantly different from zero at a 5% level, using a two-tailed test.*
*** *Significantly different from zero at a 1% level, using a two-tailed test.*

Notes: Maximum likelihood probit estimation was used in all regressions reported in this table. The parameter estimates (and their standard errors) are partial derivatives. The Pseudo R^2 statistic was developed by Estrella (1998, Journal of Business and Economic Statistics, 17), and is a function of the log-likelihood statistics from regressions with only a constant term (L_0) and all independent variables included (L):

$$Estrella\ Pseudo\ R^2\ Statistic = 1 - \left(\frac{L}{L_0}\right)^{-2L_0/N}$$

None of the individual covariates had statistically significant effects at every age. Yet, changes in the relative importance of a number of factors in forming these expectations across these ages is revealing. For example, only at ages 15 and 16 does a post-school qualification for the father have positive and statistically significant effects on the probability of the subject expecting to attend university. Other factors held constant, the father's post-school qualification is estimated to increase this probability by 13.4 and 14.3 percentage points, respectively, over these last two years. Any measurable effects of the number of older siblings on youth expectations of attending university disappear after age 13.

The Grade Point Average (GPA) for the subject, which is computed from assessments of classroom teachers over the ages of 7 through 12, positively and significantly influences youth expectations of attending university at ages 13 and 14 only. The Scholastic Ability Test (TOSCA) administered at age 13, which is designed to measure the aptitudes necessary

to succeed in higher education, only significantly influences these expectations after age 13. This measured scholastic ability appears to have a more substantial role in forming these expectations at later ages.

Among the time-varying covariates, only the proportion of years in a private school positively and significantly influences the probability of the youth expecting to attend university. The measurable effects of private schooling begin only after age 13. It is important to recognize that the effects of private schooling on these expectations are measured after we hold constant factors like parental education, family income and earlier academic performance which may themselves influence the attendance of both private schools and (subsequently) university.

Finally, weekly hours of work at the time of the survey have no measurable effects on the probability of the subject expecting to attend university. There is no indication in these regressions that in-school work between the ages of 13 and 16 has any influence on youth expectations of eventually attending university.

Table 8 displays the results from OLS regressions using an alternative definition of the expected educational attainment of youth. Rather than focusing on the single dimension of expecting to attend university, this variable attempts to use all of the information on highest educational expectations. Each dependent variable approximates the age at which the individual expects to terminate his or her education (i.e., 15 if leaving without a school qualification; 16 after sitting School Certificate exams; 17 after 6th form; 18 after 7th form; 19 if attending polytechnic; and 20 if attending university). The age is measured in whole years if the individual answers "yes" to a particular level of educational attainment in this list. The age is measured in half years if the individual answers "maybe" to this level of educational attainment.[6] Compared to the dummy dependent variables used in the regressions reported in Table 7, these quantitative dependent variables utilize more of the information on expected educational attainment. We want to know whether the results found from the previous regressions were specific to this particular measure of educational expectations.

As before, the overall explanatory power of this model generally increases with age. Except for a slight decline in the R^2 statistics between ages 13 and 14, these summary statistics rise steadily through age 16. Approximately one-quarter of the variation in the highest age of expected educational attainment can be explained by all covariates on personal and family background factors at ages 13 and 14. These same explanatory variables can account for around one-third of the variation in this dependent variable by ages 15 and 16.

The only estimated coefficients significantly different from zero at every age are those associated with the dummy variable on a school qualification for the mother, and the youth's TOSCA score. The estimated coefficients on TOSCA are positive and significant at better than a 1% level at all four ages. A one-standard deviation increase in this test score increases the expected age of highest educational attainment by an average of between 0.277 (at age 14) and 0.418 (at age 15) years. These positive effects of measured scholastic ability were

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6 For example, suppose the individual says "yes" to leaving school after 6th Form and "no" to any other higher education. His expected age of educational attainment is recorded as 17. Another individual says "maybe" to leaving school after 7th Form and "no" to any other higher education. Her expected age of educational attainment is recorded as 17.5.

Table 8
Estimated Determinants of the Expected Age
of Educational Attainment of Youth at Ages 13 to 16

Independent Variables	Dependent Variable Approximates the Age of Highest Expected Educational Attendance:			
	Age 13	Age 14	Age 15	Age 16
Constant	15.202*** (0.893)	17.256*** (0.832)	19.428*** (0.750)	17.827*** (0.768)
Female	-0.060 (0.101)	-0.099 (0.093)	0.128 (0.083)	0.150* (0.085)
Maori or Pacific Islander	0.262* (0.140)	0.138 (0.129)	0.284** (0.116)	0.088 (0.119)
School Qualification Mother	0.229** (0.111)	0.194* (0.102)	0.193** (0.092)	0.171* (0.094)
Post-School Qualification Mother	0.249* (0.135)	0.144 (0.125)	0.040 (0.112)	0.156 (0.114)
School Qualification Father	0.033 (0.108)	0.079 (0.100)	0.216** (0.090)	0.146 (0.092)
Post-School Qualification Father	-0.024 (0.151)	0.169 (0.139)	0.245** (0.125)	0.271** (0.129)
Number of Older Siblings	-0.003 (0.051)	0.033 (0.047)	0.007 (0.042)	0.033 (0.043)
Number of Younger Siblings	-0.003 (0.050)	0.029 (0.050)	-0.019 (0.045)	-0.020 (0.046)
Proportion Years Part-Time Work Mother	-0.057 (0.184)	-0.095 (0.171)	-0.080 (0.153)	-0.142 (0.157)
Proportion Years Full-Time Work Mother	-0.088 (0.270)	0.160 (0.250)	-0.080 (0.225)	0.277 (0.230)
Proportion Years Part-Time Work Father	0.868 (1.064)	0.859 (0.986)	-0.835 (0.882)	0.942 (0.899)
Proportion Years Full-Time Work Father	0.864 (0.532)	-0.126 (0.498)	-0.752* (0.448)	0.348 (0.455)
Mean Depression Score Mother	0.111** (0.048)	0.035 (0.044)	-0.015 (0.040)	0.006 (0.041)
Proportion Years Family on Benefit	0.830** (0.412)	0.592 (0.379)	0.149 (0.339)	0.203 (0.347)
Mean Real Family Income	0.020 (0.081)	0.029 (0.075)	0.056 (0.067)	-0.008 (0.068)
Mean Family Living Standards	0.274* (0.155)	0.272* (0.143)	0.053 (0.128)	0.095 (0.132)
Mean IQ Test Score	-0.050 (0.081)	-0.077 (0.075)	0.127* (0.068)	0.024 (0.069)
Scholastic Ability Test Score	0.374*** (0.090)	0.277*** (0.091)	0.418*** (0.082)	0.313*** (0.084)

Table 8 Continued

Mean Grade Point Average	0.293*** (0.106)	0.198** (0.098)	-0.126 (0.088)	0.149* (0.090)
Mean Class Size	0.027** (0.012)	0.000 (0.011)	0.012 (0.010)	-0.009 (0.010)
Association with Deviant Peers	0.036 (0.047)	-0.033 (0.043)	-0.030 (0.040)	-0.108** (0.042)
Mean Conduct Problem Score	0.003 (0.053)	-0.055 (0.049)	0.026 (0.044)	-0.100** (0.045)
Proportion of Years with Single Parent	0.413 (0.532)	-0.510 (0.489)	-0.925** (0.429)	-0.030 (0.425)
Proportion of Years with Step-Parent	0.308 (0.267)	0.179 (0.240)	-0.050 (0.209)	0.378* (0.211)
Proportion of Years in Private School	0.329** (0.149)	0.212 (0.141)	0.402** (0.128)	0.263** (0.133)
Proportion of Years in Top Class in Cohort	-0.040 (0.123)	-0.064 (0.114)	0.011 (0.102)	-0.129 (0.104)
Mean Truancy Episodes	-0.051 (0.118)	-0.029 (0.199)	-0.017 (0.011)	-0.023** (0.010)
Mean Weekly Work Hours	-0.016 (0.018)	-0.013 (0.022)	-0.014 (0.022)	-0.008 (0.019)
R^2	0.266	0.212	0.313	0.336

* *Significantly different from zero at a 10% level, using a two-tailed test.*
** *Significantly different from zero at a 5% level, using a two-tailed test.*
*** *Significantly different from zero at a 1% level, using a two-tailed test.*

Notes: Ordinary Least-Squares estimation was used in all regressions reported in this table. The dependent variable approximates the age at which the individual expects to terminate his or her education. See the text for further details on the construction of this dependent variable at each age.

found in earlier regressions on the probabilities of expecting to attend university (see Table 7), but were not as consistently significant across the four ages.

The estimated direct effects of parental qualifications on the educational expectations of their children are somewhat stronger in the regressions reported in Table 8 compared to those reported in Table 7. Four of the 16 estimated coefficients on parental qualifications in the regressions on the probability of expecting to attend university are individually significant. Eight of the 16 estimated coefficients on parental qualifications in the regressions on the highest expected age of educational attainment are individually significant.
There is evidence in the regression results reported in Table 8 to confirm the earlier finding that a young person's GPA has positive impacts on educational expectations, but that these effects tend to decline in magnitude and statistical significance as the individual ages.

The only other fairly consistent finding from these regressions is the positive influence of the proportion of years spent in private schooling on these expectations. Three of the four estimated effects are significantly different from zero at better than a 5% level. Recall that three of the four estimated coefficients on this same variable were also statistically significant

in the regressions on expecting to attend university.

One of the potential issues with the regression results presented thus far is that they may suffer from omitted-variable bias associated unobserved heterogeneity. Even though we have extensive information in the CHDS on personal and family backgrounds, unmeasured factors may bias the estimated coefficients attached to our measured explanatory variables.

To motivate this issue suppose we have the following set of four regressions:

$$Y_{13i} = Z_i'\beta_{13} + \overline{X}_{13i}'\delta + \alpha_i + u_{13i} \tag{1}$$

$$Y_{14i} = Z_i'\beta_{14} + \overline{X}_{14i}'\delta + \alpha_i + u_{14i} \tag{2}$$

$$Y_{15i} = Z_i'\beta_{15} + \overline{X}_{15i}'\delta + \alpha_i + u_{15i} \tag{3}$$

$$Y_{16i} = Z_i'\beta_{16} + \overline{X}_{16i}'\delta + \alpha_i + u_{16i} \tag{4}$$

where the dependent variable is the highest expected age of educational attainment at the time of the surveys at ages 13 through 16. The variables in the vector Z_i are time-invariant. We allow their effects on educational expectations to vary by age. The variables in the vector X_{ti} are time-varying. We assume for simplicity that their effects do not vary by age, but the variables are cumulative (represented as means) and updated over the period when these educational expectations are being formed.

Suppose there are a set of unobserved factors represented by α_i that vary across the sample, but are fixed over time (e.g., personality traits like motivation and perseverance, parenting abilities and child-parent relationships). Estimating these equations individually means that the estimated β and δ coefficients may be biased if these unobserved variables are correlated with observed variables. For example, attending private schools may not directly raise youth expectations of educational attainment. It may be that parents who place their children in private schools have certain attributes that would independently influence these expectations.

To test this hypothesis, we take a 'long-wave approach'. The idea is that by examining the change in the educational expectations of youth over the widest possible time interval, we can better isolate the effects of these determinants. This gives youth sufficient time to alter these expectations, and for variations to occur in the time-varying factors. Taking the difference between equations (4) and (1) gives us the following 'long-difference' specification:

$$\left(Y_{16i} - Y_{13i}\right) = Z_i'\left(\beta_{16} - \beta_{13}\right) + \left(\overline{X}_{16i}' - \overline{X}_{13i}'\right)\delta + \left(u_{16i} - u_{13i}\right) \tag{5}$$

which can be written more compactly in the following form.

$$\Delta Y_i = Z_i'\Delta\beta + \Delta\overline{X}_i'\delta + \Delta u_i \tag{6}$$

The key is that the unobserved, fixed effects are eliminated by this differencing. Note that although this specification yields direct estimates of the coefficients, it only estimates the changes in the coefficients between ages 16 and 13 related to the time-invariant factors.

Table 9
Estimated Determinants of the Difference in the Expected Age
of Educational Attainment of Youth Between Ages 16 and 13

Independent Variables	
Constant	2.133[**] (1.014)
Female	0.183 (0.117)
Maori or Pacific Islander	-0.206 (0.168)
School Qualification Mother	-0.081 (0.132)
Post-School Qualification Mother	-0.119 (0.159)
School Qualification Father	0.126 (0.129)
Post-School Qualification Father	0.271 (0.179)
Number of Older Siblings	0.041 (0.060)
Number of Younger Siblings	0.007 (0.064)
Proportion Years Part-Time Work Mother	-0.090 (0.220)
Proportion Years Full-Time Work Mother	0.373 (0.320)
Proportion Years Part-Time Work Father	0.379 (1.122)
Proportion Years Full-Time Work Father	-0.192 (0.470)
Mean Depression Score Mother	-0.119[**] (0.057)
Proportion Years Family on Benefit	-0.596 (0.486)
Mean Real Family Income	-0.042 (0.096)
Mean Family Living Standards	-0.152 (0.183)
Mean IQ Test Score	0.082 (0.096)
Scholastic Ability Test Score	-0.093 (0.114)

Table 9 Continued

Mean Grade Point Average	-0.139 (0.124)
Mean Class Size	-0.036*** (0.013)
Association with Deviant Peers	-0.165*** (0.059)
Mean Conduct Problem Score	-0.100 (0.064)
Proportion of Years with Single Parent	2.716** (1.246)
Proportion of Years with Step-Parent	-0.574 (1.393)
Proportion of Years in Private School	0.616 (0.569)
Proportion of Years in Top Class in Cohort	1.663 (2.074)
Mean Truancy Episodes	-0.004 (0.015)
Mean Weekly Work Hours	0.013 (0.025)
R^2	0.085

* *Significantly different from zero at a 10% level, using a two-tailed test.*
** *Significantly different from zero at a 5% level, using a two-tailed test.*
*** *Significantly different from zero at a 1% level, using a two-tailed test.*

Notes: Ordinary Least-Squares estimation was used in all regressions reported in this table. The dependent variable is the difference in approximate ages at which the individual expects to terminate his or her education when these expectations were formed at ages 16 and 13. See the text for further details on the construction of this variable at each age.

Table 9 reports the results from this regression where the dependent variable is the difference in youth expectations over the age of highest educational attainment between the interviews at ages 16 and 13. Among the time-invariant factors, only the estimated coefficient on the maternal depression score is significantly different from zero. This negative estimated parameter suggests that young people with mothers who exhibited signs of depression in the past tended to lower their educational expectations between ages 13 and 16.

It is important to understand how these estimated coefficients on the time-varying factors should be interpreted. The TOSCA score was found in previous regressions to generally have a positive and significant effect on educational expectations. The estimated coefficient on this same variable in Table 9 is negative, but not statistically different from zero. This simply suggests that there is no systematic change in the positive effects that scholastic ability has on educational expectations between ages 13 and 16. The estimated effects associated with these time-invariant factors are the changes in the β coefficients between the two years.

Both of the estimated effects of Mean Class Size and Association with Deviant Peers are negative and statistically significant at better than a 1% level in this regression. However, these results seem to have quite different origins based on the findings from Table 8. The first result captures the fact that being in larger class sizes appears to increase educational expectations at age 13, but not at later ages. The second result captures the fact that associating with deviant peers reduces educational expectations at age 16, but not at earlier ages.

Differencing educational expectations and observing changes to time-varying factors over a four-year interval was intended to produce unbiased estimates of the associated effects in the formation of these expectations. The estimated coefficients on these time-varying factors are all insignificant, except for the proportion of years living with a single parent. This effect is positive and statistically significant at a 5% level. This suggests that once we control for both observable and unobservable time-invariant factors, youth living in single-parent families tend to increase their expected age of educational attainment.

We had found previously that private schooling lead to an increase in the expected age of educational attainment (see Table 8). The results from Table 9 raise some doubts about this result. The estimated coefficient on this variable is now positive, but insignificant. It may be that these earlier estimated effects were biased upward by unmeasured factors that were not controlled for in this specification. These might be fixed attributes of the young person or his or her family that lead simultaneously to private schooling and higher educational expectations.

Table 10 reports the regression results from the re-estimation of the equations shown in Table 7, where the only change to this specification is the addition of a new explanatory variable on whether or not the parents expected their child to attend university. This additional binary regressor is taken from the parental survey at the same age for the subject used in measuring the dependent variable. We want to know the correspondence between youth and parental expectations over the same educational outcome at the same age, once other measurable factors are held constant. It may be that parental expectations capture otherwise unobservable determinants of youth expectations in attending university. Using parental expectations as another independent variable means that the regression at age 15 must be dropped from the analysis, since parents were never asked about the educational expectations for their offspring during that survey.

Parental expectations are positively related to youth expectations for attending university. These estimated effects increase steadily in magnitude from the ages of 13 through 16, and are all significantly different from zero at better than a 1% level. Holding other personal and family background variables constant, we estimate that parents' expectations that their child will attend university are associated with an average increase in the subject's expectations of attending university by 24.4 percentage points at age 13. Similar estimated derivatives at ages 14 and 16 are 30.3 and 42.0 percentage points, respectively. This suggests a closer correspondence between the expectations of youth and their parents over university attendance as youth approach the end of their schooling.

Table 10

Estimated Determinants of the Probabilities of Youth
Expecting at Ages 13 to 16 to Eventually Attend University
Including Similar Expectations of Parents as an Explanatory Variable

Independent Variables	Dependent Variable Equals One if Youth Expects to Attend University at:		
	Age 13	Age 14	Age 16
Constant	-1.955*** (0.411)	-1.130*** (0.405)	-0.563 (0.442)
Female	-0.041 (0.045)	-0.043 (0.044)	-0.026 (0.047)
Maori or Pacific Islander	0.132* (0.071)	0.051 (0.067)	-0.071 (0.063)
School Qualification Mother	0.100* (0.053)	0.007 (0.050)	0.021 (0.054)
Post-School Qualification Mother	-0.003 (0.059)	-0.010 (0.056)	0.023 (0.063)
School Qualification Father	0.072 (0.050)	-0.011 (0.047)	-0.015 (0.052)
Post-School Qualification Father	0.024 (0.068)	-0.003 (0.064)	0.138* (0.076)
Number of Older Siblings	0.054** (0.023)	0.033 (0.023)	-0.001 (0.025)
Number of Younger Siblings	0.019 (0.025)	0.011 (0.025)	-0.058** (0.028)
Proportion Years Part-Time Work Mother	0.039 (0.083)	0.031 (0.081)	-0.080 (0.090)
Proportion Years Full-Time Work Mother	-0.076 (0.127)	0.075 (0.121)	-0.205 (0.137)
Proportion Years Part-Time Work Father	0.920* (0.471)	0.546 (0.446)	0.926* (0.509)
Proportion Years Full-Time Work Father	0.285 (0.236)	0.087 (0.241)	0.219 (0.262)
Mean Depression Score Mother	0.041* (0.022)	0.014 (0.022)	0.030 (0.024)
Proportion Years Family on Benefit	0.229 (0.186)	0.024 (0.191)	0.029 (0.200)
Mean Real Family Income	0.013 (0.036)	0.025 (0.035)	0.030 (0.039)
Mean Family Living Standards	0.144** (0.068)	0.062 (0.067)	-0.023 (0.075)
Mean IQ Test Score	0.001 (0.037)	-0.043 (0.037)	-0.030 (0.039)
Scholastic Ability Test Score	0.031 (0.044)	0.057 (0.044)	0.088* (0.048)

Table 10 Continued

Mean Grade Point Average	0.123** (0.048)	0.078* (0.047)	0.053 (0.051)
Mean Class Size	0.012** (0.006)	0.006 (0.005)	-0.001 (0.005)
Association with Deviant Peers	-0.001 (0.021)	0.012 (0.021)	-0.000 (0.024)
Mean Conduct Problem Score	0.017 (0.024)	-0.035 (0.026)	-0.044 (0.030)
Proportion of Years with Single Parent	0.255 (0.241)	0.052 (0.243)	0.254 (0.247)
Proportion of Years with Step-Parent	0.076 (0.120)	0.067 (0.116)	0.226 (0.124)
Proportion of Years in Private School	0.104 (0.064)	0.153** (0.064)	0.161** (0.073)
Proportion of Years in Top Class in Cohort	0.019 (0.052)	-0.029 (0.052)	0.012 (0.057)
Mean Truancy Episodes	-0.075 (0.156)	-0.013 (0.026)	-0.005 (0.008)
Mean Weekly Work Hours	-0.001 (0.009)	0.010 (0.011)	0.002 (0.012)
Parents Expect University Attendance	0.244*** (0.049)	0.303*** (0.047)	0.420*** (0.051)
Pseudo R^2	0.252	0.233	0.356

* *Significantly different from zero at a 10% level, using a two-tailed test.*
** *Significantly different from zero at a 5% level, using a two-tailed test.*
*** *Significantly different from zero at a 1% level, using a two-tailed test.*

Notes: Maximum likelihood probit estimation was used in all regressions reported in this table. The parameter estimates (and their standard errors) are partial derivatives. The Pseudo R^2 statistic was developed by Estrella (1998, <u>Journal of Business and Economic Statistics</u>, 17), and is a function of the log-likelihood statistics from regressions with only a constant term (L_0) and all independent variables included (L):

$$\textit{Estrella Pseudo } R^2 \textit{ Statistic } = 1 - \left(\frac{L}{L_0}\right)^{-2L_0/N}$$

It is interesting to ask whether the significance of the estimated effects on the other covariates reported in Table 7 persist after we include the parents' expectation of attending university. It was anticipated that parental expectations might incorporate the effects of many of these personal and family background factors. For example, parents may have already internalized the effects of family income and the academic potential of their child in forming their own forecasts. For this reason, it is interesting that the estimated effects of the TOSCA scores on youth expectations decline substantially with the inclusion of parental expectations as a regressor.

Recall that this indicator of scholastic ability had positive estimated effects that were statistically significant from ages 14 through 16 (see Table 7). The estimated coefficients on this same variable are now positive, but only statistically significant at a 10% at age 16 (see Table 10). On average, the estimated effects of the TOSCA score on the formation of youth expectations for attending university fall by approximately 50% when similar parental expectations are included in these regressions. Parents at least partially 'recognize' the academic aptitudes of their offspring in forming their own expectations over university attendance. Similar things could be said about the estimated effects of GPA in these two sets of regressions.

Yet, the effects of private schooling on youth expectations of attending university are not greatly affected by the inclusion of similar parental expectations. The estimated coefficients on this time-varying variable in Table 7 at ages 13, 14 and 16 are 0.093, 0.152 and 0.131. The estimated coefficients on the same variable in Table 10 at the same ages are 0.104, 0.153 and 0.161. Only the estimated effects at ages 14 and 16 in both sets of regressions are statistically significant. The influences that private schooling have on the formation of youth expectations of attending university are largely unrelated to similar parental expectations. These results run counter to the earlier suggestion that permanent, unmeasured effects lead to both private schooling and higher educational expectations. We would expect these omitted variables would be at least partially captured by parental expectations. In this sense, the effects of private schooling on youth expectations appear to be genuine.

Tables 11 and 12 attempt to validate the importance of the educational expectations formed by youth and parents in terms of the eventual educational attainment of these young people. Once we hold constant personal and family background factors, is there any statistical relationship between these expectations of attending university and the actual outcomes in terms of either attending university or receiving a university qualification by age 25?

The dependent variable in the regressions reported in Table 11 is binary. It equals one if the subject attended university at any time up to the interview at age 25; zero otherwise. The same basic explanatory variables used in the earlier regressions are included in this estimation. It is interesting to compare the estimated coefficients on these variables to those in Table 7. The earlier results are the estimated effects on the expectations of attending university. The later results are the estimated effects on actually attending university.

The financial situations of the families in which these subjects were raised appear to have a somewhat larger impact on actually attending university compared to earlier expectations of this outcome. Mean family incomes have no measurable effects in any of these regressions, but interviewer assessments of family living standards do have positive and statistically significant effects on subjects actually attending university. Note that this is true after we hold constant both youth and parental expectations of attending university. This same variable was only positive and significant in the regression on youth expectations at age 13 of attending university. Thus, financial situations appear to constrain actual university attendance, and these limits are not fully incorporated into earlier expectations.[7]

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7 When expectations are excluded from this regression, the estimated coefficient on Mean Family Living Standards is 0.206, and significant at better than a 5% level. When youth expectations are included, the estimated coefficient on the same variable falls to 0.184. When both youth and parental expectations are included the estimated coefficient on the same variable declines further to 0.175. Yet, these estimated parameters are all significant at a 5% level.

Table 11
Estimated Determinants of the Probability of the Youth
Attending University by Age 25

Independent Variables	Including Earlier Expectations of Youth	Including Earlier Expectations of Youth and Parents
Constant	-0.911* (0.490)	-0.963* (0.499)
Female	0.015 (0.054)	0.023 (0.054)
Maori or Pacific Islander	0.000 (0.075)	0.003 (0.076)
School Qualification Mother	0.042 (0.058)	0.047 (0.059)
Post-School Qualification Mother	0.150** (0.071)	0.145** (0.071)
School Qualification Father	0.086 (0.056)	0.073 (0.057)
Post-School Qualification Father	0.072 (0.080)	0.072 (0.081)
Number of Older Siblings	-0.007 (0.028)	-0.006 (0.029)
Number of Younger Siblings	0.026 (0.030)	0.022 (0.030)
Proportion Years Part-Time Work Mother	-0.018 (0.102)	-0.023 (0.103)
Proportion Years Full-Time Work Mother	-0.090 (0.152)	-0.100 (0.154)
Proportion Years Part-Time Work Father	-0.961 (0.682)	-0.852 (0.705)
Proportion Years Full-Time Work Father	0.094 (0.286)	0.112 (0.294)
Mean Depression Score Mother	0.007 (0.027)	0.003 (0.027)
Proportion Years Family on Benefit	0.371 (0.236)	0.389 (0.237)
Mean Real Family Income	0.033 (0.042)	0.030 (0.043)
Mean Family Living Standards	0.184** (0.086)	0.175** (0.087)
Mean IQ Test Score	0.105** (0.044)	0.103** (0.045)
Scholastic Ability Test Score	0.098* (0.053)	0.070 (0.054)

Table 11 Continued

Mean Grade Point Average	-0.033 (0.057)	-0.043 (0.058)
Mean Class Size	0.001 (0.006)	0.003 (0.006)
Association with Deviant Peers	-0.041 (0.027)	-0.046* (0.028)
Mean Conduct Problem Score	-0.010 (0.030)	-0.014 (0.030)
Proportion of Years with Single Parent	-0.043 (0.266)	-0.050 (0.273)
Proportion of Years with Step-Parent	-0.150 (0.140)	-0.136 (0.141)
Proportion of Years in Private School	0.029 (0.083)	0.043 (0.084)
Proportion of Years in Top Class in Cohort	0.005 (0.063)	0.015 (0.064)
Mean Truancy Episodes	-0.006 (0.008)	-0.005 (0.008)
Mean Weekly Work Hours	-0.019 (0.013)	-0.018 (0.013)
Youth Expects University Attendance – Age 16	0.176*** (0.057)	0.134** (0.060)
Youth Expects University Attendance – Age 15	0.091 (0.062)	0.074 (0.063)
Youth Expects University Attendance – Age 14	0.131** (0.061)	0.101 (0.063)
Youth Expects University Attendance – Age 13	0.035 (0.060)	0.004 (0.061)
Parents Expect University Attendance – Age 16	---	0.090 (0.067)
Parents Expect University Attendance – Age 14	---	0.077 (0.067)
Parents Expect University Attendance – Age 13	---	0.081 (0.065)
Pseudo R^2	0.402	0.414

* *Significantly different from zero at a 10% level, using a two-tailed test.*
** *Significantly different from zero at a 5% level, using a two-tailed test.*
*** *Significantly different from zero at a 1% level, using a two-tailed test.*

Notes: Maximum likelihood probit estimation was used in all regressions reported in this table. The parameter estimates (and their standard errors) are partial derivatives. The Pseudo R^2 statistic was developed by Estrella (1998, <u>Journal of Business and Economic Statistics</u>, 17), and is a function of the log-likelihood statistics from regressions with only a constant term (L_0) and all independent variables included (L):

$$\text{Estrella Pseudo } R^2 \text{ Statistic} = 1 - \left(\frac{L}{L_0}\right)^{-2L_0/N}$$

The subject's mean IQ score had no measurable effects on their expectations of attending university. Yet, IQ is estimated to positively and significantly influence actual university attendance. An increase of one standard deviation in IQ is estimated to increase the probability of attending university by just over 10 percentage points in the regressions reported in Table 11. These results suggest that, although intelligence ultimately influences university attendance, it has no direct measurable effects on these expectations.

When youth expectations at ages 13 through 16 of attending university are added to the other covariates in the regression on actually attending university by age 25, the pseudo R^2 statistics increase from 0.354 to 0.402. The estimated coefficients on the expectations at all ages are positive as expected, but only individually significant from ages 16 and 13. The null hypothesis that the coefficients on youth expectations are simultaneously equal to zero can be easily rejected at a 1% level. These expectations help predict actual outcomes even after a wide variety of measured personal and family background factors have been held constant in this regression.

When parental expectations of the subject attending university are added to this regression, the pseudo R^2 statistics increase from 0.402 to 0.414. The estimated coefficients on parental expectations are positive, but none of them are statistically significant. However, the null hypothesis that they are simultaneously equal to zero can be rejected at a 3.2% level. These parental expectations also help predict actual outcomes, but appear to be relatively less important than youth expectations.

Table 12 reports the regression results where the dependent variable takes on a value of one if the subject received a university qualification by age 25; zero otherwise. The results from Table 11 show that Maori or Pacific Island youth are no less likely to attend university than non-Maori and non-Pacific Islander youth, once other independent variables have been held constant. However, the results from Table 12 show that they are less likely to acquire a university qualification. Maori or Pacific Island subjects have probabilities of receiving a university qualification that are, on average, 8.0 and 8.6 percentage points lower than those of other ethnic groups once earlier expectations of attending university are held constant. In fact, these expectations make little difference on the ethnicity result. The estimated coefficient on this variable is -0.076 when expectations of both young people and their parents are excluded from this estimation.

Mean Family Living Standards have positive and significant estimated effects on the probability of obtaining a university qualification by age 25. It would appear that the effects of family finances on this outcome are not fully incorporated into the expectations of young people and their parents over attending university.

There is no evidence form the regression results in Table 11 that conduct problems influence the probability of attending university. However, the results from Table 12 indicate that these same conduct problems reduce the probability of receiving a qualification. A one standard deviation increase in this variable leads to an average decline in the probability of receiving a qualification by 7.1 percentage points in both specifications. These effects are significant at a 1% level.

Table 12
Estimated Determinants of the Probability of the Youth
Receiving a University Qualification by Age 25

Independent Variables	Including Earlier Expectations of Youth	Including Earlier Expectations of Youth and Parents
Constant	-0.860*** (0.301)	-0.887*** (0.303)
Female	-0.011 (0.031)	-0.007 (0.031)
Maori or Pacific Islander	-0.080** (0.032)	-0.086*** (0.030)
School Qualification Mother	-0.001 (0.035)	-0.006 (0.036)
Post-School Qualification Mother	0.052 (0.043)	0.053 (0.043)
School Qualification Father	0.059 (0.038)	0.048 (0.037)
Post-School Qualification Father	0.076 (0.054)	0.078 (0.054)
Number of Older Siblings	0.000 (0.016)	0.003 (0.017)
Number of Younger Siblings	0.026 (0.019)	0.022 (0.019)
Proportion Years Part-Time Work Mother	0.070 (0.057)	0.067 (0.057)
Proportion Years Full-Time Work Mother	-0.018 (0.089)	-0.035 (0.090)
Proportion Years Part-Time Work Father	-0.446 (0.394)	-0.282 (0.415)
Proportion Years Full-Time Work Father	-0.205 (0.179)	-0.177 (0.180)
Mean Depression Score Mother	0.005 (0.016)	0.003 (0.016)
Proportion Years Family on Benefit	-0.278* (0.146)	-0.256* (0.146)
Mean Real Family Income	-0.035 (0.024)	-0.033 (0.024)
Mean Family Living Standards	0.148*** (0.049)	0.134*** (0.049)
Mean IQ Test Score	0.045* (0.025)	0.038 (0.026)
Scholastic Ability Test Score	0.038 (0.031)	0.025 (0.031)

Table 12 Continued

Mean Grade Point Average	0.056* (0.033)	0.052 (0.033)
Mean Class Size	0.004 (0.004)	0.005 (0.004)
Association with Deviant Peers	-0.029* (0.017)	-0.028 (0.017)
Mean Conduct Problem Score	-0.071*** (0.024)	-0.071*** (0.024)
Proportion of Years with Single Parent	-0.085 (0.173)	-0.058 (0.177)
Proportion of Years with Step-Parent	-0.052 (0.097)	-0.033 (0.096)
Proportion of Years in Private School	0.049 (0.045)	0.055 (0.045)
Proportion of Years in Top Class in Cohort	0.004 (0.034)	0.016 (0.034)
Mean Truancy Episodes	-0.016** (0.008)	-0.016* (0.008)
Mean Weekly Work Hours	-0.022** (0.009)	-0.020** (0.009)
Youth Expects University Attendance – Age 16	0.069* (0.037)	0.040 (0.037)
Youth Expects University Attendance – Age 15	0.028 (0.037)	0.016 (0.037)
Youth Expects University Attendance – Age 14	0.044 (0.037)	0.028 (0.036)
Youth Expects University Attendance – Age 13	0.008 (0.033)	-0.006 (0.032)
Parents Expect University Attendance – Age 16	---	0.044 (0.041)
Parents Expect University Attendance – Age 14	---	0.095** (0.044)
Parents Expect University Attendance – Age 13	---	-0.012 (0.035)
Pseudo R^2	0.446	0.463

* *Significantly different from zero at a 10% level, using a two-tailed test.*
** *Significantly different from zero at a 5% level, using a two-tailed test.*
*** *Significantly different from zero at a 1% level, using a two-tailed test.*

Notes: Maximum likelihood probit estimation was used in all regressions reported in this table. The parameter estimates (and their standard errors) are partial derivatives. The Pseudo R^2 statistic was developed by Estrella (1998, <u>Journal of Business and Economic Statistics</u>, 17), and is a function of the log-likelihood statistics from regressions with only a constant term (L_0) and all independent variables included (L):

$$Estrella\ Pseudo\ R^2\ Statistic = 1 - \left(\frac{L}{L_0}\right)^{-2L_0/N}$$

No evidence has been found up to this point to suggest that in-school work has any effects on either youth or parental educational expectations, or the probability of actually attending university. However, mean weekly hours of work over ages 13 to 16 are found to have negative and significant impacts on the probability of obtaining a university qualification by age 25. This estimated effect is largely unrelated to the inclusion of these expectations.

When youth expectations at ages 13 through 16 of attending university are added to the other covariates in the regression on actually receiving a university qualification by age 25, the pseudo R^2 statistics increase from 0.427 to 0.446. The estimated coefficients on the expectations at all ages are positive as expected, but only the parameter estimate at age 16 is individually significant at a 10% level. The null hypothesis that these coefficients on the expectations of subjects are simultaneously equal to zero can be rejected at a 1.5% level.

When parental expectations are added to the previous regression, the pseudo R^2 statistics increase in value from 0.446 to 0.463. The estimated coefficients on the parental expectations are positive in 2 of the 3 cases, but only the one at age 14 is statistically significant. However, the null hypothesis that they are simultaneously equal to zero can be rejected at a 1.2% level.

5. *Conclusions*

This report represents the first known study on the formation of educational expectations by young people and their parents living in New Zealand. We take advantage of a unique data set that contains information on the educational expectations of children and their parents from separate surveys when these young people were between the ages of 13 and 16. The CHDS also provides extensive data on the personal and family background characteristics of these subjects, and their actual educational histories through age 25.

Very few youth in our sample expected to leave school at ages 15 and 16. Less than one-third expected at age 13 to leave school with no more than a 6th Form education. This proportion drops to approximately one-fifth of our subjects by age 16. Evidence suggests that these expectations of low educational attainment become increasingly accurate over this age range. The estimated correlations between expecting to leave school after 6th Form and not receiving a qualification beyond the 6th Form by age 25, increase steadily over the ages of 13 to 16. Yet, the youth in our sample systematically underestimate the probability of low educational attainment. More than one-half of these young people had no more than a 6th Form education by age 25.

Approximately one-third of the subjects in our sample expected to attend university. This is slightly lower than the proportion actually attending university, but slightly higher than the proportion actually receiving a university qualification by age 25. Evidence suggests that these expectations become increasingly accurate with age. Parents also expected that about one-third of their children would eventually attend university. Parental expectations are relatively more stable over time, and relatively more accurate in terms of actual outcomes. The expectations formed by children and their parents over attending university become increasingly similar over the observed age range.

The changes in the expectations of youth over eventually attending university during these four years provide some interesting insight into this process. This is especially true when we examine these age-related patterns in youth expectations for separate categories of personal and family background characteristics. Subjects from more disadvantaged backgrounds are generally less likely to expect to attend university. More surprisingly, these expectations decline relative to those from more advantageous backgrounds over the ages of 13 to 16, and these changes over time are validated by actual outcomes in terms of both attending university and receiving a university qualification. For example, subjects who lived in families that never received a social welfare benefit *increased* their expectations of attending university through age 16. Subjects who lived in families that had received social welfare benefits *decreased* their expectations of attending university over the same age range. Even more striking, more than 70% of youth from non-benefit backgrounds who attended university received a qualification. University qualifications were received by only 38% of youth who attended university if they were raised in families with a benefit history.

Regression analysis was used to estimate the determinants of various forms of educational expectations by youth. We started with the binary outcomes on whether or not the young person expected at ages 13 through 16 to eventually attend university. Maximum likelihood probit estimation was used to isolate the partial effects of a wide array of personal and family background characteristics. Separate estimates of the determinants of these probabilities were produced at each age. No single factor had a statistically significant effect in all four years. However, youth were found to be more likely to expect to attend university if they had proven academic abilities (higher classroom GPA and higher scholastic ability test scores) and histories of private schooling. Family income or interviewer assessments of standards of living had little impact on these expectations, as did weekly hours of paid work.

We altered the dependent variable to take fuller advantage of the depth of the information on educational expectations available in the CHDS. The expected age of educational attainment approximates the age at which the subject expected to leave school or tertiary study. Parental qualifications were found to play a larger positive role on the expected age of educational attainment compared expected university attendance. The previous positive results on academic ability and private schooling were confirmed in these regressions.

In both sets of regressions, the overall explanatory power of the models improved with the age of the subject. Our ability to forecast educational expectations with typical variables on personal and family backgrounds increased over these teenage years.

To allow for the confounding effects of unobserved permanent factors in isolating the determinants of these expectations, changes the expected age of educational attainment over the three years between the ages of 13 and 16 were regressed against all previous independent variables. Negative and significant effects were found from larger class sizes and the association with deviant peers. The estimated effects of private school were positive, but no longer statistically significant. The interpretation is that positive and significant effects from private schooling found earlier may be biased upward by latent factors that increase both the likelihood of private schooling and the educational expectations of youth.

In another set of auxiliary regressions, probit models on young people expecting to attend university were re-estimated with the inclusion of an additional regressor on the expectations of their parents over the same outcome at the same age. The idea was that parental

expectations may have internalized the effects of many of the measured background factors already included in these regressions, and may capture additional unmeasured factors that influence youth expectations. The inclusion of parental expectations did weaken the measured effects of academic abilities on youth expectations. At least some of the effects of GPA and scholastic aptitudes were incorporated into parental expectations of their offspring attending university. Yet, the estimated effects of private schooling on youth expectations of attending university were not greatly affected by inclusion of parental expectations. They continued to be positive and statistically significant. This provides further proof that these private schooling effects on youth educational expectations are genuine. The estimated effects of parental expectations that their child will attend university increased from 24.4 percentage points at age 13 to 42.0 percentage points at age 16. This result supports earlier findings from descriptive statistics on the growing consistency over these teenage years between in the educational expectations of children and their parents.

The last set of auxiliary regressions examined the relationship between actual educational outcomes of young people and earlier educational expectations of both themselves and their parents. These actual educational outcomes are dummy variables on whether the subject attended university and whether he or she received a university qualification by age 25. Once we hold constant personal and family background characteristics, Maori or Pacific Island youth are found to just as likely to attend university, but far less likely to receive a university qualification. Similar results are found for young people who were raised in families who received social welfare benefits. IQ scores at ages 8 and 9 had positive estimated impacts on university outcomes by age 25, but no measurable effects on earlier educational expectations.

The financial circumstances of families are estimated to influence actual education outcomes, but not earlier educational expectations. This same conclusion was reached in Reynolds and Pemberton (2001). In particular, better family living standards are estimated to increase both the probability of attending university and the probability of receiving a university qualification. Real family income, measured over 13 years, has no measurable effects on any of these outcomes. It may be that subjective assessments of living standards capture alternative dimensions of the family's financial situations (e.g., asset levels or financial acumen).

After holding constant the wide array of background factors in these regressions, the educational expectations of subjects and their parents are found to have positive and statistically significant effects on both attending university and receiving a university qualification by age 25. This suggests that these expectations capture personal or family circumstances that are related to actual educational attainment, but unrelated to even the detailed background measures available in the CHDS.

In-school paid work over the ages of 13 to 16 had no measurable effects on the formation of educational expectations. Although it also had no impact on the probability of actually attending university, it was found to negatively and significantly influence the probability of receiving a university qualification. We interpret this finding with some caution, however, since the causal relationship is unclear. Youth who work more during their teenage years are less likely to receive a qualification. Yet, these early work histories may be indicative of generally weaker attachments to education that are not captured by either observable background factors or measured educational expectations.

References

Burkam, David T. and Valerie E. Lee. (1998) "Effects of Monotone and Nonmonotone Attrition on Parameter Estimates in Regression Models with Educational Data." *Journal of Human Resources*, 33(2): 555-574.

Hanson, Sandra L. (1994) "Lost Talent: Unrealised Educational Expectations and Expectations among U.S. Youth." *Sociology of Education*, 67(3): 159-183.

Haveman, Robert and Barbara Wolfe. (1995) "The Determinants of Children's Attainments: A Review of Methods and Findings." *Journal of Economic Literature*, 33(4): 1829-1878.

Manski, Charles F. and Davis A. Wise. (1983) *College Choice in America*. Harvard University Press, Cambridge, MA.

O'Brien, Margaret and Deborah Jones. (1999) "Children, Parental Employment and Educational Attainment: An English Case Study." *Cambridge Journal of Economics*, 23(5): 599-621.

Reynolds, John R. and Jennifer Pemberton. (2001) "Rising College Expectations Among Youth in the United States." *Journal of Human Resources*, 36(4): 703-726.

Zax, Jeffrey S, and Daniel I. Rees. (2002) "IQ, Academic Performance, Environment and Earnings." *Review of Economics and Statistics*, 84(4): 600-616.

Appendix
Definitions of Independent Variables used in Regression Analysis

Variable Names	*Descriptions*
Female	Binary variable equal to one if the subject is female; zero if male.
Maori or Pacific Islander	Binary variable equal to one if the subject is Maori or Pacific Islander; zero for non-Maori and non-Pacific Islander.
School Qualification Mother	Binary variable equal to one if the highest educational qualification of the mother at the birth of the child is a school qualification; zero otherwise.
Post-School Qualification Mother	Binary variable equal to one if the highest educational qualification of the mother at the birth of the child is a post-school qualification; zero otherwise.
School Qualification Father	Binary variable equal to one if the highest educational qualification of the father at the birth of the child is a school qualification; zero otherwise.
Post-School Qualification Father	Binary variable equal to one if the highest educational qualification of the father at the birth of the child is a post-school qualification; zero otherwise.
Number of Younger Siblings	Maximum number of siblings younger than the subject living in the household in which the subject resided through age 15.
Number of Older Siblings	Maximum number of siblings older than the subject living in the household in which the subject resided through age 15.
Proportion Years Part-Time Work Mother	Proportion of annual interviews from ages 1 through 14 of the subject in which the mother or female custodial adult worked fewer than 30 hours per week.
Proportion Years Full-Time Work Mother	Proportion of annual interviews from ages 1 through 14 of the subject in which the mother or female custodial adult worked 30 or more hours per week.
Proportion Years Part-Time Work Father	Proportion of annual interviews from ages 1 through 14 of the subject in which the father or male custodial adult worked fewer than 30 hours per week.
Proportion Years Full-Time Work Father	Proportion of annual interviews from ages 1 through 14 of the subject in which the father or male custodial adult worked 30 or more hours per week.

Appendix Continued

Mean Depression Score Mother	Mean of maternal depression score from ages 6 through 13 of the subject. In each of the eight years, mothers were questioned about their depressive symptoms over the month preceding the interview. Questions were based on the Levine-Pilowsky Depression Inventory. The scale originally ranged from 0 to 37 with high scores indicating symptoms of depression for the mother. This variable is standardized to have a zero mean and unit variance within our sample. See Horwood and Fergusson (1977) for background on this measure.
Proportion of Years on Benefit	Proportion of years between ages 1 and 14 of the subject in which either parent was in receipt of social welfare benefits. These benefits came primarily from the Unemployment and Domestic Purposes Benefit.
Mean Real Family Income	This is the average real family between ages 1 and 14 of the child. The Consumer Price Index is used to inflate estimated family income from both labour and nonlabour sources at the time of each survey to constant 1996 dollars. This variable is standardized to have a zero mean and unit variance within our sample.
Mean Family Living Standards	This is the average of subjective impressions of CHDS interviewers over the family's standard of living at the time of the interviews when the subject was between 1 and 12 years. A five-point scaled is used, where 5 indicates a family that is "… obviously affluent or well to do," and 1 indicates a family that is "… obviously poor or very poor."
Mean IQ Test Score	Mean score on the Revised Weschler Intelligence Scale for Children administered by the CHDS when these children were aged 8 and 9 years. This variable is standardized to have a zero mean and unit variance within our sample.
Scholastic Ability Test Score	Test score on the Test of Scholastic Abilities (TOSCA) administered by the CHDS when the child was age 13. This test is designed to measure the extent to which the subject has the aptitudes necessary for success in high school. This variable is standardized to have a zero mean and unit variance within our sample.
Mean Grade Point Average	Mean Grade Point Average (GPA) of the subject between ages 7 and 12. Classroom teachers of these children were asked to rate their performance in the areas of reading, writing, spelling and mathematics over these 6 surveys. A five-point scale was used ranging from 1 for very poor to 5 for very good. The number reported here is the mean of these 4 variables across the 6 years.
Mean Class Size	Mean class size of subject between ages 7 and 17.
Association with Deviant Peers	At age 15 subjects were asked about their association with peers displaying various forms of deviant behaviour. A checklist was created with a minimum score (zero) indicating no deviant behaviour, and a maximum score (10) indicating substantial deviant behaviour among peers. This variable is standardized to have a zero mean and unit variance within our sample.
Mean Conduct Problem Score	Mean score on conduct problem surveys of both parents and teachers at ages 7, 9, 11 and 13. These conduct problems could include disruptive, oppositional, destructive and aggressive behaviour, as well as lying, stealing and cheating. This variable is standardized to have a zero mean and unit variance within our sample.

Appendix Continued

Proportion of Years with Single Parent	Proportion of years between the ages 1 and the current period in which the subject lived in a single-parented family. This variable is time-varying and constantly updated over the ages of 13 to 16 when these educational expectations are being formed.
Proportion of Years with Step-Parent	Proportion of years between the ages 1 and the current period in which the subject lived in a step-parented family. This variable is time-varying and constantly updated over the ages of 13 to 16 when these educational expectations are being formed.
Proportion Years Private of Church School	Proportion of years between the ages of 7 and the current period in which the subject was enrolled in a private or church school. This variable is time-varying and constantly updated over the ages of 13 to 16 when these educational expectations are being formed.
Proportion of Years in Top Class in Cohort	Proportion of years between the ages of 7 and the current period in which the subject was in the top class level of those in that cohort. There are three categories in the designation of class levels in the CHDS. Very few individuals in our sample (less than 1%) were in the bottom class, and between 20% and 25% were in the top class in any year. This variable is time-varying and constantly updated over the ages of 13 to 16 when these educational expectations are being formed. This is the only information on classroom academic performance (other than the receipt of formal qualifications) beyond age 12 in the CHDS.
Mean Truancy Episodes	Average number days reported to be truant (by both the subject and parents) between the ages of 12 and the current period. This variable is time-varying and constantly updated over the ages of 13 to 16 when these educational expectations are being formed.
Mean Weekly Work Hours	Average number of hours usually worked by the subject at the time of survey between the ages of 13 and the current period. This information comes from reports of both subjects and their parents. This variable is time-varying and constantly updated over the ages of 13 to 16 when these educational expectations are being formed.