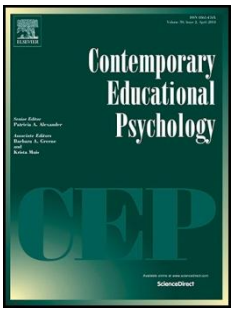
Accepted Manuscript



Title: Relations between teachers' achievement, over- and underestimation, and students' beliefs for Māori and Pākehā students

Author: Christine M. Rubie-Davies, Elizabeth R. Peterson

PII: S0361-476X(16)00003-5
DOI: http://dx.doi.org/doi: 10.1016/j.cedpsych.2016.01.001
Reference: YCEPS 1532

To appear in: *Contemporary Educational Psychology*

Running head: TEACHER EXPECTATIONS, STUDENT BELIEFS, AND ACHIEVEMENT

Relations between teachers' achievement, over- and underestimation, and students' beliefs for Māori and Pākehā students

Christine M. Rubie-Davies[a]

Elizabeth R. Peterson[b]

[a] School of Learning, Development and Professional Practice, Faculty of Education and Social Work, The University of Auckland, Private Bag 92601, Auckland, 1150, New Zealand

[b] School of Psychology, Faculty of Science, The University of Auckland, Private Bag 92019, Auckland, 1142, New Zealand

Christine Rubie-Davies email: c.rubie@auckland.ac.nz

Elizabeth Peterson email: e.peterson@auckland.ac.nz

Correspondence concerning this article should be addressed to Professor Christine M. Rubie-Davies, School of Teaching, Learning and Development, Faculty of Education and Social Work, The University of Auckland, Private Bag 92601, Auckland, 1150, New Zealand.

E-mail: c.rubie@auckland.ac.nz

Phone: +649 373 7599 extn 82974

Fax: +649 623 8827

Highlights

- Teachers underestimated the math achievement of indigenous students
- Indigenous students' perceptions of peer support predicted math achievement
- A performance goal orientation predicted achievement gains for indigenous students
- Teachers underestimated the math achievement of girls, particularly European girls'
- School SES strongly predicted student math achievement

Abstract

In the New Zealand context, the indigenous Māori group achieve below their Pākehā (European) peers in most academic subjects. The gap begins early in elementary school and is evident throughout schooling. Historically, this has been of concern to researchers, educators, and policy makers because Māori are disadvantaged socially and economically. Teacher expectations are known to contribute to student achievement and, similarly, some student beliefs have been associated with achievement. The current study explored student beliefs and teacher expectations in relation to Māori (n = 127) and Pākehā (n = 523) middle school students, aged 10-14 years. Teachers were more likely to underestimate Māori and overestimate Pākehā students although this difference disappeared when school socioeconomic status was controlled. Māori students more strongly endorsed performance goals than Pākehā. Greater achievement gains over one year were found in schools in high socioeconomic areas. For Māori students, beginning-of-year achievement, school socioeconomic status, holding a performance orientation, and having low levels of peer support predicted their gains whereas for Pākehā students, only prior achievement, school socioeconomic status and being male were associated with higher end-of-year achievement. The findings are discussed in relation to the implications for Māori and Pākehā students and their schooling. The inclusion of a culturally-based intervention which focuses on improving

student-teacher relationships, raising teacher efficacy for teaching Māori, and including culturally appropriate teaching methods is recommended, particularly for teachers teaching in low socio-economic schools. Such interventions may help to increase Māori achievement and decrease the ethnic achievement gap.

Keywords: indigenous students; teacher expectations; academic competence; goal orientation; teacher support; peer support

1. Introduction

Within the New Zealand context, the underachievement of the indigenous Māori population relative to the European (Pākehā in the Māori language) majority has been a concern and a focus for policy makers, researchers, and educators since the early 1960s (Bishop & Berryman, 2006; Hattie, 2008; Ministry of Education, 2009). Lock and Gibson (2008) argued that the inability of policy interventions to close the ethnic achievement gap was of increasing concern for New Zealand. The relatively high fertility rates among Māori and a younger age structure mean that the New Zealand economy is going to be increasingly reliant on the future Māori working population, but unless the ethnic achievement gap closes, that workforce is going to be less educated and potentially less productive.

1.1. Historical and contextual background to Māori educational achievement

Māori education and economic disadvantage is culturally situated within the New Zealand historical and educational context. Māori have long been marginalized by successive New Zealand governments. This is despite promises in the Treaty of Waitangi, signed in 1840 by representatives of the British Crown and 512 Māori leaders, which was supposed to establish a new nation, where Māori were promised full participation in the benefits of that new nation, and full control over their cultural and physical resources in return for the Europeans' right to settle and establish a government (Bishop, 2005). However, after the signing of the Treaty of Waitangi, the latter part of the nineteenth century

saw the Māori population descend into poverty, due largely to the confiscation of their land by the crown (Bishop, 2005). The dominant discourse at the time, however, was that Māori poverty was due to their resistance to assimilation. Further, their downward plight fueled ideas about cultural and racial inferiority (Bishop, 2005).

Māori were further excluded with the introduction of Native schools in 1867 which delivered a restrictive curriculum of basic reading, writing, agricultural skills, and personal hygiene. Of note, more Māori than Pākehā were literate at the time (Simon, 1998). Lessons in Native schools were conducted in English and students were frequently punished, often physically, for speaking te reo Māori (Simon & Tuhiwai-Smith, 2001). Deficit theorizing about Māori was also reflected in polices, with schooling becoming compulsory for Pākehā in 1867, whereas for Māori this was not mandated until 1894. Secondary (high school) education became compulsory for all in the 1930s, but for Māori access was limited. Mostly either poorly resourced high school departments were added to Native schools or Māori could attend Māori boarding schools for two years, Years 7 and 8 only, effectively giving them only an upper elementary level of education. Such policies served to limit future educational and economic opportunities for Māori. As in other countries with indigenous communities, education in many respects was a means for socialization and subjugation (Adams, 1995; Greymorning, 2012; Pierotti, 2011).

Disparities in Māori and Pākehā achievement were first statistically identified in the 1960 Hunn Report (Hunn, 1960). The report advocated integration as a way to address Māori disadvantage and led to all Native schools being closed by 1969 with their students sent to mainstream schools (Calman, 2012). Despite educational reforms from the 1970s onwards, with policies such as biculturalism and multiculturalism, which have all sought to address the educational disparities, for most Māori who attend mainstream schools (over 90%) until very

recently there has been little real change in these inequalities since they were first statistically identified over fifty years ago (Bishop, Berryman, Cavanagh, & Teddy, 2009).

1.2. Māori educational achievement today

Current Ministry of Education data shows that whereas the number of students leaving school with a qualification is growing for all ethnic groups, there continues to be an ethnic achievement gap (Education Counts, 2015). Compared to their Pākehā counterparts, Māori student achievement levels are low, and they are overrepresented in lower track and in special education programs for behavioral issues. Māori are more likely than other students to leave school early with fewer formal qualifications and are less likely to enroll in university-level education (Bishop et al., 2009).

In New Zealand, there are national level examinations at Years 11-13 (Grades 10-12) entitled the National Certificate of Educational Achievement (NCEA). Students normally complete one level each year and need at least Level 2 NCEA in order to enter university. In 2004, 55% of Māori achieved this level whereas the figure for Pākehā was 79% (New Zealand Qualifications Authority, 2015). However, by 2014, the gap had closed considerably with 82% of Māori gaining NCEA Level 2 and 92% of Pākehā achieving the qualification. Hence, although the proportion of Pākehā eligible for university has also improved, the growth for Māori has been even greater. The Te Kotahitanga program, in particular, which has been introduced to some high schools appears to have been responsible for at least some of this improvement:.

The Te Kotahitanga program was developed in high schools by Bishop and colleagues (Bishop & Berryman, 2006; Bishop, Berryman, Tiakiwai, & Richardson, 2003) following an investigation in which Māori students were interviewed about why they believed they were not succeeding at high school. The students identified low expectations, poor relationships with teachers, and cultural insensitivity as major factors contributing to their failure. The Te

Kotahitanga program focused on professional development for teachers and was designed to enhance relationships between teachers and students, and improve teacher efficacy for teaching Māori students. Māori students in the program now achieve much more highly than those in other high schools (Bishop & Berryman, 2010).

1.3. Teacher expectations for Māori

Nevertheless, low historical attainment of Māori has resulted in low teacher expectations, stereotyping, and deficit theorizing (Bishop & Berryman, 2006; Rubie-Davies, Hattie, & Hamilton, 2006; Turner, Rubie-Davies, & Webber, 2015). Without some form of professional development intervention for teachers, many Māori students are aware that they are not expected to be successful within an historically Pākehā education system (Bishop & Berryman, 2006; McClure et al., 2011). This perpetuation of deficit beliefs about the capabilities and prospects of Māori may influence students' own beliefs, and later achievement. Māori student awareness of stereotyping may result in them having less positive self-efficacy and their self-beliefs may, in turn, influence their motivation and achievement (McClure et al., 2011).

In elementary school, there is evidence that teachers have lower expectations for Māori students than they do for Pākehā (Rubie-Davies et al., 2006; St. George, 1983). Young students are very sensitive to teachers' low expectations and have been shown to detect nuanced behaviors that even trained observers do not notice (Babad, 2009; Weinstein, 2002). It seems feasible that because students understand what is expected of them, that they assimilate these messages.

There have been consistently strong links shown between teacher expectations and student achievement (Rubie-Davies et al., 2014), between student self-efficacy and achievement (Liem, Marsh, Martin, McInerney, & Yeung, 2013), and between student motivation and achievement (Kaplan & Maehr, 2007). Hence, as McClure et al. (2011) have

suggested, it would seem possible that when teachers have low expectations of students, in turn, this is related to lowering of self-esteem and declines in motivation, ultimately being reflected in lower achievement than the students may be capable of. The opposite scenario is also likely. However, these associations between teacher expectations, self-beliefs, and motivation have not previously been investigated for Māori students and because research (as cited below) has shown these relations to be of practical significance for student achievement among other groups, it would therefore seem important to investigate such relations for Māori students. It is the purpose of the current study to explore whether teachers do under- or overestimate Māori and Pākehā students' achievement, and how this estimation relates to students' self- and motivational beliefs, and their end-of-year achievement.

1.4. Teacher expectations and indigenous groups

Teacher expectation research began with the classic study of Rosenthal and Jacobson (1968). Through an experimental study, the researchers demonstrated that teacher expectations could affect student achievement. However, this seminal work left many questions unanswered. One of these related to the bases on which teachers formed their expectations. Several student characteristics have been investigated as possible bases for teachers' expectations, for example, gender, labelling, socioeconomic status, and ethnicity (Rubie-Davies, 2015). The most recent meta-analysis of ethnicity (Tenenbaum & Ruck, 2007) as potentially influencing teachers' expectations, showed that expectations were higher for European American than for Latino (d = .46) or African American students (d = .25). Nevertheless, although many studies have investigated teacher expectations for minority groups (e.g., McKown & Weinstein, 2008), there have been fewer that have investigated teacher expectations for indigenous students. Rampaul, Singh, and Didyk (1984) investigated Canadian teachers' expectations for their 41 third and fourth grade Native Indian students and

found positive correlations between teachers' expectations and student achievement and self-concept.

In a more recent Australian study, Dandy, Durkin, Barber, and Houghton (2015) compared the expectations of trainee high school teachers, practicing elementary school teachers, and Year 6-9 students. Trainee teachers rated Aboriginal students lower than Anglo-Australian and Asian students on all categories (talent, effort, current and future performance, and career) in both English and mathematics. Teachers rated Aboriginal students lower in ability, achievement, and effort, and viewed Aboriginal parents as unsupportive of their children. Aboriginal students seemed aware of the stereotypes about their group because they also rated expectations for their group's current and future performance lower than the other two groups, but not their effort.

However, neither of the preceding studies accounted for student achievement in their estimates of teacher expectations. It could be that expectations were lower for Aboriginal and Canadian Indian students because achievement was lower, and therefore that lower expectations were in some way justified. One problem with low expectations is that they lead to reduced opportunities to learn for students with teachers giving students lower level, repetitive work which tends to sustain low achievement rather than providing opportunities for students to be challenged and to make marked progress (Rubie-Davies, 2015).

There are two studies in New Zealand (Rubie-Davies et al., 2006; St. George, 1983) that have measured teacher expectations for Māori elementary school students compared with those for other groups. Both studies have found lower expectations for Māori students. In the earlier study, however, due to low numbers of Māori participants, St George combined both Māori and Pacific Island students into one group, potentially confounding the results.

The study of Rubie-Davies et al. (2006) which accounted for prior achievement, found that teachers had high expectations for all groups (including Pacific Island students), but not

for Māori. These lower expectations for Māori were also related to end-of-year achievement. That is, although Māori were not achieving below Pākehā or Asian students at the beginning of the year, they were by year's end. The authors suggested that the low expectations for Māori students may have led teachers to offer them reduced opportunities to learn, in turn resulting in lower end-of-year achievement.

1.5. Student self-beliefs and indigenous groups

Some studies have examined the self-beliefs of indigenous students. Self-beliefs include beliefs about one's perceived competence, self-efficacy, self-esteem, and self-concept although these constructs are theoretically distinguishable. Perceived competence is defined as the student's perception of current competence at a given activity (Wigfield & Eccles, 2000), that is, how competent students believe they are currently in a particular area. Self-efficacy, on the other hand, relates to beliefs about whether, and how well, students can complete a task, often in the future. Self-concept concerns students' knowledge about themselves and how students define themselves, whereas self-esteem relates to the value students place on themselves; it is an evaluation of worth. The current study, assessed student perceived competence and self-efficacy. These measures have been used previously and successfully by the current authors in other projects with younger students (e.g., Rubie-Davies, 2015). Further, perceptions of competence and self-efficacy have been related to teachers' expectations (a construct measured in the current study) in the literature. That is, when teachers convey messages that students are and can be successful at tasks (they convey high expectations of students), this is likely to be related to high levels of student perceived competence and self-efficacy (McClure et al., 2011; Weinstein, 2002).

Mostly, studies of self-beliefs have used questionnaires designed in a western context and have employed invariance testing to examine the applicability of such questionnaires with different indigenous groups (e.g., Arens, Bodkin-Andrews, Craven, & Yeung, 2014;

Bodkin-Andrews, Seaton, Nelson, Craven, & Yeung, 2010). Generally such studies suggest that indigenous students gain similar meaning for items designed to assess self-beliefs. Nevertheless, the relations between self-beliefs and student achievement appear less straightforward among indigenous students, with some studies showing the positive relations evident in western contexts (Beiser, Sack, Manson, Redshirt, & Dion, 1998) and others showing no relations (Bodkin-Andrews et al., 2010). Within the New Zealand context, no study has specifically examined the self-beliefs of Māori elementary school students and relations with academic achievement. However, because several studies have shown such relations to be of practical significance, it is therefore important to determine the strength of relations between self-beliefs and achievement for Māori students.

In the United States, there have been several studies examining the self-beliefs of American Indian students. For example, Beiser et al. (1998) tracked 1251 first nations and 457 non-indigenous students for three years, beginning in Grade 2. In Grade 2, there was no difference in the self-concept of first nations versus non-indigenous students. By Grade 4, however, the self-concept of non-indigenous students had risen substantially whereas among the first nations students, self-concept had declined considerably. Even when prior achievement was controlled for, self-concept exerted an independent effect on subsequent achievement. This finding suggested that for first nations students, increasing exposure to schooling was associated with decreases in self-concept and corresponding declines in achievement. Similarly, a three-year longitudinal study by Whitesell, Mitchell, Spicer, and The Voices of Indian Teens Project Team (2009) of three first nations groups found further evidence that self-esteem affected achievement rather than the converse.

In Australia, several studies (Arens et al., 2014; Bodkin-Andrews, O'Rourke, Dillon, Craven, & Yeung, 2012; Bodkin-Andrews et al., 2010; Craven & Marsh, 2004; McInerney, Cheng, Mok, & Lam, 2012; Purdie & McCrindle, 2004) have shown that generally the

academic self-beliefs and school achievement of Aboriginal and Torres Strait Islanders are lower than those of their Anglo-Australian peers. However, the studies indicate complex associations between a range of self-beliefs, academic performance, and other factors. For example, Purdie and McCrindle (2004) compared the self-concept of approximately 300 Aboriginal and 300 non-Aboriginal mostly elementary and lower high school students. They found family, peer, and general school self-concept were most strongly endorsed among Aboriginal students, which the authors argued reflected the collectivist culture of the Aboriginal students. The non-Aboriginal students endorsed self-acceptance, academic achievement, and career, more so than Aboriginal students, possibly reflecting an individualist framework. In contrast to the Beiser et al. (1998) findings described above, the self-concept of Aboriginal students increased over their schooling career whereas that of non-Aboriginal students decreased.

In New Zealand, few studies have measured the self-beliefs of Māori. In the only study of Māori elementary school students' self-concept that could be located, Rubie-Davies et al. (2013) found that the reading self-concept of Pākehā students was higher than that of Māori students, whereas in mathematics the reverse was found.

1.6. Student support in the educational context and indigenous groups

It has been suggested that students in indigenous groups who draw on more collectivist ideals may seek support from a wider network of people than those from individualistic cultures where early independence is promoted. However, little research has been conducted on students' beliefs about how they value the support they receive. Some researchers (McInerney, 2008) have looked at related variables such as peer influence and found that Aboriginal, compared to other junior high school students, were high on negative peer influence and low on positive peer influence, and also reported significantly higher negative

parental influence. This suggests that the notion that students from collectivist cultures will value family and peer support is not unequivocally supported in the Australian studies.

Other research looking at school dropout and substance abuse among adolescent indigenous groups (e.g., Moon, Blakey, Boyas, Horton, & Kim, 2014) has emphasized the importance of creating positive, supportive relationships within the classroom. In particular, many of these studies (e.g., Santoro, 2007; Thorpe, Bell-Booth, & Staton, 2013) point to the importance of enhancing relationships with teachers and acknowledging and respecting students' cultural background if indigenous students are to become engaged in schooling.

In New Zealand, the Te Kotahitanga program (Bishop & Berryman, 2006; Bishop, Berryman, Tiakiwai, & Richardson, 2003) described above was founded on the importance of building relationships between students, teachers, and the community. Although this high school program has shown improved achievement for Māori high school students, at the elementary and middle school levels, how well Māori students feel supported in their learning by their teachers and peers is unknown. Whether teacher and peer support was associated with student achievement was one aspect investigated in the current study.

1.7. Student motivation beliefs and indigenous groups

Indigenous research on student motivational beliefs has largely focused on differences in the endorsement of mastery and performance goals. As defined by Midgley et al. (2000), mastery approach goals relate to learning to improve skills; performance goals have been divided into what are termed performance approach goals (endeavoring to demonstrate competence in relation to others) and performance avoid goals (attempting to avoid showing incompetence). In accord with recent studies in the field (e.g., King, Ganotice & Watkins, 2014), the two approach goals were examined in the current project.

The assumption used to be that indigenous groups would be less performance and more mastery oriented than non-indigenous groups due to the more collectivist nature of their

culture (McInerney, 1998). Several studies, however, have shown that the relations are more complex, showing variations not only among different indigenous groups in one country (Smith, Cech, Metz, & Huntoon, 2014) but also across groups living in both different countries (McInerney, Roche, McInerney, & Marsh, 1997), and communities within the same country (McInerney, 2012). Further, invariance testing has shown that the motivation beliefs of indigenous students tend to be more like those of non-indigenous students than they are different (McInerney et al., 1997).

For example, one study explored the beliefs of high school Australian Aboriginal, American Navaho Indian, Montagnais Betsiamite Canadian Indian, and Anglo-Australian students (McInerney et al., 1997). They found that all groups had a strong mastery goal orientation, were equivocal about competition, and were not motivated by power. In contrast, a more recent study (Ali, McInerney, Craven, Yeung, & King, 2014) of Navajo and Anglo students, found that Navajo students endorsed competition less, and social concern more, than Anglo students. Of note, however, in neither of these studies were performance beliefs examined.

Magson et al. (2014) explored the motivation beliefs of indigenous and non-indigenous Australians and of indigenous high school students from Papua New Guinea. They found that males in all groups endorsed performance approach goals more than females, but also showed that the Australian Indigenous and Papua New Guinean males were more mastery oriented than both female indigenous groups. Interestingly, Smith et al. (2014) found similar results among indigenous undergraduate American Indian groups studying in STEM fields. These studies highlight how gender and culture may contribute to differences in motivational beliefs.

The motivation studies above, however, have mostly involved comparisons of different indigenous groups of high school students (Smith et al., 2014). Far fewer studies have been

conducted with elementary level students. One exception is the Lillemyr, Sobstad, Marder, and Flowerday (2010) study which compared the beliefs of Navajo, Aboriginal, and Sámi (Norwegian) indigenous students with Anglo and Ethnic Norwegians. The authors predicted greater differences might be found among younger indigenous versus non-indigenous students due to having less time to be socialized into the expectations of western schooling. However, the findings were less straightforward. Both the Australian and American groups endorsed performance goals more than the Norwegian groups, whereas the Anglo-American group (but not the indigenous group) was less mastery oriented than any other group.

In the New Zealand context, only one study (Rubie-Davies et al., 2013) has compared the motivation of Māori versus Pākehā elementary school students. Again, the stereotypical portrayals of indigenous students' motivation as representing a collectivist view and non-indigenous students being more individualist were not supported. Māori were found to endorse performance goals more, and reported enjoying mathematics more, than Pākehā, although levels of mastery beliefs were similar for both groups. Overall, the literature appears to show a pattern whereby collectivist groups have similar levels of mastery beliefs to those of their non-indigenous peers but higher levels of performance goals. King, McInerney, and Watkins (2012) have proposed that collectivist cultures may hold high levels of performance beliefs because educational success is seen as a means of bringing prestige to the family and of overcoming poverty – again a contribution to the family. Hence, performance goals are seen as indicating success for the group rather than the individual, as in studies of individualist groups.

Nevertheless, many of the studies above have simply compared the beliefs of one indigenous group with those of other groups. The authors have not always explored how student beliefs relate to achievement nor have they considered potential relations with teacher beliefs and practices. Given that teacher expectations can influence achievement, it may be that they can also influence student self-beliefs and motivation. Indeed, one study (Rubie-Davies, 2006) has shown that student self-concept in both reading and mathematics altered over one year in line with teachers' expectations but no studies, to our knowledge have

examined relations between teachers who over- or under-estimate (have high or low expectations relative to achievement) their students and the students' self- and motivational beliefs, and no studies have investigated these ideas in relation to indigenous students. Given the significant relations that have been found between student self-beliefs, motivation, and academic achievement, it would seem important to investigate the role of teachers' expectations as related to self-beliefs and motivation, and student academic achievement. The current study was designed to investigate these ideas. The research questions were:

1) To what extent do teachers under- or overestimate the achievement of their Māori and Pākehā students? That is, do they under- or overestimate one group more than the other?
2) Do Māori and Pākehā students differ in their self-beliefs, motivation, perceived support, and their academic achievement in mathematics?
3) To what extent do students' self-beliefs and motivation, and teachers' under or overestimation of their achievement, relate to Māori and Pākehā students' end-of-year mathematics achievement?

2. Method

2.1. Participants

A total of 2,234 students and their teachers completed the questionnaires[1]. Of those, 1093 students identified as either Māori or Pākehā. A total of 55% of the Māori or Pākehā students were in Year 7 (approximately 11 years) and 45% were in Year 8 (approximately 12 years) and their ages ranged from 10–13 years (Mean 11.6, SD = .59); 52% were male. The age range is broader than 11-12 years because a small proportion of students (1%) were 10 and 13 years (5%) when the data were gathered.

[1] The larger study involved both teachers and students completing parallel questionnaires at the beginning and end-of-year related to their motivation and self-beliefs. The aim of the larger study was to explore the degree to which student beliefs changed to more closely match those of teachers' over the year. For the current study, we extracted the data related to Māori and Pākehā students.

Achievement data were not available for 222 of the Māori or Pākehā students (20%) due to the child being absent from class when the test was administered either at beginning or end-of-year, or for both. An additional 3% of students were missing teacher expectation data. Of the remaining 834 cases, 432 cases (52%) had teachers who either over or underestimated their student end-of-year performance by more than half a standard deviation. Of those who were under- or overestimated, 97 were Māori (63% were underestimated; 37% were overestimated) and 335 were Pākehā students (65% were overestimated, 35% were underestimated).

In the city where the study took place, Māori students make up approximately 16% of the school-age population and Pākehā 41%, and hence the proportion of Māori to Pākehā in the current study is fairly representative of the broader population. The students came from three intermediate (middle) schools, which in New Zealand cater specifically for students in Years 7 and 8, and are considered part of the primary (elementary) school sector. Students have the same teacher for all core curriculum areas (mathematics, English, Māori, science, social studies, physical education, music, languages) but specialist teachers for curriculum areas such as food technology, materials technology, and art.

Schools in New Zealand are assessed on a 1-10 scale based on census data to determine the socioeconomic level of the school. It is illegal in New Zealand to record parental occupation as a socioeconomic indicator. However, because the school ranking is based on census data for the local school area, it is commonly used to indicate student socioeconomic level. This metric is referred to as the school's decile, with deciles 1-3 representing schools in a low socioeconomic area, deciles 4-7 a mid-socioeconomic area, and deciles 8-10 a high socioeconomic area. In the current study, the sample of Māori and Pākehā students whose achievement was overestimated or underestimated by more than half a standard deviation were located in a range of school deciles. A total of 13 % were from a low decile school

(Māori = 42, Pākehā = 13), 24% from a middle decile school (Māori = 36, Pākehā = 77), and 64% from a high decile school (Māori = 29; Pākehā = 245).

2.2. Measures

The measures in this study were of student mathematics achievement, teacher expectations, and student self-beliefs in mathematics, student mastery and performance goal orientation, and student perceptions of teacher and peer support.

2.2.1. Student mathematics achievement

Student mathematics achievement was assessed at the beginning and end of the academic year using e-asTTle mathematics (Electronic Assessment Tools for Teaching and Learning). e-asTTle is a standardized mathematics test used in New Zealand with Years 4-12 students (aged 8-16 years). The e-asTTle system consists of a large item bank with an integrated computer system that can create tests of varying lengths, at different curriculum levels, assess different aspects of the curriculum, and be completed either online or in a paper-and-pencil version. All items were pre-calibrated in national norming trials using item response theory (Embretson & Reise, 2004) which means that students can be expected to score similarly no matter which e-asTTle test they are given; therefore scores can be compared across classes, schools, and year levels. The standard error of any e-asTTle test is approximately 15 points. In mathematics, approximately 57% of the items are multiple choice. Teachers use the e-asTTle system to create standardized tests for their students and then use the reports it generates to plan future student lessons. Therefore, the tests that students took at beginning and end-of-year were not identical but were similar. This avoided practice effects but because of the calibration of individual items, we could be confident that the tests were equivalent.

In consultation with the deputy principals of the schools involved, the first author created 40-minute mathematics tests that included items ranging from Levels 2 to 6. The levels

related to the New Zealand curriculum levels. Students spend approximately two years at each curriculum level. Hence, average Year 7 and 8 students would normally be working at Level 4. At both the beginning and end-of-year, the tests included items related to number knowledge, number sense, and algebra. All students completed the tests in paper and pencil form, and the tests were then marked online in the e-asTTle system. As part of the project, teachers were not provided with the student scores on our e-asTTle tests, although they would have conducted their own standardized assessments during the year of the study. Total scores for mathematics can range from 1100-1900 points. In the current study, scores ranged from 1226-1845 (M = 1501.65; SD = 92.32). Student achievement gains across the year were calculated by subtracting their beginning-of-year mathematics score from their end-of-year mathematics score. On average, students are expected to increase 30 points on an e-asTTle test over one year.

2.2.2. Teacher expectations

Teachers provided expectations in mathematics for each student at the beginning of the academic year. Teacher expectations were assessed using a 1-7 Likert five-item scale. In relation to the five-item scale, teachers provided a judgment in relation to mathematics of where students were currently achieving, the level they predicted students would achieve by end-of-year, whether they predicted students would receive a good initial school report, the degree to which they believed the student would be successful in their class, and the degree to which they thought the student would have a successful school career; α = .89 for the current sample. This scale was developed specifically for the current project (based on earlier work by the first author) to avoid the use of just one item to assess expectations and enable reliability estimates to be calculated. To explore whether teachers' over- or underestimated student achievement, the students' beginning-of-year mathematics achievement score was regressed on to the teachers' mean expectation score. Those with a positive standardized

residual score of more than half a standard deviation (n = 254) were classified as overestimated (59%), and those whose standardized score was negative and greater than -0.5 (n = 178) were classified as underestimated (41%). As the extent of over or underestimation was not the primary focus of the study, but rather whether there was a tendency for teachers to over or underestimate one ethnic group more than the other by more than half a standard deviation, and whether this positive or negative estimation was associated with subsequent student achievement, we dichotomized the over- and under-expectation data in our analyses.

2.2.3. Mathematics self-efficacy

Student self-efficacy in mathematics was measured using a four-item scale taken from Fast et al. (2010); α = .78 for the current sample. Students responded on a five-point Likert scale ranging from 1 = False, 2 = Mostly false, 3 = Sometimes false, sometimes true, 4 = Mostly true, 5 = True. An example item is: "I am sure that I can do even the hardest work in math this year." In the current sample, 190 students (29%) had a mean factor score of between 4 and 5 indicating that on average they responded 'mostly true' or 'true' to the mathematics self-efficacy items.

2.2.4. Perceived competence

Students' perceived competence was measured using the 1-5 scale outlined above and was taken from a scale developed by Wigfield and Eccles (2000); α = .83 for the current sample. It included four items. In order to be appropriate for the Likert scale employed, items were adapted. For example, "Compared to most of your other school subjects, how good are you in math?" was changed to: "Compared to most other subjects, I am better at math." In the current sample, 122 students (18.8%) had a mean factor score of between 4 and 5 indicating that on average they reported a positive response to having perceived competence.

2.2.5. Goal orientation

Student mastery and performance goal orientation was assessed using items from the PALS scale (Midgley et al., 2000). There were five items for each of the two approach subscales. Students responded on the five-point Likert scale outlined above. An example of a mastery goal item is: "I really want to learn a lot of new skills in math this year"; α = .84 with the current sample. A total of 417 students (64%) had a mean factor score of between 4 and 5 indicating that on average they endorsed a mastery approach. An example of a performance goal item is: "I really want to do better than most other students in math"; α = .80 among the current students. A total of 120 students (19%) had a mean score of between 4 and 5, indicating that on average they endorsed a performance approach.

2.2.6. Teacher and peer support

Student perceptions of teacher and peer support were assessed using two subscales from the Student Personal Perception of Class Climate Scale (SPPCC; Rowe, Kim, Baker, Kamphaus, & Horne, 2010). The teacher and student support subscales measure student perceptions of both academic and personal support. There are 8 items in each subscale and students responded on the five-point Likert scale outlined above. An example from the teacher support scale is: "My teacher really cares about me" and from the student support scale: "The kids in my class like to help me learn"; α = .85 for the teacher support subscale and α = .89 for the student support subscale with the current sample. A total of 343 students (53%) endorsed the teacher support factor with a mean score of between 4 and 5, and 113 (17%) students endorsed the peer support factor with a mean score of between 4 and 5 .

2.3. Procedures

Following ethical approval for the study, principals in three schools agreed to participation by their teachers and students. Teachers and students (with parent consent) participated voluntarily. Three weeks into the academic year, in the absence of school records and away from their classroom, teachers completed the teacher expectation scale.

Raudenbush's (1984) meta-analysis established that teachers form their expectations early in the school year, normally within the first week, and, after that time, expectations remain stable. While teachers completed their survey, students completed the questionnaires in their classrooms. One researcher and a research assistant supervised student completion of the questionnaires. The researcher read the instructions to students and ensured that students fully understood what was required of them before they began. Both the researcher and research assistant were available to answer student queries. No readability difficulties were encountered.

One week later, students completed their e-asTTle tests. The tests were couriered to each class, teachers administered the tests, and then they were returned to the researchers who marked them. At the beginning of every e-asTTle test is a very clear protocol with explicit instructions which teachers read aloud to the students. This helped to ensure consistent delivery across classes.

2.4. Statistical design

2.4.1. Missing data

As noted above, both achievement and expectation data were missing for some students. These data were not imputed because both these variables were used as dependent variables in the data analysis. Students with missing achievement and or teacher expectation data were compared to those with no missing data to see if their student beliefs differed. Only two statistically significant differences were found. That is, students who reported receiving slightly more teacher support were more likely to have missing teacher expectation data ($t[1518] = 3.06$, $p = .002$) and more likely to be missing end-of-year achievement data ($t[1518] = 2.07$, $p = .04$).

2.4.2. Data analysis

For research question 1, examining the extent to which teachers' over- or underestimated Māori or Pākehā students' end-of-year mathematics achievement, a multiple level model was run in MPLUS v 7.1 with student level characteristics modelled at level 1 and school decile modeled at level 2.

For research question 2, examining how Māori and Pākehā students' differed in their motivation, self-beliefs, perceived support, and academic achievement in mathematics, an analysis of covariance was conducted controlling for decile.

Research question 3 explored the extent to which six predictors (students' self-beliefs, mastery and performance beliefs, perceived teacher and peer support, and teachers' over- or underestimation of mathematics achievement) related to students' end-of-year mathematics achievement for Māori and Pākehā students. Consistent with research question 1, a multiple level model was run in MPLUS v 7.1 with student level characteristics and beliefs modelled at level 1 and school decile modeled at level 2.

3. Results

The descriptive statistics for the variables used in the current study for Māori and Pākehā students who were over or underestimated by their teachers are provided in Table 1. The skewness and kurtosis of all the variables was found to be within the acceptable range for small samples being less than 2.58 (Field, 2000). Zero-order correlations for all variables are also provided in Table 2.

3.1 To what extent do teachers under- or overestimate the achievement of Māori and Pākehā students?

Although Pākehā students were significantly more likely to have their achievement overestimated by more than half a standard deviation compared to Māori students [($\chi^2(1)=24.3$, Cramer's V=.237, p = <.001)], this ethnic difference in teachers' over-expectation was not found when run in a multi-level model clustered by teacher. More

specifically, a multilevel logistic regression was conducted to examine whether teachers were more likely to over- or underestimate Māori and Pākehā students' mathematics performance while controlling for the student characteristics of age and gender, and the school characteristic of decile. An empty model found that 38% of the variance could be found at level 2. At level 1, no ethnic differences were found in teachers' over- or underestimation of Māori and Pākehā students' achievement. Instead, we found that teachers were 2.2 times (β = -.78) more likely to underestimate girls' achievement compared to boys'. At level 2, we found that students in the high decile school were more likely to be overestimated than students at lower decile schools (β = 1.81).

3.2 Do Māori and Pākehā students differ in their self-beliefs, motivation, perceived support and their academic achievement in mathematics?

The means of the variables in Table 1 suggested that whereas the Pākehā students in the current study have on average higher beginning and end-of-year achievement, and higher teacher expectations than the Māori students, the Māori students on average had higher scores on all the self-beliefs measures. To explore whether these apparent group differences were statistically significant an Analysis of Covariance (ANCOVA) was conducted controlling for school decile. The results found only two statistically significant differences, with Māori students having higher performance goal scores (F [1, 3994] = 4.013, p = .046) and slightly lower beginning year Mathematics scores (F (1,394) = 3.31, p = .07) although this difference was only marginally significant.

3.3. To what extent do the students' self-beliefs and motivation, and teachers' under or overestimation of their achievement relate to Māori and Pākehā students' end-of-year mathematics achievement?

To examine whether Māori and Pākehā students' self-beliefs and teachers' over or underestimation of their achievement related to their end-of-year achievement in

mathematics, we conducted a two-level multilevel model in MPLUS clustering the data by the teacher. Separate models were run for each ethnic group.

In both cases an empty unconditional multilevel model was constructed first to establish what proportion of variance in student end-of-year mathematics achievement could be explained by level 2 factors. The ICCs of these initial empty models indicated that between 5 and 7% of both the Māori and Pākehā students' mathematics achievement at end-of-year was attributable to factors residing at the teacher/school level. Comparing the empty model to subsequent models allowed us to estimate the value of additional predictors in the model. The unstandardized regression coefficients, their standard errors and statistical significance, the variance estimates, and R^2 statistic at the student level and the teacher level are reported in models 2 and 3 of Tables 3 and 4.

Model 2 is the control model with the descriptive variables (student gender and student age) and the students' beginning year mathematics scores, as well as the teachers' over- or underestimation of their achievement. At level 2, we modelled the influence of decile on students' end-of-year achievement. In both the Māori and Pākehā models, we found that students with higher mathematics scores at beginning-of-year had higher end-of-year mathematics scores (Māori $\beta = .87$, Pākehā $\beta = .78$), and students in the high decile school had higher end-of year-mathematics achievement (Māori $\beta = .74$, Pākehā $\beta = .56$). In addition, in the Pākehā model we found that male students performed significantly better in mathematics at end-of-year, although this effect was only marginally significant ($p = .06$). Overall, with respect to end-of-year mathematics achievement, the addition of the model 2 control predictors reduced the prediction error in level 1 by 71% percent for Māori and by 65% for Pākehā. At level 2 it reduced the prediction error by 36% for Māori and by 43% for Pākehā.

For the final models we added the student belief factors at level 1. The significant predictors introduced in model 2 remained significant in model 3, with the exception of gender which became non-significant. For Māori, students who reported higher performance goals and less peer support were more likely to have higher mathematics scores at end-of-year. None of the beliefs of the Pākehā students were significantly related to students' end-of year mathematics scores. Correspondingly, the addition of the student belief predictors at level 1 reduced the prediction error by 5% for Māori students and by .2% for Pākehā.

4. Discussion

4.1. The equity of teachers' expectations

The first research question related to whether teachers' expectations of Māori and Pākehā students were equivalent in mathematics. The raw data showed that teachers were more likely to underestimate Māori students and to overestimate Pākehā students. However, this ethnic difference was not found in the multi-level model. Instead, the model showed that teachers were twice as likely to overestimate the mathematics achievement of boys compared to girls. Further, teachers were more likely to overestimate students in the high decile school compared to those attending schools in lower decile areas. This suggests that gender and school decile are more likely to be underlying differences in the extent to which teachers overestimate their students, rather than ethnicity. It was a refreshing finding that teachers did not underestimate Māori students relative to Pākehā when student age, gender, and school decile were taken into account. Other New Zealand studies have shown lower teacher expectations of Māori students (Turner et al., 2015), even when achievement was controlled (Rubie-Davies et al., 2006), but these studies did not control for the socioeconomic status of the school. The finding in the current study that teachers did not underestimate Māori students is possibly attributable to Ministry of Education initiatives (e.g., Ka Hikitia - Managing for Success; Ministry of Education, 2009) to try to raise teachers' expectations for

Māori. There has been an increasing awareness among teachers of the potential effects of having lower expectations for Māori when compared to Pākehā students. Nevertheless, it is important to remember that more Māori students in the current study were located in the mid and low, rather than high decile school and so, to some extent, ethnicity and socioeconomic status become confounded. Teachers tend to provide lower level skill-based tasks for those for whom they have low expectations and more cognitively challenging activities requiring higher level thinking to those for whom they have high expectations (Rubie-Davies, 2015; Weinstein, 2002; Zohar, Degani, & Vaaknin, 2001). It is important that Ministry of Education personnel and researchers continue their efforts in New Zealand to make teachers in all schools aware of the potentially damaging effects of holding lower expectations for all students, particularly those working in lower decile schools.

Student gender was also found to be a significant predictor of teachers' over-expectations. This is consistent with previous studies that have also found teacher expectations are lower for girls in mathematics than for boys (Robinson-Cimpian, Lubienski, & Ganley, 2014). This is problematic because girls enter the STEM (Science, Technology, Engineering, Mathematics) fields in lower numbers than boys, and it has been hypothesized that teacher expectations are one factor contributing to exacerbating the gap between boys and girls, beginning at elementary school, and ultimately leading to fewer girls taking advanced mathematics courses (Robinson-Cimpian et al., 2014).

4.2. Ethnic differences in student achievement and educational beliefs

The second research question related to whether there were differences between Māori and Pākehā students on the achievement and beliefs variables of interest in the current study. Interestingly, although there was a trend for Māori students to be achieving at lower levels than Pākehā students at the beginning of the year, this difference was not found at the end of the year. This was because, over the course of the year, Māori students gained on average 56

points on their standardized mathematics achievement test whereas Pākehā students gained a mean of 40 points. This larger increase in achievement by Māori students may be indicative of the trend found in recent years in high schools in New Zealand, whereby Māori students do appear to be closing the achievement gap with Pākehā students.

Whereas there have been programs developed at the high school level which have clearly had an impact on Māori achievement (e.g., Te Kotahitanga) such supportive interventions have not yet been developed at the elementary level of schooling in New Zealand. Even though our results indicated no significant differences between Māori and Pākehā students at the end of the school year (once decile was controlled), marginally statistically significant ethnic differences were found at the beginning of the year, suggesting there is still work to be done on closing the achievement gap at the elementary school level. Programs such as Te Kotahitanga which have been successfully employed in New Zealand high schools could also be applied to New Zealand elementary schools to help with this. Te Kotahitanga as noted above, is about helping teachers to develop a culturally responsive pedagogy which places relationship-building at is core. The program has five main components which all have applicability in elementary schools: 1) Caring for students as Māori and acknowledging their culture; 2) Having high expectations; 3) Managing the classroom in ways that promote learning; 4) Using a range of dynamic, interactive teaching styles; 5) Working collaboratively with students to reflect on progress and to set clear goals for future achievement. Significant investment in professional development at the elementary school level (equivalent to that invested in Te Kotahitanga) could result in substantial improvements in social, economic, and educational equity for Māori. Importantly programs like Te Kotahitanga, although targeted at Māori, have been found to significantly improve outcomes for all students (Bishop, Berryman, Cavangah, Teddy, 2009; Ladwig, 2012). This highlights the broader benefit of

developing culturally responsive learning environments that focus on embedding trust in teacher-student relationships.

With regard to ethnic differences in motivation, self-belief, and perceived support variables, although the means for Māori students on all variables were greater than those for Pākehā students, the only one that was statistically significant when school decile was controlled, was performance goals. Māori students more strongly endorsed the view that they wanted to outdo their peers. In another New Zealand study (Rubie-Davies, et al. 2013), Māori students were also shown to endorse performance goals more so than their Pākehā counterparts. It may be that Māori students have strong performance beliefs because achieving at high levels (higher levels than peers) brings prestige to the family and students are aware that education is one means of moving their family out of poverty (King et al., 2012; Rubie-Davies, 2011). However, it is also possible that given the prevailing stereotype of Māori student underachievement, Māori students feel a stronger need to adopt a more performance orientated approach so that they can be recognized as being as good as, or better than, their ethnic majority classmates. Perhaps if the current research had been conducted in Te Kotahitanga high schools which promote the development of more supportive and collaborative classrooms, the difference between the Māori and Pākehā students' endorsement of performance goals would not be found.

4.3. Predicting student achievement from teacher expectations and student beliefs

The final research question examined whether teacher expectations and student beliefs predicted end-of-year achievement. Perhaps unsurprisingly, for both Māori and Pākehā students, beginning-of-year mathematics achievement was the strongest predictor of end-of-year achievement. Similarly, students in the high decile school made greater gains in mathematics by year's end for both ethnic groups. This finding is in keeping with previous research which has found that middle class New Zealand students tend to achieve at higher

levels than those from poorer communities (Timperley & Robinson, 2001). Unfortunately, most Māori are located in lower decile schools and therefore cannot always take advantage of the benefits that being in a middle class school can bring. Although New Zealand schools are inversely funded (those in higher socioeconomic areas receive less government funding than those in low) such that all schools tend to be well equipped, nevertheless, students in higher decile schools are advantaged in terms of parental resources and achievement (Hattie, 2008). Even if it is a long-term strategy, the introduction of targeted programs such as Te Kotahitanga, adapted for an elementary school environment, may serve to help close the achievement gap found at the elementary level. This may help Māori to enter high school and later higher education on a more equal footing, which, in turn, could ultimately help change the social structure in New Zealand, and contribute towards building long-awaited equity for Māori.

In the final model which included the students' beliefs, other predictors of end-of-year achievement differed for Māori and Pākehā students. However, it is important to note that for both groups, the addition of the student belief factors added relatively little to the reduction in error prediction of the model. Nevertheless, some interesting ethnic differences were observed.

Among Māori students, having a performance approach goal orientation and a lack of perceived peer support predicted marginally greater achievement gains in mathematics. Although studies with indigenous populations have looked at differences in endorsement of performance and mastery goals by indigenous and non indigenous populations (e.g., Lillemyr et al., 2010; Magson et al., 2014), few studies have looked at how the endorsement of these goals relates to subsequent academic achievement. Our finding that Māori students who endorse a performance approach also have higher end-of-year academic achievement, suggests that academically successful Māori in the current study's schools may be adopting a

competitive approach to learning in mathematics – an approach, which, as argued above, may be one means of enhancing their family's social status or alternatively, may be necessary to be noticed within the current New Zealand education system.

Another interesting finding for Māori students was that students' perception that they had *less* peer support ultimately predicted greater gains in their achievement. Although we do not know why higher achieving Māori students report less peer support, it is possible that this is a consequence of the same students adopting a more performance orientated approach which puts competition above collaboration. To some extent these findings are concerning because good social support is vital for long term mental and physical health (Heinrich & Gullone, 2006). Given that the peer support items included statements like "In this class others students care about my feelings", and "In this class other students really care about me", the lack of endorsement of these items by higher achieving Māori suggests that success in these students' classroom environments may come at a cost.

Hence, although our findings could be interpreted as suggesting that conveying information about personal achievement relative to other students may be important in promoting Māori student achievement, we could also use these findings to reflect on the types of classroom that encourage such an approach and the potential consequence of that. Although our study is only cross sectional and hence we cannot say whether the adoption of a performance approach leads to increased social isolation from peers, Te Kotahitanga schools have shown that creating learning environments that focus on relationship-building and support, rather than competition with peers, has a sizable and sustained impact on student achievement over time, and is particularly effective at raising ethnic minority student achievement (Bishop et al., 2009).

On the other hand, among Pākehā students, none of their beliefs predicted end-of-year achievement. Indeed, almost all of the variance in end-of-year school achievement was

explained by model 2 which contained beginning-of-year mathematics achievement and school decile. This is not to say that Pākehā student beliefs do not matter, but rather that prior achievement and school decile are more powerful influences on student achievement. The only predictor that was marginally significant in the Pākehā model was gender. Being female predicted lower mathematics achievement by year's end. This finding has parallels with our first research question which showed that teachers were 2.2 times more likely to underestimate girls' achievement compared to boys'. It may be that these lowered expectations of girls led to teachers designing lower level opportunities to learn for girls compared to boys, such that by the end of the year, girls had made fewer gains than boys. Interestingly, however, this gender effect was only found for Pākehā girls, not Māori girls, perhaps because fewer stereotypes are operating in relation to Pākehā girls compared to Māori girls.

4.4. Limitations

The current study has some limitations. First, invariance testing was not conducted on the beliefs scales. It is acknowledged that Māori and Pākehā students may interpret items in the scales differently. However, in a different study (Meissel & Rubie-Davies, under review) which examined student self-efficacy and motivation among Māori, Pākehā, Pacific Island, and Asian students in New Zealand, and used the same self-efficacy and goal orientation scales as those in the current study, the factor structure was found to be invariant across the cultural groups. This provided some confidence that the scales could be used reliably with both Māori and Pākehā in the current study.

Second, it is acknowledged that the numbers of Māori students, in particular, were small for the kinds of multilevel models included in the current paper. For this reason, interpretation of the results should be treated with some caution. Similarly the distribution of the ethnic groups across the school deciles was not even. Although this reflects the

distribution found nationally and the current analysis controlled for decile, future research should consider oversampling of some ethnic groups to try and collect a more balanced sample. The inclusion of a broader sample of schools in any future studies would also provide more confidence in generalizing the results to other schools in New Zealand, and possibly beyond.

Third, the current study was mostly correlational by design and therefore causal implications cannot be made. Future studies in the field that were longitudinal or experimental would enable researchers to explore whether teachers' expectations at the beginning of the year were associated with changes in students' beliefs and could potentially tease out the directionality of the associations between teacher expectations, student beliefs, and achievement.

Fourth, students who reported greater levels of teacher support were more likely to have expectation and end-of-year achievement data missing. This may have influenced the results. Of note, however, the amount of variance explained by the models was small.

4.5. Conclusion

The current study has provided several illuminating findings in relation to Māori and Pākehā students and their teachers. New Zealand teachers underestimated the achievement of Māori students and overestimated that of Pākehā although this finding disappeared when controlling for decile suggesting that socioeconomic status may be underlying teachers' lower expectations of Māori more than ethnic differences per se. Interestingly, in the current study, Māori showed marginally lower mathematics achievement scores at beginning-of-year, but not by end-of-year; they made greater gains. Māori students also showed more support for performance goals, than their Pākehā counterparts. Further, beginning-of-year achievement, endorsement of performance goals, and reported lower levels of perceived peer support predicted end-of-year achievement for Māori but not Pākehā. Among Pākehā, only

beginning-of-year achievement and gender were related to student end-of-year achievement. To our knowledge, relations between teacher expectations, a wide range of student beliefs, and student achievement have not previously been examined within the indigenous literature.

Considering that providing equitable opportunities for all students is crucial if all are to succeed, further exploring the beliefs of students, especially those from different socioeconomic backgrounds, and how they and teacher expectations contribute to student success, would seem worthwhile, particularly in low decile schools. In any nation with indigenous students, who are also often students from socioeconomically deprived areas, until they are achieving at the same levels as students from the dominant culture, education in the respective countries cannot be judged to be successful.

Acknowledgements

This study was supported by an Early Career Excellence Award to the first author from the University of Auckland in 2011. The committee who decided upon the award played no role in the study design, in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the article for publication. The authors would also like to acknowledge the senior researcher and research assistants who provided valuable assistance on this project. We are very grateful to the principals, teachers, and students who devoted valuable time to helping us understand more about the schooling experiences of Māori and Pākehā students.

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Table 1 *Descriptive Statistics for Student Achievement and Student Beliefs, and Teacher Expectations for Māori and Pākehā Students*

		N	Minimum	Maximum	Mean	SD	Skew	Kurtosis
Māori	Math Score Beginning-of-Year	97	1251	1767	1456	107.59	0.34	-0.53
	Math Score End-of-Year	78	1271	1845	1512	114.42	0.32	0.05
	Teacher Expectation	97	1.20	7.00	4.43	1.24	-0.11	-0.45
	Self-efficacy	97	1.75	5.00	3.90	0.81	-0.69	-0.15
	Perceived Competence	97	2.60	5.00	4.40	0.63	-1.05	0.20
	Mastery	97	1.40	5.00	3.67	0.81	-0.40	-0.42
	Performance	97	1.50	5.00	4.14	0.64	-1.13	2.11
	Teacher Support	97	1.38	5.00	3.51	0.84	-0.19	-0.53
	Peer Support	97	2.25	5.00	3.87	0.74	-0.12	-0.96
Pākehā	Math Score Beginning-of-Year	335	1250	1845	1540	98.10	-0.29	-0.48
	Math Score End-of-Year	319	1295	1845	1580	94.10	-0.30	-0.03
	Teacher Expectation	335	1.40	7.00	5.10	1.14	-0.71	0.53
	Self-efficacy	335	1.00	5.00	3.57	0.82	-0.40	-0.21
	Perceived Competence	335	1.00	5.00	4.16	0.81	-0.99	0.78
	Mastery	335	1.00	5.00	3.19	0.85	-0.13	-0.27
	Performance	335	1.00	5.00	3.95	0.78	-0.98	1.01
	Teacher Support	335	1.00	5.00	3.18	0.84	-0.29	-0.12
	Peer Support	335	1.00	5.00	3.75	0.74	-0.46	0.35

Table 2 *Zero-Order Correlations Between all Variables in the Current Study*

		1	2	3	4	5	6	7	8	9	10	11
1	Ethnicity (Pākehā 1, Māori 0)											
2	Gender	.060										
3	Age	-.124**	-.010									
4	Math Score Beginning-of-year	-.331**	-.074	.205**								
5	Math Score End-of-year	-.265**	-.107*	.135**	.888**							
6	Overestimation	-.237**	-.107*	.134**	.862**	.772**						
7	Mastery	.130**	.068	-.008	-.020	-.077	-.072					
8	Performance	.228**	-.009	-.103*	-.123*	-.135**	-.113*	.425**				
9	Academic Competence	.069	.072	-.052	-.038	-.033	-.133**	.345**	.328**			
10	Self-Efficacy	.167**	-.021	.012	-.059	-.064	-.116*	.522**	.460**	.578**		
11	Teacher Support	.109*	.172**	.043	-.083	-.092	-.196**	.316**	.157**	.313**	.260**	
12	Peer Support	.162**	.204**	-.008	-.129**	-.161**	-.188**	.229**	.327**	.410**	.358**	.460**

Note: *= $p < .05$, ** = $p < .001$

Table 3 *The Relationship Between Māori Students' Self-Beliefs, Motivation, Perceived Support their Teachers' Overestimation of their Achievement, and Student End-of-year Achievement in Mathematics* (*n* = 78)

		Model 1	Model 2	Model 3
		Intercept Only	Control Model	Final Model
Level 1	Student Gender (female 1, male 0)		-.096(.090)	-.094(.089)
	Student Age		-.015(.087)	-.048(.108)
	Math Achievement Beginning of year		.870(.089)***	.917(.096)***
	Achievement Estimation (Over = 1, Under = 0)		.385(.299)	.397(.304)
	Mastery Goals			-.139(.091)
	Performance Goals			.174(.082)*
	Self-Efficacy			-.087(.099)
	Perceived Academic Competence			.062(.082)
	Teacher Support			.066(.098)
	Peer Support			-.207(.074)***
Level 2				
	Decile		.735(.188)***	.733(.190) ***
	Intercept	15.243(.106)	15.250(.178)***	15.252(.179)
	Residual Variance Level 1		.105(.030)***	.085 (.018)
	Residual Variance Level 2		.701(.369) #	.723(.190)
	ICC	059	.751	.759
	R^2at level 1		.712	.761
	R^2at level 2		.361	.353

Note: # $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 4 *The Relationship Between Pākehā Students' Self-Beliefs, Motivation, Perceived Support, their Teachers' Overestimation of their Achievement and Student End-of-year Achievement in Mathematics* (*n* = 319)

		Model 1 Intercept Only	Model 2 = Control Model	Model 3 Final Model
Level 1	Student Gender (female 1, male 0)		-.117(.063)#	-.138(.073)#
	Student Age		-.078(.065)	-.081 (.067)
	Math Achievement Beginning of year		.782(.039)***	.781 (.041)***
	Achievement Estimation (Over = 1, Under = 0)		.053(.098)	.055 (.097)
				-.021 (.045)
	Mastery Goals			-.013(.036)
	Performance Goals			-.034 (.044)
	Self-Efficacy			-.012(.040)
	Perceived Academic Competence			-030(.034)
	Teacher Support			.025(.033)
	Peer Support			
Level 2				
	Decile		.564(.148)***	.563 (.148)***
	Intercept	15.489(.078)***	15.734(.074)***	15.73(.074)
	Residual Variance level 1		.208(.044)***	.207(.042(
	Residual Variance level 2		.242(.057) ***	.242(.057)
	ICC	.074	.418	.419
	R^2at Level 1		.649	.651
	R^2at Level 2		.432	.431

Note: # *p* < .10, * *p* <.05, ** *p* < .01, *** *p* < .001