

## 8. Engagement

In the age-16 round of data collection we have several variables that measure what could loosely be termed “engagement” (or lack of it). Some are derived from teacher responses about the classes they teach, and the study students; some are from the students' responses to how they feel about their schooling (in general); some are derived from the students' categorisation of what happens in their three classes (English, most, and least enjoyed subjects); and we also have measures of how they feel they know they're doing well in school. These variables are described fully in *Scale variables, cluster variables, and history variables*.

We also have several measures of achievement, and in this chapter we look at *overall ability, ability to cope with NCEA, number of Level 1 NCEA credits, and cognitive competency*. The first two are based on teacher perceptions, the second on a school outcome, and the third a more general measure that is more consistent with the cognitive measures used in Competent Children, Competent Learners over time.

This section attempts to unravel the complex set of inter-correlations between all these variables, and to determine which make “unique” contributions to engagement, over and above the contributions of the other variables with which they are correlated. We first present all the strongest correlations and inter-correlations, and then fit some linear models to the data.

In this section we are using the data for the 427 students still at school. However, in most of the analyses reported, we have complete data for considerably fewer students. Those not at a mainstream school do not have complete teacher data, as they do not have teachers who see them daily in a classroom situation. Those not enrolled for NCEA for one reason or another do not have data on NCEA (this includes those doing alternate qualifications, such as Cambridge, those not academically able to obtain any formal qualification, and those who nominated a most or least enjoyed subject in which no NCEA qualifications were offered). The sample sizes, then, vary between about 404 and 420, depending on the variables included in the particular analysis.

### Engagement and achievement variables

#### The outcome variables

In this section, the two scale variables as to how they feel about their schooling in general are used as outcome variables (dependent variables). These variables are *engaged in school* (a high score is obtained by someone who *does* like their teachers, keeps out of trouble, enjoys learning, and *does not* want to leave school as soon as possible, gets tired of trying, gets bored, skips classes, or feels restless), and *affirmed at school* (a high score is obtained by someone who feels they belong, are safe, the discipline and rules are fair, it's important to do their best, is treated as an individual and an adult, has a say in how the school runs, learns quickly, can take leadership roles, and gets all the help they need). The correlation between these variables is 0.58, which is moderately strong.

Three achievement variables are also modelled: *overall ability* at 16 (the teachers' perception of the student's ability relative to their peers); *ability to cope with NCEA* (the teachers' perception of the student's ability to cope with NCEA); *number of Level 1 NCEA credits*; and *cognitive composite*. The first two have been modelled in the chapter *Relationship between class, family, and friends* but are included here again, using a slightly different set of explanatory variables because they give the teachers' perspective on the student's engagement in learning and [likely] achievement.

## The explanatory variables

The learning opportunities variables (teacher reports of what happened in their class), as well as corresponding age-14 variables where available (*engaged* or *affirmed*) and the age-14 composite cognitive and attitudinal competencies and age-16 family, friends, and life experience variables were used to model the six outcome variables. Models were also fitted using the age-16 class engagement variables. The demographic and other discrete variables were also used as explanatory variables in all models, where they added significantly to the model.

### Learning opportunities

These variables describe what tends to happen in the class (one of English, most and least enjoyed classes) and are described in *Scale variables, cluster variables, and history variables*. They are:

- *students involved and active*
- *feedback and support*
- *reflective learning*
- *students working alone*.

One set of three scale variables, those about *students working alone*, are at best weakly correlated with the other learning opportunities variables. This is not surprising as the items used to make this scale are about whether the students work on their own; many of those of the other scales are about what opportunities students have to work together. The other nine of the 12 scale variables (four for each of the three subjects) are moderately correlated within each subject ( $0.37 < r < 0.53$ ), but are uncorrelated between subjects, as would be expected. In other words, there is some tendency for a teacher giving item responses about English, say, that give a relatively high score on *students involved and active* to also give responses that give a relatively high score on *feedback and support* and on *reflective learning*. But the responses of the English teacher and the other teachers showed no associations. The correlations within the subjects are shown in Table 66. The correlations for English classes are stronger than those for the other classes, perhaps because what happens in different English classes is more consistent than what happens in mathematics and visual art classes, for example.

**Table 66: Correlations among the teacher description of class variables**

	Feedback and support	Reflective learning	Students working alone
Students involved and active			
English	<b>0.48</b>	<b>0.48</b>	-0.14
Most enjoyed	0.37	0.37	-0.14
Least enjoyed	<b>0.41</b>	<b>0.41</b>	-0.33
Feedback and support			
English		<b>0.52</b>	–
Most enjoyed		<b>0.44</b>	-0.15
Least enjoyed		<b>0.43</b>	–
Reflective learning			
English			–
Most enjoyed			-0.21
Least enjoyed			-0.23

– indicates  $-0.1 < r < 0.1$ ; all correlations over 0.4 in absolute value are in **bold face**.

We have values of these variables for between 408 (*reflective learning* in most enjoyed class) and 418 (*reflective learning* in English class) of the young people.

### *Family, friends, and experiences variables*

These are the age-16 versions of the variables used in the preceding chapters:

- *inclusive family*
- *supportive family*
- *family communicates well*
- *family pressure*
- parent perception of young person's *self-confidence*
- parent perception of young person's *self-efficacy*
- parent perception of young person's *responsibility*
- *rejection*
- *praise and achievement*
- *adverse events*
- *friends with risky behaviour*
- *solid friendships*
- *risky behaviour*
- *extending friendships.*

The class environment variables are *relevant learning opportunities* in each of the three classes.

### *Class engagement variables*

These include the age-16 attitudinal competency variables, as well as the student perceptions of class and their progress with and attitude towards work:

- *thinking and learning*
- *focused and responsible*
- *social skills*
- *social difficulties*
- *internal markers of achievement*
- *absorbed in learning*
- *attitude to work*
- *positive about teacher*
- *positive about class*
- *disengaged in learning*
- *disrupted learning environment.*

### *Demographic variables*

These are the "usual suspects" of gender, ethnicity, maternal qualifications, age-14 family income and financial situation, as well as school-level "demographics" of decile and gender mix.

### *Discrete variables*

These are a mix of one age-16 variable, and several age-14 variables that were created either as a result of a cluster analysis (e.g., motivation) or to capture a history of experiences (e.g., history of involvement in bullying, or

enjoyment of reading). The age-14 variables are the same ones used in *Overview of the relationships between factor and cluster variables and school and social characteristics*.

For these models, two versions of *attendance* at age 16 were used: the full version, with seven possible levels, and one dichotomised into acceptable and poor, where acceptable includes all students other than those whose attendance was rated poor. For some outcome variables, there is a graduation of response; for others, the only real contrast was between those with poor attendance and the rest.

Year level was included in the models if it was statistically significant, to allow for the possibility that there was an engagement or achievement difference between the Year 11 and Year 12 students.

## Model-fitting process

We first present two relatively simple models for the age-16 *cognitive competency* and the *number of Level 1 NCEA credits* achieved. These models include as possible explanatory variables only age-8 competencies, maternal qualifications, age-5 or age-14 family income, year level, and variables that track education history (school decile pattern, enjoyment of reading, and motivation at age 14). These models attempt to measure the extent to which current achievement can be traced back to early experiences.

How important are more recent experiences in determining outcomes at age 16? To answer this question we next present a series of more full models, which include a wider selection of variables from the categories:

- learning opportunities in each of the three classes (English, most, and least enjoyed)
- age-16 family
- age-16 friends and life experiences
- age-14 composite attitudinal and cognitive competencies
- age-14 engaged and affirmed at school
- social characteristics
- age-14 and 16 discrete variables (*motivation, student values, etc.*).

Once a model including these variables had been fitted, age-16 class engagement variables (including the attitudinal competencies) were tested to see if they added significantly to the model. This allowed a comparison of the importance of learning opportunities as reported by the teacher, and learning environment as reported by the student.

The models were fitted in the stages:

- basic model of learning opportunities, age-14 composite competencies, and age-14 engagement variables; variables not statistically significant were dropped from the model
- social characteristics, if any added significantly
- discrete variables, if any added significantly
- age-16 family, friends, and life variables, if any added significantly
- examination of variance inflation factors, and where necessary one or more of the variables were excluded from the model
- examination of residual plots, which led, as in models described in previous chapters, to some observations being excluded for one or more of the models.

## Inter-correlations between engagement and achievement variables

The correlations between the continuous explanatory variables have been described in *Family and friends* and *Relationship between class, friends, and home*.

The correlations between the outcome variables and between the explanatory and outcome variables are given in a series of tables, the first containing the correlations between the outcome variables, and between those variables and learning opportunities. The rest of the tables show the correlations between the outcome variables and other categories of explanatory variables.

The strongest correlations between the outcome variables (Table 67) are between the perceptions of the teacher about the student's ability and their ability to cope with NCEA ( $r = 0.79$ ). The relationship between the student's actual ability, whether measured by the *number of Level 1 NCEA credits* or our *composite competency* and these variables was weaker (0.64). Weaker again is the relationship between *engaged* or *affirmed* or *cognitive competency* and *ability to cope with NCEA*. The weakest correlations are between *engaged* or *affirmed* and *cognitive competency*, which may suggest that some students are under- or over-achieving.

**Table 67: Correlation between the age-16 engagement and achievement variables and with the age-16 opportunities to learn variables**

	Engaged 16	Affirmed 16	Overall ability 16	Ability to cope with NCEA 16	Number of L1 credits	Cognitive competency 16
Affirmed 16	<b>0.58</b>					
Overall ability 16	<b>0.64</b>	0.37				
Ability to cope with NCEA 16	<b>0.50</b>	<b>0.43</b>	<b>0.79</b>			
Number of Level 1 credits	<b>0.57</b>	0.36	<b>0.64</b>	<b>0.64</b>		
Cognitive competency 16	0.32	0.22	<b>0.64</b>	<b>0.50</b>	<b>0.57</b>	
English						
–Students involved	–	–	0.16	0.11	–	–
–Feedback and support	–	–	–	–	–	–
–Reflective learning	–	–	0.18	0.13	–	–
–Students working alone	0.18	0.12	0.26	0.25	0.27	0.22
Most enjoyed subject						
–Students involved	–	–	–	–	–	–
–Feedback and support	–	–	–	–	–	–
–Reflective learning	–	–	–	–	–	–
–Students working alone	–	–	0.12	–	0.12	0.13
Least enjoyed subject						
–Students involved	–	–	–	–	–	–
–Feedback and support	–	–	–	–	–	–
–Reflective learning	–	–	–	–	–	–
–Students working alone	–	–	–	–	–	–

– indicates  $-0.1 < r < 0.1$ ; all correlations over 0.4 in absolute value are in **bold face**.

The opportunities to learn variables have at best a weak correlation with the outcome variables. There are some stronger associations with the age-16 family, friends, and life variables (Table 68), particularly with those measuring risky behaviour at age 16.

**Table 68: Correlation between the age-16 engagement and achievement variables and with the age-16 family, friends, and life variables**

	Engaged 16	Affirmed 16	Overall ability 16	Ability to cope with NCEA 16	Number of L1 credits	Cognitive competency 16
Inclusive family	0.25	0.33	0.14	0.12	0.14	–
Supportive family	0.21	0.31	0.11	0.10	0.14	–
Family communicates well	0.27	0.34	0.18	0.21	0.18	–
Family pressure	-0.28	-0.18	-0.19	-0.22	-0.18	-0.10
Parent view of self-confidence	0.19	0.13	0.22	0.16	0.16	0.20
Parent view of self-efficacy	0.25	0.19	0.25	0.23	0.28	0.26
Parent view of responsibility	0.27	0.22	0.35	0.33	0.34	0.39
Friends with risky behaviour	<b>-0.41</b>	-0.27	-0.32	<b>-0.44</b>	-0.32	-0.27
Solid friendships	–	0.22	–	–	–	–
Extending friendships	0.13	0.35	0.11	0.10	0.11	0.11
Rejection	-0.18	-0.12	–	–	–	–
Praise and achievement	–	0.27	–	–	0.10	–
Risky behaviour	<b>-0.53</b>	-0.24	-0.37	<b>-0.49</b>	-0.35	-0.30
Adverse events	-0.28	-0.15	-0.15	-0.521	-0.22	-0.21

– indicates  $-0.1 < r < 0.1$ ; all correlations over 0.4 in absolute value are in **bold face**.

There are considerably stronger correlations with the classroom engagement variables (Table 69), and with similar age-14 variables. Perhaps what is important in a class is not so much what the teacher thinks is happening, or what learning opportunities are offered, but how the students perceive or understand these opportunities and, even more, the interpersonal relationships that are built within the classroom.

**Table 69: Correlation between the age-16 engagement and achievement variables and with the age-14 and age-16 class engagement variables**

	Engaged 16	Affirmed 16	Overall ability 16	Ability to cope with NCEA 16	Number of L1 credits	Cognitive competency 16
Engaged at school 14	<b>0.45</b>	0.33	0.36	<b>0.40</b>	0.30	0.31
Affirmed at school 14	0.27	<b>0.42</b>	0.29	0.33	0.29	0.21
Cognitive composite 14	0.30	0.24	<b>0.64</b>	<b>0.50</b>	<b>0.61</b>	<b>0.88</b>
Attitudinal composite 14	<b>0.43</b>	0.37	<b>0.63</b>	<b>0.62</b>	<b>0.59</b>	<b>0.58</b>
Cognitive composite 8	0.22	0.24	<b>0.56</b>	0.39	<b>0.51</b>	<b>0.77</b>
Attitudinal composite 8	0.13	0.16	0.35	0.26	0.33	<b>0.44</b>
Thinking and learning 16	<b>0.46</b>	<b>0.40</b>	<b>0.79</b>	<b>0.82</b>	<b>0.62</b>	<b>0.54</b>
Focused and responsible 16	<b>0.55</b>	<b>0.42</b>	<b>0.79</b>	<b>0.91</b>	<b>0.64</b>	<b>0.54</b>
Social skills 16	<b>0.42</b>	0.38	<b>0.59</b>	<b>0.65</b>	<b>0.46</b>	<b>0.42</b>
Social difficulties 16	-0.35	-0.26	<b>-0.45</b>	<b>-0.58</b>	<b>-0.44</b>	<b>-0.43</b>
Internal markers of success 16	0.38	<b>0.45</b>	0.33	0.33	0.29	0.28
External markers of success 16	0.10	0.18	0.23	0.19	0.19	0.25
Positive about classes 16	<b>0.43</b>	<b>0.51</b>	0.24	0.30	0.15	0.11
Positive about teachers 16	<b>0.44</b>	<b>0.48</b>	0.31	0.35	0.21	0.20
Absorbed in learning 16	<b>0.43</b>	<b>0.46</b>	0.24	0.32	0.15	–
Disengaged in learning 16	<b>-0.55</b>	-0.35	-0.27	-0.41	-0.26	-0.17
Disrupted learning environment 16	-0.21	-0.12	-0.14	-0.13	-0.18	-0.19
Attitude to all work 16	<b>0.43</b>	<b>0.42</b>	0.18	0.39	0.30	0.35
Relevant learning opportunities 16	–	0.15	–	–	-0.14	-0.11

– indicates  $-0.1 < r < 0.1$ ; all correlations over 0.4 in absolute value are in **bold face**.

Models fitted

Mainly age-8 variables

Cognitive competency age 16

There is a relatively strong correlation between the age-8 and age-16 cognitive competencies ( $r = 0.77$ ), so the model for the *cognitive competency* accounts for 65 percent of the variability in the age-16 value (Table 70). Gender and ethnicity did not add significantly to the model.

**Table 70: Model to estimate cognitive competency at 16 from age-8 competency variables, demographic variables, and age 8–14 history variables**

	Parameter estimate	Standard error	p-value	$\eta_p^2$ (%)	Partial correlation
Intercept	2.42	0.26	< 0.0001		
Cognitive composite 8	0.58	0.03	< 0.0001	44.1	0.66
Maternal qualifications–none	0		0.0009	3.7	
–mid-secondary/trade	0.16	0.13	0.213		
–senior secondary/tertiary	0.31	0.15	0.046		
–university	0.52	0.15	0.0009		
Year level–Year 11	0		0.007	1.9	
–Year 12	0.22	0.08	0.007		
School decile pattern 8–14–mainly 1–2	0		0.016	3.1	
–mainly 3–8	0.47	0.18	0.009		
–mainly 9–10	0.60	0.18	0.001		
–mixed	0.55	0.19	0.004		
Motivation 14–high	0		0.010	2.4	
–unsure	-0.13	0.10	0.192		
–low	-0.32	0.11	0.003		
Reading pattern 8–14–enjoy reading	0		0.007	3.1	
–mainly enjoy reading	-0.22	0.10	0.029		
–mixed responses	-0.36	0.11	0.001		
–repeated lack of enjoyment	-0.33	0.19	0.079		

The model above includes *motivation*, or the value placed on education, at age 14, and *enjoyment of reading* between ages 8 and 14. It can be argued that these both reflect aspects of the home environment as well as ability (enjoyment of reading in particular) and that these aspects of the home environment would have been influencing the child before age 8, so it is legitimate to include them in this baseline model. How much worse would the model be without them? The indications from Table 70 are that it would not be much worse (each accounts for less than 5 percent of the variability in the age-16 cognitive competency), and this is confirmed by the model in Table 71, which accounts for 63 percent of the variability.

**Table 71: Model to estimate cognitive competency at 16 from age-8 competency variables, demographic variables**

	Parameter estimate	Standard error	p-value	$\eta_p^2$ (%)	Partial correlation
Intercept	1.73	0.22	< 0.0001		
Cognitive composite 8	0.63	0.03	< 0.0001	51.5	0.72
Maternal qualifications–none	0		0.0009	4.2	
–mid-secondary/trade	0.19	0.13	0.156		
–senior secondary/tertiary	0.39	0.16	0.013		
–university	0.56	0.16	0.0004		
Year level–Year 11	0		0.004	2.1	
–Year 12	0.25	0.08	0.004		
School decile pattern 8–14–mainly 1–2	0		0.013	3.2	
–mainly 3–8	0.47	0.18	0.010		
–mainly 9–10	0.63	0.19	0.008		
–mixed	0.58	0.20	0.003		

#### *Number of Level 1 NCEA credits*

How well does the age-8 *cognitive competency* predict the *number of credits achieved in Level 1 of the NCEA*? Using only age-8 competencies, demographic variables, and some history variables, the model in 0 accounts for 34 percent of the variability in the number of Level 1 credits.

**Table 72: Model to estimate number of Level 1 NCEA credits at 16 from age-8 competency variables and demographic variables**

	Parameter estimate	Standard error	p-value	$\eta_p^2$ (%)	Partial correlation
Intercept	19.12	9.13	0.037		
Cognitive composite 8	9.75	1.15	< 0.0001	15.5	0.39
Attitudinal composite 8	3.18	1.20	0.005	2.0	0.14
School decile pattern 8–14–mainly 1–2	0		0.0001	7.3	
–mainly 3–8	7.57	6.42	0.239		
–mainly 9–10	23.09	6.47	0.004		
–mixed	10.42	6.86	0.130		

Outcomes in the NCEA are more strongly influenced by environmental changes than are the basic literacy, numeracy, and problem-solving competencies captured in the *cognitive composite*. Adding more variables that capture some changes in environment between 8 and 14, as well as more attitudes and advantages (positive or negative) associated with home substantially improves the fit of the model (Table 73, , and see also Table 82), so that it accounts for 41 percent of the variability in the *number of Level 1 NCEA credits* achieved. Student values at 16 have been included in this model as they are likely to capture some differences at the family level, as well as between the young people themselves.

Table 73: Model to estimate number of Level 1 NCEA credits at 16 from age-8 competency variables and demographic variables, and age 8–14 history variables

	Parameter estimate	Standard error	p-value	$\eta_p^2$ (%)	Partial correlation
Intercept	42.03	10.69	< 0.0001		
Cognitive composite 8	7.54	1.13	< 0.0001	10.4	0.32
Attitudinal composite 8	2.80	1.15	0.015	1.5	0.12
School decile pattern 8–14–mainly 1–2	0		0.0004	5.2	
–mainly 3–8	4.07	6.13	0.507		
–mainly 9–10	17.07	6.31	0.007		
–mixed	6.35	6.63	0.339		
Involvement in bullying 8–14				4.3	
–involved once	0		0.0002		
–involved at least twice	-12.62	3.12	< 0.0001		
–no involvement	-2.90	3.32	0.383		
Family income 14–< \$30K	0		0.003	4.2	
–\$30–60K	7.56	4.74	0.111		
–\$60–100K	15.50	4.64	0.0009		
–\$100K+	15.30	4.83	0.002		
Motivation 14–high	0		0.015	2.2	
–unsure	-2.71	3.15	0.381		
–low	-9.89	3.53	0.005		
Student values 16–satisfying life	0		0.018	2.1	
–aspirational	-4.64	3.44	0.118		
–standing out	-9.04	3.17	0.005		

It would seem that what qualifications are achieved, certainly by Level 1 NCEA, does depend on achievement both cognitively and attitudinally that is shown as early as age 8, but depends even more on what happens to the young person in the intervening years: where they go to school, what experiences they have, the peer group with which they associate, and how family resources change (which in turn affects where they attend school).

For each of the next set of outcome variables examined, two models are presented, one which excludes all class engagement variables, and one that includes them.

### *Models using age-14 and age-16 data*

#### *Engaged at school*

From the reported correlations above we can see that a number of variables are moderately correlated with *engaged at school* (and each other). Not all added significantly to the model, because of the intercorrelations between the variables.

The final model for *engaged at school* excluding class engagement variables accounted for 43 percent of the variability in *engaged at school* (Table 74). The variable accounting for most of the variability was *risky behaviour* (about 15 percent). None of the opportunities to learn variables added significantly to the model.

**Table 74: Model to estimate engagement at 16 from age-14 engagement and competency variables, opportunities to learn, and age-16 family and friends variables**

	Parameter estimate	Standard error	p-value	$\eta_p^2$ (%)	Partial correlation
Intercept	3.26	0.45	< 0.0001		
Risky behaviour 16	-0.28	0.03	< 0.0001	15.0	-0.39
Family communicates well 16	0.13	0.03	< 0.0001	4.8	0.22
Engaged at school 14	0.13	0.04	0.0006	3.2	0.18
Attitudinal composite 14	0.14	0.04	0.0009	2.9	0.17
Parent perception of responsibility 16	0.08	0.04	0.033	1.2	0.11
Attendance 16—acceptable	0		0.045	1.1	
—poor	-0.29	0.14	0.045		

The final model for *engaged at school* that included classroom engagement variables (Table 75). accounted for 57 percent of the variability in *engaged at school*.

**Table 75: Model to estimate engaged at school from classroom engagement and other variables**

	Parameter estimate	Standard error	p-value	LMG (%) (confidence interval)	Partial correlation
Intercept	3.74	0.49	< 0.0001		
Risky behaviour	-0.23	0.03	< 0.0001	13.5 (9.9, 17.2)	-0.35
Disengaged in learning	-0.23	0.03	< 0.0001	12.7 (9.7, 15.9)	-0.32
Attitude to all work	0.17	0.04	< 0.0001	6.1 (3.8, 8.8)	0.22
Engaged at school 14	0.11	0.03	0.0006	6.9 (4.4, 10.0)	0.17
Focused and responsible	0.08	0.03	0.007	9.4 (7.1, 12.3)	0.13
Internal markers of progress	0.07	0.03	0.017	4.0 (2.0, 7.1)	0.12
Positive about classes	0.10	0.05	0.038	4.7 (2.7, 7.1)	0.10

From the table we can see that:

- A single unit increase in *risky behaviour* is associated with the largest increase or decrease in *engaged at school at 16* (a decrease of 0.23), and a single unit increase in *positive about classes* with the smallest (0.10)—both of these changes being when all other variables in the model are held constant.
- Appropriately, these are the variables with the highest and lowest partial correlations (in absolute value) with *engaged at school at 16*.
- The LMG measures show that *disengaged in learning* and *risky behaviour* account for almost equally-sized parts of the variability in *engaged in learning* (about 13 percent).
- The confidence intervals for the LMG estimates indicate that *disengaged in learning* and *risky behaviour* probably both account for significantly more of the variability in *engaged in learning at age-16* than do

*attitude to all work, internal markers of success, and positive about classes* (they account for almost twice as much of the variability, and the two sets of confidence intervals do not overlap).

This measure of engagement, then, is largely explained by a similar measure two years before, the teachers' perception of the student (*focused and responsible*; given the strong correlation between this variable and *thinking and learning*, it is not surprising that only one can be included in the model), and some aspects of the students' perceptions of the class (their attitude to work, how they measure their progress, and that they behave co-operatively and responsibly). A sense of engagement seems associated with attitudes to work and determination to succeed.

*Affirmed at school*

From the reported correlations above we can see a number of variables that are moderately correlated with *affirmed at school* (and each other). Not all remained adding significantly to the model, because of the inter-correlations between the variables. The final model for *affirmed at school* that excluded the classroom engagement variables accounted for 39 percent of the variability in *affirmed at school* (Table 76).

**Table 76: Model to estimate affirmed at school at 16 from age-14 engagement and competency variables, opportunities to learn, and age-16 family and friends variables**

	Parameter estimate	Standard error	p-value	$\eta_p^2$ (%)	Partial correlation
Intercept	-0.29	0.48	0.554		
Praise and achievement 16	0.13	0.03	< 0.0001	4.5	0.21
Attitudinal composite 14	0.13	0.04	0.0002	3.7	0.19
Affirmed at school 14	0.13	0.04	0.0006	3.0	0.17
Relevant learning opportunities 16	0.11	0.04	0.004	2.1	0.15
Friends with risky behaviour 16	-0.06	0.02	0.008	1.8	-0.13
Parent perception of responsibility 16	0.08	0.03	0.013	1.6	0.13
Extending friendships 16	0.10	0.04	0.015	1.5	0.12
Supportive family 16	0.06	0.03	0.016	1.5	0.12
Positive about classes 14	0.11	0.04	0.005	2.1	0.14
Student values 16–satisfying life	0		0.046	1.6	
–aspirational	0.05	0.10	0.636		
–standing out	-0.18	0.09	0.043		
–difference between aspirational and standing out	0.23	0.10	0.025		

Having standing out values is associated with lower scores for *affirmed at school*. A sense of affirmation is associated with positive family relationships, achieving things that result in praise, and having *relevant learning opportunities*. It is about getting recognition for success and as an individual.

A model that included classroom engagement variables accounted for 48 percent of the variability in *affirmed at school* (Table 77).

Table 77: Model to estimate affirmed at school from other engagement variables

	Parameter estimate	Standard error	p-value	LMG (%) (confidence interval)	Partial correlation
Intercept	-1.36	0.35	0.0001		
Positive about classes 16	0.21	0.05	< 0.0001	8.4 (5.7, 11.8)	0.21
Affirmed at school 14	0.17	0.03	< 0.0001	8.4 (5.3, 12.1)	0.26
Focused and responsible 16	0.12	0.03	< 0.0001	7.4 (4.8, 10.4)	0.23
Internal markers of progress 16	0.11	0.03	0.0008	8.1 (5.2, 11.3)	0.17
Attitude to all work 16	0.10	0.04	0.012	5.5 (3.5, 8.2)	0.13
Extending friendships 16	0.11	0.04	0.004	5.2 (3.2, 7.8)	0.14
Supportive family 16	0.06	0.02	0.022	3.3 (1.6, 5.7)	0.12
Praise and achievement 16	0.06	0.03	0.017	2.8 (1.2, 5.2)	0.12

From the table we can see that:

- A single unit increase in *positive about classes at 16* is associated with the largest increase in *affirmed at school at 16* (0.21), followed by *affirmed at school at age 14* (0.17), and a single unit increase in *praise and achievement* with the smallest (0.06)—all of these increases being when all other variables in the model are held constant.
- Appropriately, these are the variables with amongst the highest and lowest partial correlations with *affirmed at school at 16*.
- The LMG measures show that *affirmed at school at 14* accounts for the largest single part of the variability in *affirmed at school* (about 8 percent).

This measure of engagement, then, is largely explained by a similar measure two years before, the composite teachers' perception of the student at age 16, and some aspects of the students' perceptions of the class (their attitude to work, the quality of the learning environment, and how they judge that they have been successful).

### Overall ability

The model for *overall ability* that excluded the class engagement variables accounted for 60 percent of the variability in *overall ability*, a similar proportion to that accounted for by the model in *Relationship between class, friends, and home*. None of the opportunities to learn variables added significantly to the model. The *age-14 cognitive composite* made the largest single contribution to this (25 percent).

Table 78: Model to estimate overall ability at 16 from age-14 engagement and competency variables, opportunities to learn, and age-16 family and friends variables

	Parameter estimate	Standard error	p-value	$\eta_p^2$ (%)	Partial correlation
Intercept	-1.61	0.62	0.010		
Cognitive composite 14	0.61	0.06	< 0.0001	25.4	0.50
Attitudinal composite 14	0.51	0.07	< 0.0001	13.6	0.37
Parent perception of self-confidence 16	0.22	0.2	< 0.0001	4.4	0.21
Risky behaviour 16	-0.20	0.05	0.0001	4.1	-0.20
Attendance 16—acceptable	0		< 0.0001	4.4	0.21
—poor	-0.91	0.23	< 0.0001		
Year level—Year 11	0		0.0003	3.7	-0.19
—Year 12	-0.51	0.14	0.0003		

Appropriately, the teachers' perception relative ability at age 16 was most strongly associated with the students' *cognitive competency* at age 14. Next most strongly associated was the age-14 *attitudinal composite*. Those whose attendance was poor were rated, on average, almost a point lower (equivalent to almost 10 percent on a percentage scale) even after taking the other variables into account. In our sample, the Year 12 students were rated as having a lower ability level than the Year 11 students.

A model that included the class engagement variables accounted for 67 percent of the variability in *overall ability* (Table 79). In this model, the age-16 attitudinal competency *focused and responsible* could not be added to the model because there appeared to be problems with multicollinearity (the signs of some of the estimates were reversed). Perhaps because of the reduced amount of residual error, one of the opportunities to learn variables was significant at the 5 percent level in this model.

Table 79: Model to estimate overall ability at 16 from age-14 engagement and competency variables, opportunities to learn, class engagement, and age-16 family and friends variables

	Parameter estimate	Standard error	p-value	$\eta_p^2$ (%)	Partial correlation
Intercept	-4.04	0.66	< 0.0001		
Cognitive composite 14	0.47	0.05	< 0.0001	18.6	0.43
Social skills 16	0.38	0.06	< 0.0001	11.9	0.34
Attitude to all work 16	0.32	0.06	< 0.0001	7.7	0.28
Attitudinal composite 14	0.32	0.07	< 0.0001	6.4	0.25
Risky behaviour 16	-0.13	0.05	0.006	2.2	-0.15
Parent perception of self-confidence 16	0.12	0.05	0.013	1.6	0.13
Career choice based on experience 16	-0.09	0.04	0.030	1.4	-0.12
English: students working alone	0.10	0.05	0.041	1.2	0.11
Attendance 16–acceptable	0		0.004	2.4	0.15
–poor	-0.61	0.21			
Year level–Year 11	0		0.0001	4.2	-0.21
–Year 12	-0.50	0.13			

*Ability to cope with NCEA*

The model that excluded the class engagement variables accounted for 57 percent of the variability in *ability to cope with NCEA*. The variable accounting for the single largest amount of the variation was the age-14 attitudinal competency (about 13 percent).

**Table 80: Model to estimate ability to cope with NCEA at 16 from age-14 engagement and competency variables, opportunities to learn, and age-16 family and friends variables**

	Parameter estimate	Standard error	p-value	$\eta_p^2$ (%)	Partial correlation
Intercept	2.82	0.47	< 0.0001		
Attitudinal composite 14	0.38	0.05	< 0.0001	13.1	0.36
Risky behaviour 16	-0.25	0.04	< 0.0001	10.1	-0.32
Cognitive composite 14	0.19	0.04	< 0.0001	5.1	0.23
English: students working alone	0.08	0.04	0.028	1.3	0.11
Ethnicity—Māori/Pacific	0		0.027	2.0	
–Pākehā/European	0.38	0.15	0.015		
Attendance 16—excellent	0		< 0.0001	9.2	
–very good	-0.03	0.14	0.839		
–good	-0.12	0.14	0.404		
–fair	-0.48	0.16	0.003		
–poor	-1.00	0.19	< 0.0001		
–absences for health reasons	-0.67	0.33	0.042		
–absences for other reasons	-0.47	0.49	0.337		
Student values—satisfying life	0		0.015	2.3	
–aspirational	0.17	0.13	0.202		
–standing out	-0.23	0.12	0.067		
–difference between aspirational and standing out	0.40	0.14	0.004		

A model that includes classroom engagement variables accounts for 84 percent of the variability in *ability to cope with NCEA*. More particularly, inclusion in the model of *focused and responsible*, which has a correlation of 0.79 with *ability to cope with NCEA*, results in a major increase in the amount of variability accounted for (almost all of it), to the extent that very few of the other continuous variables remain significant. It would appear that the teachers' perceptions of the students' ability in the NCEA was very tightly bound up with their perception of the students' ability to stay on task, and apply themselves in a positive way in the classroom.

Table 81: Model to estimate ability to cope with NCEA at 16 from age-14 engagement and competency variables, opportunities to learn, class engagement, and age-16 family and friends variables

	Parameter estimate	Standard error	p-value	$\eta_p^2$ (%)	Partial correlation
Intercept	0.17	0.25	0.488		
Focused and responsible 16	0.78	0.02	< 0.0001	78.2	0.88
Attitude to all work 16	0.12	0.03	< 0.0001	4.1	0.20
English: students working alone	0.05	0.02	0.017	1.4	0.12
Motivation 14–high	0		0.029	1.8	
–unsure	-0.18	0.07	0.013		
–low	-0.17	0.08	0.030		
Parent interests–read widely, involved	0		0.010	2.8	
–TV, not involved	-0.01	0.07	0.897		
–mixed	-0.17	0.11	0.115		
–TV, few interests	-0.25	0.08	0.002		

### Number of Level 1 credits in NCEA

The model that excluded the class engagement variables accounted for 56 percent of the variability in *number of Level 1 credits in NCEA*. The variable accounting for the single largest amount of the variation was the age-14 cognitive competency (about 16 percent).

The parameter estimates in this model look considerably different than those in the other models, as the number of credits has values up to almost 300, rather than being a 1–10 scale as the other outcome variables are. The parameter estimates for the continuous scale variables represent the number of additional credits achieved for a single unit increase in the scale. For example, for each unit increase in *cognitive competency at 14*, holding all other variables constant, students achieved on average almost eight extra credits.

The parameter estimates for categorical variables represent the change in the number of credits achieved compared to the reference category. For example, students with poor attendance achieved an average of about 18.5 fewer credits than other students (holding all other variables constant).

Table 82: Model to estimate number of Level 1 NCEA credits at 16 from age-14 engagement and competency variables, opportunities to learn, and age-16 family and friends variables

	Parameter estimate	Standard error	p-value	$\eta_p^2$ (%)	Partial correlation
Intercept	-42.9	11.2	0.0002		
Cognitive composite 14	7.9	1.0	< 0.0001	15.5	0.39
Attitudinal composite 14	6.7	1.1	< 0.0001	9.5	0.31
Family communicates well 16	1.9	0.8	0.018	1.6	0.13
English: students working alone	5.0	2.0	0.013	1.8	0.13
Parent perception of responsibility	2.2	1.0	0.022	1.5	0.12
Family income age 14-< \$30K	0		0.008	3.9	
-\$30-60K	8.4	4.3	0.051		
-\$60-100K	13.3	4.2	0.002		
-\$100K+	14.6	4.3	0.0007		
Attendance 16-acceptable	0		< 0.0001	6.4	
-poor	-18.5	3.8			
Involvement in bullying 8-14				3.2	
-involved once	0		0.004		
-involved at least twice	-6.7	2.8	0.018		
-no involvement in bullying	5.9	2.3	0.012		
Year level-Year 11	0		0.012	1.8	
-Year 12	5.92	2.3	0.012		

The fact that Year 12 students achieved on average almost six extra credits, taking all other variables into account, suggests that several of the Year 12 students achieved further Level 1 credits in Year 12.

A model that includes classroom engagement variables accounts for 60 percent of the variability in *number of Level 1 NCEA credits*.

Table 83: Model to estimate number of Level 1 NCEA credits at 16 from age-14 engagement and competency variables, opportunities to learn, class engagement, and age-16 family and friends variables

	Parameter estimate	Standard error	p-value	$\eta_p^2$ (%)	Partial correlation
Intercept	-23.1	8.85	0.009		
Cognitive composite 14	6.7	1.0	< 0.0001	12.3	0.35
Thinking and learning 16	6.1	1.0	< 0.0001	9.5	0.31
Attitudinal composite 14	3.9	1.2	0.0008	3.1	0.18
English: students working alone	2.6	0.84	0.002	2.7	0.16
Attendance 16–acceptable	0		< 0.0001	4.3	-0.21
–poor	-14.5	3.6			
Involvement in bullying 8–14					
–involved once	0		0.0006	4.1	
–involved at least twice	-9.9	2.6	0.001		
–no involvement in bullying	-5.5	2.7	0.039		
Family income age 14–< \$30K	0		0.026	3.0	
–\$30–60K	7.8	4.0	0.051		
–\$60–100K	10.5	3.9	0.007		
–\$100K+	12.7	3.9	0.001		
Year level–Year 11	0		0.005	2.2	0.15
–Year 12	6.3	2.2			

This model tells much the same story as the previous one: students' success is associated with their cognitive competency, and their attitude to work. There are students achieving Level 1 credits in Year 12 (on average, accounting for the other variables, six or seven credits).

*Cognitive competency*

The model that excluded the class engagement variables accounted for 78 percent of the variability in *cognitive competency*. The variable accounting for the single largest amount of the variation was the age-14 cognitive competency (about 60 percent). Because of the strong correlation between the two cognitive competency measures ( $r = 0.88$ ), few other variables remain in the model.

**Table 84: Model to estimate cognitive competency at 16 from age-14 engagement and competency variables, opportunities to learn, and age-16 family and friends variables**

	Parameter estimate	Standard error	<i>p</i> -value	LMG (%) (confidence interval)	Partial correlation
Intercept	0.71	0.23	0.003		
Cognitive composite 14	0.75	0.03	< 0.0001	59.5 (55.6, 63.4)	0.82
Attitudinal composite 14	0.08	0.03	0.007	15.2 (12.1, 18.4)	0.13
Risky behaviour 16	-0.05	0.02	0.047	3.1 (1.8, 5.0)	-0.10

In this instance, the model fit is not improved by adding any of the class engagement variables. The *cognitive competency* scores are relatively constant over time: a high score is associated with “good attitudes”, a good general ability level, and an absence of risky behaviour.