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Towards an Integration of Theories of Achievement Motivation

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Submitted in fulfillment of the requirements for the degree of Master of Arts

Deakin University

February 2001
I certify that the thesis entitled: Towards an Integration of Theories of Achievement Motivation

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# Table of Contents

List of Tables

List of Figures

Abstract

1. Introduction
   1.1. Beliefs and Values: Expectancy-value Theory/ Self-Concept
       1.1.1 Expectancy-Value Theory
       1.1.2 Self-Concept
   1.2. Implicit Theories of Intelligence
   1.3. Flow Theory
   1.4 Integrating Self Beliefs, Implicit Theories of Intelligence and Flow Perspectives to Achievement Motivation
   1.5. Study 1: Overview
   1.6. Predictions
       1.6.1. Expectancy-Value Theory
       1.6.2. Self Concept (SDQ)
       1.6.3. Achievement-Related Beliefs (ITI General and Subject-Specific)
       1.6.4. Flow Theory
       1.6.5. Cross-Theoretical Integration

2. Study 1 Method
   2.1. Participants
   2.2. Materials
       2.2.1. Children’s Achievement Motivation Questionnaire
           2.2.1.1. Expectancy-value theory.
           2.2.1.2. Self-Concept.
               2.2.1.3. Implicit theories of intelligence.
               2.2.1.4. The experience of flow.
           2.2.2. Questionnaire for Parents
               2.2.2.1. Expectancy-value theory.
               2.2.2.2. Implicit theories of intelligence.
           2.2.3. Questionnaire for Teachers

VII
IX
XI
1
2
2
5
6
9
14
18
20
20
21
22
23
24
25
25
25
25
25
26
28
29
30
30
31
31
7.6. Reading Time 2  
7.6.1. Data Preparation and Assumptions  
7.6.2. Expectancy-Value Theory Measurement Model  
7.6.3. Structural Model for Expectancy-Value Theory  
7.6.4. Flow Theory Structural Model  
7.6.5. Composite Reading Model – Time 2  
7.6. Music Time 1  
7.6.1. Data Preparation and Assumptions  
7.6.2. Expectancy-Value Theory Measurement Model  
7.6.3. Structural Model for Expectancy-Value Theory  
7.6.4. Structural Model for Flow Theory  
7.6.5. Composite Music Model – Time 1  
7.7. Music Time 2  
7.7.1. Data Preparation and Assumptions  
7.7.2. Expectancy-Value Theory Measurement Model  
7.7.4. Structural Model for Expectancy-Value Theory  
7.7.5. Flow Theory Structural Model  
7.7.6. Composite Music Model – Time 2  
8. Study 2 Discussion  
8.1. Overview of Study 2  
8.2. Expectancy-value Theory  
8.2.1. Competence Beliefs and Self-Concept  
8.2.2. Subjective Task Values  
8.2.3. Expectancy-value Theory and Achievement  
8.2.4. Gender Differences in Children’s Competence Beliefs and Subjective Task Values  
8.2.5. Gender Differences in Achievement  
8.3. Flow Theory  
8.3.1. Relationships Between Flow Group and Emotional Experience of Lessons  
8.3.2. Relationships Between Flow Theory and Achievement  
8.3.3. Gender Differences in Flow Theory  
8.4. Composite Models
8.4.1. Relationships Between the Expectancy-value Theory and Flow Theory Constructs 166

8.4.2. Relationships in the Composite Models to Children’s Achievement 168

9. General Discussion 171

9.1. Expectancy-value Theory 172

9.1.1. Children’s Self-concept and Competence Beliefs 172

9.1.2 Relationships Between Expectancy-value Theory Constructs 174

9.1.3. Teacher Achievement Ratings 175

9.2. Implicit Theories of Intelligence 176

9.3. Flow Theory 177

9.4. Composite Models 178

9.5. Practical Implications 179

9.6. Limitations 181

9.7. Future Research Directions 183

Appendices

A Questionnaire for Children 191
B Questionnaire for Parents 208
C Questionnaire for Teachers 214
D Plain Language Statement for Children 218
E Plain Language Statement for Parents 219
F Consent Form for Parents 221
G Consent on Behalf of a Minor 222
H Plain Language Statement for Teachers 223
I Consent Form for Teachers 224
J Questionnaire for Children 225
K Questionnaire for Parents 237
L Plain Language Statement for Children 240
M Plain Language Statement for Parents 241
N Consent Form for Parents 243
O Consent on Behalf of a Minor 244
P Plain Language Statement for Teachers 245
Q Consent Form for Teachers 246
Tables

1. Children’s Competence Beliefs Mean Scores by Subject Area and Gender 35
2. ANOVA and Planned Comparisons for Children’s Competence Beliefs Scores by Subject Area and Gender 36
3. Children’s Subjective Task Values Mean Scores by Subject Area and Gender 38
4. ANOVA and Planned Comparisons for Children’s Subjective Task Values Scores by Subject Area and Gender 40
5. Standard Multiple Regressions of Children’s and Parents’ Competence Beliefs and Subjective Task Values Scores for Children’s Maths Achievement 41
6. Standard Multiple Regressions of Children’s and Parents’ Competence Beliefs and Subjective Task Values Scores for Children’s Reading Achievement 43
7. Correlations Between Children’s Music Achievement and Children’s and Parents’ Competence Beliefs and Subjective Task Values Scores 44
8. Standard Multiple Regressions for Children and Parents’ of Competence Beliefs and Subjective Task Values Scores for Sport Achievement 46
9. Correlations Between Children’s and Parents’ Expectancy-value Theory-related Beliefs by Subject Area 47
10. Children’s Self-concept Means and Standard Deviations for SDQ Scales in Each Subject Area and General School 48
11. Standard Multiple Regression of Children’s Competence Beliefs and SDQ-scales for Maths and Reading Achievement 49
12. Standard Multiple Regression of Children’s Competence Beliefs and SDQ-scales for Music and Sport Achievement 51
13. Mean Scores and Correlations of Children’s General ITI Scale with Each Subject-specific ITI Scale 52
14. Standard Multiple Regressions of Children’s ITI Music Achievement Beliefs on Music Achievement 54
15 Standard Multiple Regression of Children’s ITI Achievement Beliefs for Sport Achievement  
16 Mean Perceptions of Classroom Experience (Challenge and Skills) by Subject Area and Gender  
17 ANOVA and Planned Comparisons for Perceptions of Classroom Experience (Challenge and Skills) by Subject area and Gender  
18 Mean Emotional Response to Classroom Experience (Happy and Clear) by Subject Area and Gender  
19 ANOVA and Planned Comparisons for Emotional Response to Classroom Experience (Happy and Clear) by Subject Area and Gender  
20 Means and Standard Deviations for Children’s Emotional Response to Classroom Activity and SDQ-parent by Flow Group  
21 Standard Multiple Regression of Flow, Emotion and SDQ-parent on Children’s Maths Achievement  
22 Standard Multiple Regressions of Flow, Emotion and SDQ-parent on Children’s Reading Achievement  
23 Standard Multiple Regressions of Flow, Emotion and SDQ-parent on Children’s Music Achievement  
24 Standard Multiple Regression of Flow, Emotion and SDQ-parent on Children’s Sport Achievement  
25 Standard Multiple Regression of Unique Predictors of Children’s Maths Achievement  
26 Standard Multiple Regressions of Unique Predictors of Children’s Reading Achievement  
27 Standard Multiple Regression of Cross-theoretical Variables on Parents’ Music Competence Beliefs About Their Child  
28 Standard Multiple Regression of Unique Predictors of Children’s Sport Achievement  
29 Means and Standard Deviations for reading Achievement by gender and type of school  
30 Means and Standard Deviations for music Achievement by gender and type of school
# Figures

1. Initial measurement model for expectancy-value theory for maths - Time 1.  
   97
   98
   99
   101
5. Initial flow model, including gender, for maths achievement – Time 1.  
   104
   105
   107
   109
   111
10. Confirmatory expectancy-value theory model (including parents’ beliefs) for maths – Time 2.  
    112
11. Confirmatory flow model for maths achievement – Time 2  
    114
    116
    119
    120
15. Final flow model, including gender, for reading achievement – Time 1.  
    124
    126
    129
18. Confirmatory expectancy-value theory model (including parents’ beliefs) for reading – Time 2.  
    130
    132
    135
    136
    138
23. Final flow model, including gender, for music achievement – Time 1.  
    141
    142
    144
26 Final expectancy-value theory model (including parents' beliefs) for music – Time 2. 145
27 Final flow model, including gender, for music achievement – Time 2. 146
28 Composite model for music achievement – Time 2. 148
Abstract

This thesis investigated children’s school achievement in terms of an integration of three theories of achievement motivation. The three theoretical outlooks were expectancy-value theory (EVT), implicit theories of intelligence (ITI), and flow theory (FT). The first of two studies was an exploratory investigation of the effectiveness of each theory independently and combined to predict children’s achievement in four school subjects. The subject areas were maths, reading, instrumental music, and sport. Participants were 84 children (40 females and 44 males) aged 9 to 10 years, one of each child's parents, and school teachers of each child in the four subject areas. All data were collected through questionnaires based on the three models. The results indicated that EVT and FT but not ITI accounted for a significant amount of the variance in children’s achievement, including effects for subject area and gender. A second confirmatory study tested EVT, FT, and an integrated model for the prediction of achievement in maths, reading, and instrumental music. The participants were further 141 children (74 females and 67 males) aged 10 to 11 years, and a parent and teachers of each child. Data collection using questionnaires occurred early in the school year (Time1) and approximately five months later (Time2). For EVT, children and parents' competence beliefs were significant predictors of children’s achievement in each subject area. Females tended to believe themselves more competent at reading and instrumental music and also valued these subjects more highly than boys. Modeling results for flow theory indicated that children’s emotional responses to classes (happiness and confusion) were significant predictors of achievement, the type of emotion varying between subject areas and time periods. Females generally had a more positive emotional reaction to reading and instrumental music classes than males did. The integrated model results indicated significant relationships between EVT and flow theories for each subject area, with EVT explaining most achievement variance in the integrated model. Children’s and parents' competence beliefs were the main predictors of achievement at Time1 and 2. Subject area and gender differences were found which provide direction for future research.
Anecdotal reports of parents and teachers often attest to individual differences in children's involvement in various school domains. Even among children of apparently similar intelligence, it is not uncommon to find one who likes nothing better than to work on a mathematics problem while another much prefers to read a novel or play a musical instrument. Some children appear to achieve good results for most of the activities in which they are engaged while others achieve in a less consistent manner, sometimes particularly excelling in one activity. Some children respond to failure experiences with a determination to improve their performance in the future while others react with resignation and acceptance of their low ability. Some children appear to become totally absorbed in the activity of playing sport while others cannot wait for the game to end. The primary research objective guiding the current thesis is how children's thoughts and feelings about school subjects differ and are related to their school achievement.

A perusal of the achievement motivation literature indicates several possible models and concepts that can be applied to explain individual differences in children's school achievement. Concepts such as academic self-concept, multiple intelligences, intrinsic and extrinsic motivation, self-beliefs, competence beliefs, subjective task values, mastery and performance goals, "Flow" experiences and social motivation are just some of the constructs used to explain children's achievement motivation, both within and between various activity domains. These constructs are proposed by researchers from different theoretical perspectives to achievement motivation. Although there is much literature relevant to each perspective, there is little research indicating how the various perspectives may relate to each other.

The current thesis will begin by reviewing three currently popular theoretical orientations cited in achievement motivation research: subjective beliefs and values; implicit theories of intelligence, and flow experience and family complexity. Following this review, a framework will be proposed for testing the determinants of children's school achievement, both within each of the three theoretical perspectives and also in combination.
1.1 Beliefs and Values: Expectancy-value Theory/ Self-Concept

1.1.1 Expectancy-Value Theory

The subjective beliefs and values that children hold are thought to affect the way children respond to various tasks (Eccles, 1984; Eccles, Adler, Futterman, Goff, Kaczala, Meece & Midgley, 1983; Wigfield, Eccles, Kwang, Harold, Arbreton, Freedman-Doan & Blumenfeld, 1997). Initially, the contemporary interest in concepts such as “self-esteem” and “perceived competence” stemmed from the development of social learning theory (Bandura, 1977) and meta-cognitive processes (see Harter, 1982). The general contention was that individuals who believe that they are competent within a domain will be more likely to perform better and be more motivated than individuals with lower competence beliefs. While preliminary work in this area proposed a general sense of competence (similar to a general intelligence quotient), Harter (1982) developed a scale for use with children as young as eight years that differentiated perceived competence on four domains: cognitive competence in school, social competence with peers, physical competence in sports, and general self-worth. Harter (1982) demonstrated that, even from early primary school age, children tend to view themselves as more or less competent across distinct domains.

From this research interest in children’s competence beliefs, Eccles et al. (1983) proposed that children’s subjective task values should be included to explain more fully the motivational predictors of children’s school performance. Both aspects have recently been defined by Wigfield et al. (1997), who defined competence beliefs “…as either estimates of how good one is at a given activity, expectations for one’s future performance, or self-efficacy” (p. 451), and subjective task values to include “…interest in the task, its importance to individuals, and its utility for them” (p. 451). It has been shown that having competence beliefs and subjective task values in synchrony is beneficial for the self-esteem of adolescents (Harter, 1990). This makes intuitive sense in that success in a certain domain should be related to the value placed on that domain. One could imagine the anxiety experienced by an individual who places high task values on an activity at which their performance was poor. Conversely, an activity where performance was good, but a very low value was placed on the activity, could lead to boredom and a decrease in motivation.
Previous research has shown that current subjective task values can be used to predict adolescents’ future choices in certain academic and sporting activities (Eccles et al., 1983; Eccles & Harold, 1991; Meece, Wigfield & Eccles, 1990). However, as Wigfield et al. (1997) noted, research on children’s achievement motivation has generally concentrated more on their competence beliefs than on their subjective task values.

To further incorporate and extend the findings, Wigfield et al. (1997) posed the research question, how do children’s competence beliefs and subjective task values develop during middle childhood? A three-year longitudinal study was designed using a sample of 615 American children, initially in grades one, two and four. Children’s competence beliefs and subjective task values were obtained each year for the domains of mathematics, reading, instrumental music and sports. Estimates of children’s competence in the subject areas were also collected from mothers and teachers.

Wigfield et al. (1997) found that competence beliefs declined over the early elementary (equivalent to “primary” in Australia) school years and became gradually closer to the competence estimates provided by mothers and teachers, with non-significant differences generally being evident by grade four. This was consistent with previous research showing that younger children often have higher expectations of competence and performance in a domain than do older children (see Stipek & Mac Iver, 1989). Wigfield et al. (1997) reported that there was a tendency for children’s competence ratings to be significantly closer to mothers’ ratings than to teachers’ ratings.

Investigating the age-related decrease in competence beliefs across domains, Wigfield et al. (1997) found that the decrease for instrumental music competence beliefs was particularly pronounced, with a weaker decrease for reading, and much less of a decrease for mathematics and sport. The large decrease in competence beliefs for instrumental music is noteworthy because it was the only domain in which most of the students had no personal experience of playing an instrument. This indicates that competence beliefs appear to be able to be formed and altered over time with little or no domain experience. Significant gender differences were found in all activity domains with girls having higher competence beliefs for reading and instrumental music while boys believed that they were more competent in mathematics and sports.
Subjective task values were divided into three separate components by Wigfield et al. (1997): domain importance, domain usefulness, and domain interest. In their study, Wigfield et al. (1997) collapsed domain importance and usefulness into a single factor (importance-usefulness), a procedure designed to allow comparison with previous research. However, it was noted by Wigfield et al. (1997) that these two measures did not always factor together. In a similar manner to the decrease found for competence beliefs, it was found that while children's ratings of domain importance and usefulness for each activity decreased over time, there were also significant differences between domains in children's level of interest over time. Interest in sports and mathematics did not decrease over time. In contrast, children's reported interest in reading and instrumental music did decline. There were also significant gender differences in children's subjective task values between subject areas.

The gender differences in subjective task values for the different domains remained fairly constant between grades one and six, indicating a stable relationship between gender and subjective task values. Females tended to rate reading and instrumental music as more important-useful and interesting than did males. Conversely, males consistently rated sports as more important-useful and interesting than did females. For maths, females and males were not found to differ. This pattern of results of children's values was similar to that reported in previous research by Eccles et al. (1993), although it should be noted that the data were drawn from the same sample as the Wigfield et al. (1997) study and therefore require further research confirmation.

A positive relationship between competence beliefs and subjective task values was also found for each subject area, with the strength of this relationship being generally stronger for the older children. However, Wigfield et al. (1997) were careful to point out that no causal direction could be deduced from their data. Overall, the results of Wigfield et al.'s (1997) study indicated that children go through a process of adjustment of competence beliefs and subjective task values during the primary school years, with both aspects generally declining over time. Although Wigfield et al. (1997) were not looking specifically for differences in the competence beliefs of children performing well and poorly in each domain, the results are consistent with the view that children rated as more competent by
their mother and teacher in a particular domain also tend to hold higher competence beliefs and subjective task values than poorer performing peers.

The theoretical interest lies in how predictors of specific domain achievement operate together and differ between domains. Explanations for the development of competence beliefs and subjective task values are typically given in terms of socialisation processes. It has been proposed that evaluative feedback from parents and teachers gradually directs children towards a more realistic understanding of their own performance with this process being aided by the age-related improvement in children's ability to accurately compare self-performance to the performance of others (Eccles, Midgley & Adler, 1984; Nicholls, 1990; Stipek & Mac Iver, 1989). An individual doing comparatively well in a particular domain receives affirmative feedback from significant others in their immediate environment. This positive feedback motivates the individual to further develop skills in the domain through the alignment of high competence beliefs and valuation of the activity.

1.1.2 Self-Concept

In the social developmental literature there is little distinction in the use of the terms competence beliefs and subject-specific self-concept. For instance, Marsh's (1989; Marsh & Craven, 1991) conception of self-concept is very similar to Wigfield et al.'s (1997) use of competence beliefs. Both terms refer to perceptions of one's comparative standing in relation to others in many different human domains. Marsh (1989) has argued that self-concept during childhood and adolescence should be viewed as a multi-dimensional construct influenced by age and gender.

Using factor analytic techniques on responses by thousands of children, many of whom were Australian, Marsh (1989; 1990) developed Self Description Questionnaires (SDQ's) to measure children and young adult's self-concepts. There are three SDQ's, designed for preadolescent children (SDQ-I), young adolescents (SDQ-II), and older adolescents and young adults (SDQ-III). Each of the instruments has been found to have good psychometric properties and to identify reliable self-concept factors that can be measured from grade two through to the end of schooling. The SDQ-I measures the following: physical appearance,
physical abilities, parent relationships, verbal/reading, math, general school, and total self-concept.

The age and gender effects found by Marsh (1989, 1990) for the SDQ-I closely parallel those reported by Wigfield et al. (1997) for children’s competence beliefs and subjective task values for maths, reading and sport. During the primary school years, Marsh found a gradual decline in children’s self-concept along all factors, with boys tending to score higher than girls on the maths and physical abilities factors and the reverse applying for the reading factor. As well, children’s maths and reading self-concept have been shown to be related to their achievement in these subject areas as measured by both objective tests and teacher ratings (Marsh, Smith, Barnes & Butler, 1983; Marsh, Smith & Barnes, 1984).

While Marsh and colleagues do not describe their research on self-concept as a model for children’s achievement motivation, it does provide a measure of children’s general beliefs about themselves and their competence in certain activities. Drawing on both Wigfield et al.’s (1997) and Marsh’s (Marsh, 1989; 1990; Marsh & Craven, 1991; Marsh et al., 1983; 1984) research, one could argue that a child with a high self-concept in a school activity would also be likely to believe that they were highly competent in the activity and would probably value that activity more than a child with low self-concept in that activity. Both perspectives indicate that this child would also tend to achieve at a higher level in the activity than a child with lower self-concept in the activity. The research on children’s beliefs and values outlined above provides a picture of achievement motivation as being domain, gender, and age-specific in a normal population of children during primary school years and into early adolescence.

1.2 Implicit Theories of Intelligence

Another group of achievement motivation researchers have been more focussed on general motivational patterns exhibited by children in response to failure experiences. Research suggests that by approximately grade five, when children are confronted with failure, their motivational patterns are associated with an implicit theory of intelligence that is either fixed (entity theory) or malleable (incremental theory)(Cain & Dweck, 1995; Diener & Dweck, 1978; Dweck & Elliott, 1983). Children with an entity theory of intelligence tend to believe that intelligence is a fixed quantity, a view consistent with notions of
innate ability and biological limitations. Incremental theorists, on the other hand, tend to believe that intelligence is malleable and can therefore grow and change. An incremental approach assumes the beneficial effects of effort and represents an environmental perspective in contrast to the biological perspective represented by the entity theory.

The relationship of implicit theories of intelligence and task motivation was investigated by Cain and Dweck (1995) in a study of 139 American children. The participants were in grades one, three and five. Interviews first elicited children’s responses on the relative emphasis of the causes of success/failure as either outcome dependent (entity theory) or process dependent (incremental theory). One week later children undertook the puzzle task, which was experimentally manipulated to provide each child with one puzzle success and three failure experiences. During the failure experience children’s hedonic tone was rated along a negative/positive scale and, on completion of the task, further questions were asked measuring persistence as well as attributions of ability and effort. Children’s persistence was measured by asking which of the four puzzles each child would like to work on again. Non-persistence was operationalised as choosing the same puzzle that had already been successfully completed, or selecting an incomplete puzzle on challenge-avoidant grounds ("e.g., "It’s the easiest one." (p. 37)). Ability and effort attributions were elicited by asking two questions with dichotomous responses. One question asked children if they thought they could finish the puzzles if they had enough time. The second question asked if they thought they could complete the puzzle if they “…tried very hard right now” (p. 35).

Cain and Dweck (1995) then used the persistence and attribution data to classify children as possessing either a mastery or a helpless oriented motivational style. Children who chose to repeat the successful puzzle completed earlier and/or made negative ability attributions were classified as having a helpless motivational style. Several children did not fit clearly into either the mastery or helpless motivational styles and were excluded from the analysis. Of the remaining students, the percentages for each grade exhibiting helplessness were 37.2% in grade one, 22.7% in grade three, and 13.3% in grade five.

In describing the differences in motivational patterns of helpless and mastery-oriented students, Cain and Dweck (1995) found that helpless-oriented students
were less likely to expect future success. They also scored lower during the failure experience on hedonic tone (negative affect) and made less effort attributions. Cain and Dweck (1995) found a main effect for age on hedonic tone scores, with grade five students scoring significantly lower on hedonic tone than grade one students. This decline parallels those mentioned earlier by Wigfield et al. (1997), Marsh (1989, 1991) and Stipek and Mac Iver (1989), where children's competence beliefs and self-concept were found to generally decrease during the primary school years. It appears that not only do children begin to judge themselves more harshly (or realistically) during this period, but there is also increasing negative affect reported during these years.

An age-related effect was also reported by Cain and Dweck (1995) for the relationship between children’s implicit theories of intelligence and their response to failure in the puzzle task. While there was no coherent pattern of intelligence beliefs prior to grade five, participants exhibiting helpless-oriented responses to the puzzle task in grade five were more likely to hold an entity theory of intelligence than a mastery-oriented response. Children with a malleable view of intelligence (incremental theory) tended to believe that their performance would improve in the future. Overall, the findings by Cain and Dweck (1995) pointed to relationships between grade five children’s intelligence theories and their behaviour and emotional experience after failure experiences.

There were also several limitations to Cain and Dweck’s (1995) study that should be mentioned. First, the sample size was small for a developmental comparison of this sort. For instance, the number of students classified as exhibiting a helpless motivational style in grade 5 was only six. Cain and Dweck (1995) did note that their puzzle task was designed to be maximally sensitive to helpless/mastery-oriented distinctions for younger students and proposed that socially desirable responding by older students could account for the failure to identify more helpless-oriented fifth graders. Second, it could be argued that a puzzle-solving task is not sufficiently related to a real-world task for fifth graders. Using Wigfield et al.’s (1997) terminology, one could argue that grade five students might not have been as motivated to tackle the puzzle task as younger students because their subjective task values for the domain may have been lower. These limitations restrict the generalisations that can be drawn from the results of Cain and Dweck’s (1995) study to apply to children’s school achievement. For
instance, different subsets of children may have been identified as exhibiting a helpless motivational style if the failure task were altered to mathematics, reading or sport. The domain-specificity of competence beliefs and subjective task values found by Wigfield et al. (1997), and the multi-dimensional nature of self-concept described by Marsh (1989, 1990, 1991), suggest that helpless/mastery-oriented motivational patterns (Cain & Dweck, 1995) may be domain specific. Such relationships are examined in the present thesis.

A third limitation of the Cain and Dweck (1995) study concerns the use of children's implicit theories of intelligence as a grouping variable. As Dweck et al. (1995) have reported, previous studies of children's implicit theories of intelligence (e.g., Cain & Dweck, 1995; Dweck & Leggett, 1988; Henderson & Dweck, 1990) have used a simple three item questionnaire to group children as entity or incremental theorists. Approximately 15 percent of respondents in each study were found to have neither entity or incremental beliefs (falling midway on the scale) and were excluded, with the other 85 percent usually making up two groups of approximately equal size. In Cain and Dweck's (1995) study, given that only 13.3 percent (n = 6) of their sample (N = 45) were classified as exhibiting a helpless motivational style, and only three students had been excluded from the study, this would suggest that there were at least some students with an entity theory of intelligence who were responding with a mastery-oriented motivational style in response to the puzzle-failure experience. Therefore, it appears unlikely that there is a direct relationship between children's general theory of intelligence and their motivational style.

This further suggests that there are factors other than intelligence theory alone that mediate motivational style. While socially desirable responses, as mentioned previously, may be effecting the measurement of motivational style, there may be other mediating factors. Motivational style could remain situation-specific (i.e., always helpless-oriented with the same subject, teacher, or parent, or a combination of the above), based on repeated failures and/or negative feedback from respected others, over a more extended time frame. This thesis tests the influence of children's general intelligence theories and their domain-specific theories of achievement as predictors of their school achievement.
1.3 Flow Theory

Proposals of self-concept, competency beliefs and subjective task values provide valuable insights into domain-specific achievement motivation and the development of children's skills, especially at the lower and average levels of performance. However, several researchers have provided evidence that expertise during late adolescence is the result of a far more complex experiential phenomenon (Csikszentmihalyi, et al., 1993; Schiefele & Csikszentmihalyi, 1995), based on perceptions of activity in a domain, the emotional reaction to that activity and perceptions of the relationship with parents (Flow theory).

One longitudinal study of talented adolescents found significant predictors for those who would continue to be considered outstanding two to three years later at the end of senior high school (Csikszentmihalyi et al., 1993). Inspired by the multiple intelligence theory of Gardner (1983), Csikszentmihalyi et al. (1993) conducted a longitudinal study of 394 students in grades nine and ten who were identified as talented in one of five domains: mathematics, science, music, athletics and art. Students were selected from a total school population of more than 8,000, and were taken to represent students performing in the top five percent in terms of ability and future career potential. Students were followed for three or four years, until the completion of senior high school, with the major experimental interest being in differences between students who continued to demonstrate exceptional performance and potential, and those whose commitment and domain performance declined over the final school years. The major finding was that students who continued to perform at an exceptional level at the end of high school had, in year nine or ten, tended to report qualitatively different experiences within their domain of expertise.

A two-part strategy was employed by Csikszentmihalyi et al. (1993). In the first phase of the study each student's experiences were recorded for one week through an Experience Sampling Measure (ESM). This involved students carrying an electronic beeper that would randomly emit a signal indicating that students should, as soon as possible, complete an experience sampling form. This form required students to respond to questions about their experience at the time of receiving the signal, including questions about external factors (e.g., time, location, activity engaged in, and who else was present) as well as internal subjective factors (e.g., physical, cognitive, emotional and motivational). During
this initial phase of the study, students completed a Personality Research Form (PRF) and the Offer Self-Image Questionnaire (OSIQ). They were interviewed about personal development, talent development and motivational factors sustaining activity within their talent domain. The final measure during this phase was a questionnaire for parents about their style of parenting, their future expectations for the child concerned and general experiences.

In the second phase of the study, Csikszentmihalyi et al. (1993) charted the development of talent using objective measures of achievement (grades) and subjective ratings of accomplishment and engagement in the domain of talent from grades nine to twelve. For instance, during the third year of the study, teachers were asked to rate each student in their area of talent along dimensions reflecting attributes and behaviours thought to be important for exceptional performance and promise. Examples of topics covered by these items included "...the student’s enjoyment of challenge, capacity for concentration, and realization of potential" (p. 60). Students completed a questionnaire about the extent of their involvement with talent development towards the end of their schooling, and also completed the Complex Family Questionnaire (CFQ). The CFQ was designed to measure family integration (household support and harmony) and family differentiation (encouragement of individual involvement and freedom). A complex family was characterised by Csikszentmihalyi et al. (1993) as one scoring above the median on both integration and differentiation. In other words, a complex family is perceived by the adolescent as providing an efficiently integrated system of emotional support and household routine, as well as encouraging personal differentiation through freedom of expression and respect for individual privacy.

Of the many results obtained by Csikszentmihalyi et al. (1993), it is worth noting several of the most relevant findings. In the first year of the study, the self-image questionnaire (OSIQ) was administered. The OSIQ is divided into 12 sub-scales measuring various dimensions of self-image. Four sub-scales measure overall psychological health. Two sub-scales measure determination to behave in a socially responsible way, and the remaining six sub-scales measure competence beliefs in achievement and interpersonal contexts. Although Csikszentmihalyi et al. (1993) did not provide summary statistics for performance on the OSIQ, when compared to responses from a group of average adolescents tested during the early
1980s, students in their talented sample tended to respond within the normal range but at the lower end for their age group. This result appears to be almost counter-intuitive because one would expect students excelling in at least one school domain to have higher than normal self-esteem. Csikszentmihalyi et al. (1993) proposed that factors related to puberty, such as increased peer pressure and sexual interest, may not co-exist sympathetically with the dedication needed to maintain high domain performance. There is some support for this from their finding that the only significant difference between talented and average teenagers on the OSIQ was for the Sexual Attitudes sub-scale, talented adolescents having lower scores.

Other self-image differences were also noted by Csikszentmihalyi et al. (1993). In a similar finding to those mentioned previously for average teenagers (e.g., Wigfield et al., 1997; Harter, 1991; Marsh, 1989, 1991), Csikszentmihalyi et al. (1993) found with their talented teenagers that there were gender and domain differences of self-image. For example, talented females tended to report a self-image profile much closer to the average norms for their age than did the talented males. Also, male musicians, when compared with male scientists, tended to report "...less confidence about their abilities and seem(ed) to be anxious about personal attractiveness and peer relations" (p 74). Male athletes, on the other hand, were found to closely parallel average self-image norms. Among females, it was found that those talented in all domains except art were approximately equal to, or exceeded, the average mean score on the Family Relationships sub-scale of the OSIQ. These results tend to further support the gender and domain specificity of self-beliefs or self-concepts by showing that exceptionally performing adolescents tend to exhibit distinct patterns of self-image depending on their gender and area of talent.

Home backgrounds were found to play an important role in the talented teenagers continuing motivation. Csikszentmihalyi et al. (1993) used the CFQ to divide their talented sample into four groups based on perceptions of family interactions. Those scoring high on dimensions of integration and differentiation (above the median) were classified as having "complex" families. Those scoring high on just the integration dimension were labelled "integrated". Those high on the differentiation dimension only were called "differentiated". Teenagers who scored their families low on both dimensions were labelled as having a "simple"
family organisation. When responses for the ESM were compared across these four groups, Csikszentmihalyi et al. (1993) found many significant differences in the quality of experience reported both at home and while engaged in productive activities. In general, adolescents from complex families reported more positive home experiences including,

...higher happiness and cheerfulness and greater alertness and excitement (results presumably due to family integration), and they were more often living up to their own and others’ expectations and doing things more important to themselves and their goals (results related to family differentiation). (p. 167)

Adolescents from complex families also spent more time engaged in study and homework, and also reported being more alert and goal-directed during this time. When ESM responses were summed to include those obtained during productive activities during school time as well as outside (i.e., homework), the same pattern of results was obtained.

To investigate whether family complexity is associated with generally superior overall school performance, Csikszentmihalyi et al. (1993) compared the school performance of students in the four family groups (using percentile class rank from multiple teachers) across the first three years of senior high school. They found significant group differences existed at each year level of high school. Adolescents from complex families were ranked above those from the other family groups, with students from simple families ranked lower than all other groups. This result held for talented students in all domains except athletics. Athletes from differentiated families were ranked higher than athletes from complex families. Csikszentmihalyi et al. (1993) conclude that, while family complexity is not a necessary condition for excellence in teenagers, it does appear to increase the likelihood that adolescents will continue to sustain attention on productive domain tasks.

Csikszentmihalyi et al. (1993) proposed that complex family organisations are particularly important in producing experiences of “flow” within individual family members. Flow was defined as “...a subjective state that people report when they are completely involved in something to the point of losing track of time and of being unaware of fatigue and of everything else but the activity itself” (p. 14). This definition describes an extreme form of undivided attention. The flow
experience is central to Csikszentmihalyi et al.'s (1993) proposal of motivation being reliant on competing systems of integration and differentiation. They proposed that for an individual, the flow experience is only present when skills (integration) and challenges (differentiation) are producing a balanced tension. Although the theoretical justification is quite complex, Csikszentmihalyi et al. (1993) proposed that system theory provides an outlook in which complexity at home provides a suitable learning environment in which the family integration and differentiation can be transposed into individual desires to balance the skills and challenges required to repeat flow experiences. These experiences are thought to be so enjoyable that individuals are intrinsically motivated to recreate the experience of flow through a homeostatic-type mechanism of skill/challenge balance. For exceptionally performing individuals, if their present skill level is too far above the challenge of a domain activity, these individuals will be more inclined to search for a greater challenge. If, on the other hand, the challenge is ahead of present skill level, these individuals will tend to work towards acquiring the requisite skills.

While a full replication of Csikszentmihalyi et al.'s (1993) study was beyond the breadth of the current study, there are several questions raised that are relevant. Would some of the same differentiations which were found to apply to a talented adolescent sample also apply to an average sample of pre-adolescent students? That is, would the experience of flow provide domain-specific differentiation? Is flow meaningfully related to the constructs of expectancy-value theory, self-concept, and implicit theories of intelligence? Would flow be more predictive of achievement than self-concept, competency beliefs, subjective task values and implicit intelligence theories? A methodological issue in the current research is whether a simpler data collection methodology than the random electronic beeper design employed by Csiksentmihalyi et al. (1993) could successfully discriminate students experiencing flow.

1.4 Integrating Self Beliefs, Implicit Theories of Intelligence and Flow Perspectives to Achievement Motivation

The three perspectives discussed so far, children’s self-beliefs (expectancy-value theory and self-concept), implicit theories of intelligence, and flow theory can be evaluated in terms of the relative utility of the findings to explain
children's achievement motivation. As has already been argued, the research into
developmental patterns of competency beliefs and subjective task values,
conducted by Wigfield et al. (1997), bears a striking similarity to aspects of
concept. Both attempt to describe and understand the developing pattern of
children's cognitions about themselves in relation to various domains. The focus
of the research is on the average pattern of responses exhibited by children of
various ages. In contrast, Cain and Dweck's (1995) research is aimed towards
identifying a minority of children who may be at risk of developing negative
cognitive patterns which influence their motivational style and possibly minimise
achievement. The flow theory research of Csikszentmihalyi et al. (1993), on the
other hand, has been concerned with differences at the upper end of adolescent
performance through investigation of relationships between achievement and
perceptions, emotions, and personal and family characteristics.

Cain and Dweck's (1995) work on children's motivational styles does not
differentiate motivation between domains. In their framework, one would expect
mastery-oriented (or helpless-oriented) children to perform at a comparatively
similar level in all school domains, an educational outcome that is not frequently
attained (Csikszentmihalyi et al., 1993). This raises interesting questions about
the relevance of children's theories of intelligence for explaining children's
achievement motivation. For instance, what other motivational factors are
influencing a child who expresses an incremental theory of intelligence but
frequently displays a lack of motivation when confronted with failure in specific
contexts or domains? Perhaps some clues can be found in the domain-specific
patterns in the previously discussed research of Wigfield et al. (1997), Marsh and
colleagues (Marsh et al., 1983a; 1983b; 1984; 1985; Marsh, 1989; 1991), and
Csikszentmihalyi et al. (1993).

By providing a multi-dimensional view of self-concept, Marsh (1989, 1991)
provides a model of how domain-specific aspects of children's self-concept differ.
Children performing poorly in a domain tend to have lower self-concept beliefs
associated with that domain than better performing students, regardless of their
performance in other domains. This is also supported by the Wigfield et al.
(1997) findings that children's competence beliefs and subjective task values
varied between the four subject areas. Taken together, this suggests that it would
be possible for a child with incremental achievement beliefs, who generally does well at school, to react with helplessness in a school activity in which their self-concept, competence beliefs and subjective task values were low.

Using flow theory concepts, it would further be expected that this child would perceive their skills during lessons as high in most school domains but low in the activity in which their performance was low. Indeed, one would expect very similar relationships between domains to those found for competence beliefs because of the similarities between the two. If a child believes that they are competent at an activity they should also consider their skill level high when engaged in that activity. However, it is less obvious how children’s perceptions of the challenge of lessons would vary between domains. Using Csikszentmihalyi et al.’s (1993) findings, one would expect children with high challenge and skill perceptions of the classroom to eventually perform at a higher level than other children with high skill but low challenge perceptions. However, whether children’s primary school performance is directly related to their perceptions of classroom challenge is yet to be evaluated. It could be that lower challenge perceptions tend to be directly related to higher achievement in some or all domains.

For primary school age children, it is unclear whether similar patterns of relationships would be found between family style and achievement as were reported for the adolescent sample studied by Csikszentmihalyi et al. (1993). It could be argued that younger children’s perceptions of family integration may be more important than their perceptions of family differentiation. A child who describes family relationships in a more positive way therefore acknowledging acceptance within the family and, through this acceptance, being encouraged to achieve at a generally higher level across domains. However, this aspect may be more important in some activities than in others, and may or may not be related to children’s school achievement, competence beliefs and subjective task values, self-concept or intelligence theories.

The final aspect of flow theory, children’s emotional experience during lessons, would be expected to be related to children’s school achievement in various domains. Younger children, as with the teenagers studied by Csikszentmihalyi et al. (1993), should feel more emotionally positive in subjects in which their achievement is higher and, within a domain, one would also expect
children performing at a higher level to also have a better emotional experience. The domain specificity of emotional lesson experience suggests that this aspect of flow theory would also be related to children’s domain-specific competence beliefs and subjective task values, self-concept, and perceptions of skills during lessons. It could be argued that these relationships would vary across subjects. It is possible that a child who is who is achieving at a high level in a domain and believes that they are highly competent may, at the same time, have low valuation of the domain. This could result in children’s emotional experience of lessons being more strongly related to their subjective task values than to their achievement.

The relationship between younger children’s specific emotional experience of lessons and the more general constructs of family perceptions or intelligence theories are problematic. This relationship could be specific to certain domains or remain generally unrelated. For instance, it could be that children with incremental beliefs will tend to have a more positive emotional experience in all of their class activities, regardless of their level of achievement, because of an underlying belief that their achievement would improve if they chose to work harder. Related to this, children’s choice of what subjects in which to work harder could be influenced by their subjective valuations of that subject.

Children’s subjective task values may also be used to explain changes in children’s achievement level. Using expectancy-value theory to predict children’s level of domain achievement over time, the following relationships could be envisaged. Amongst 10-year-old children, those with high competency beliefs would all initially outperform others with lower beliefs, regardless of the task values individually associated with a domain. Over time however, there could be considerable changes in performance depending on children’s subjective valuation of the domain. A child with high domain competence beliefs but low subjective valuation might lack the motivation to do the work necessary to acquire more advanced skills. On the other hand, a child with lower competency beliefs but higher task values could eventually outperform the previously mentioned student through motivated domain practice over an extended period. This could especially be the case for children with incremental achievement beliefs who may tend to believe that more work will result in higher levels of achievement. If this
proposal is correct, however, it would suggest an increasing relationship, with age, between children's achievement and their implicit theories of intelligence.

1.5. Study 1: Overview

The first study was designed to investigate the relative contributions of a range of children's beliefs, values, perceptions and emotions as predictors of their achievement in different subject areas, with parents' beliefs and children's gender as mediating factors. The four subject areas selected for investigation were maths, reading, instrumental music and sport. These were selected to provide an Australian comparison to the American findings of Wigfield et al. (1997), for expectancy-value theory, at the same time as testing flow and implicit theories of intelligence approaches.

A review of the literature has identified three dimensions of children's achievement-related beliefs that have been linked with children's achievement. First, children's self-beliefs about their competence and subjective valuation of subject areas have been shown to relate to achievement through expectancy-value theory (Eccles, et al., 1983a; 1983b; 1984; 1989; Eccles & Harold, 1991; Wigfield, et al., 1991; 1997) and self-concept theory (Marsh, 1989; 1990; 1993; Marsh, et al., 1983; 1984; 1985; 1991; Marsh & Craven, 1991). This literature has identified gender and subject area differences and, in the case of expectancy-value theory, also reported important relationships between children's and parents' beliefs. Second, children's achievement-related beliefs have been related to their achievement behavior through their naive theory of intelligence as proposed in the Implicit Theory of Intelligence research (ITI; Cain & Dweck, 1995; Diener & Dweck, 1978; Dweck, et al., 1995). Finally, adolescents' perceptions of classroom experience, their emotional reaction to that experience, and perceptions of relationships with parents have been linked to their subsequent achievement in various subject areas through Flow research (Csikszentmihalyi, et al., 1993; Csikszentmihalyi & Larson, 1987; Schiefele & Csikszentmihalyi, 1995; Turner, et al., 1998).

At a theoretical level, there are several important questions that can be addressed. Do children's implicit theories of intelligence predict real-world achievement at school? Do children's experience of flow and perceptions of family relationships predict school achievement? Are children's domain
competence beliefs and self-concept sufficiently related that they can be treated as being a part of the same basic construct? The most important implications of the thesis, however, arise through the process of integrating significant predictors from each theoretical orientation. This provides the first attempt at viewing achievement motivation as a process existing within a system of beliefs and social influences drawn from various perspectives rather than as isolated theoretical orientations. Any advances in this direction should assist in the development of a more holistic view of children's achievement and motivation and, therefore allow for the development of more effective intervention strategies.

There are significant educational and theoretical implications arising from this research. By examining subject-specific differences in how each of the three theoretical orientations accounts for children's achievement, important information may be provided to direct the instructional methods of teachers in each domain. For example, the research may indicate that children's achievement in maths was most closely related to children's perceptions of lesson challenge and skills, whereas music achievement might be more closely related to children's subjective task values. This information would suggest that teachers in each domain may provide greater motivation for their students if lessons were focussed differently. Parents could also use this information to implement effective home-based strategies.

The study was also designed to investigate the relationship between children's competence beliefs (expectancy-value theory) and self-concept in each of the subject areas to determine the strength of the relationship of the two constructs. It was also planned to begin to integrate the findings of the three theoretical approaches for each subject area by evaluating the relationships between significant predictors of children's achievement determined for each theoretical approach.

The secondary objective of this thesis was to investigate possible extensions to two of the theoretical approaches being evaluated: expectancy-value theory, and children's achievement related beliefs (ITI). For expectancy-value theory, the extension entailed investigating the relationship between parents' subjective task values and children's achievement and subjective task values in each subject area to determine any mediating effects of parents' values on children's achievement and values. The extension to ITI theory consisted of investigating the subject area
specificity of children's achievement related beliefs and the relationship between children's general theory of intelligence and their subject specific beliefs.

1.6. Predictions

The initial research predictions relate to each theoretical approach independently. The final predictions are based on an integration across theories for each subject area.

1.6.1. Expectancy-Value Theory

Consistent with the findings of Wigfield et al. (1997), it was expected that there would be both subject area and gender differences in the levels of children's competence beliefs and subjective task values. It was also anticipated that children's competence beliefs and subjective task values would be related to their achievement in each subject area. The study also examined the relationships between children's three subjective task values of importance, usefulness and interest. While previous research has shown that the three subjective task values tend to be related to each other and to achievement, the extent of this relationship is not clear. In Wigfield et al.'s (1997) study, descriptive statistics were given in which children's scores for importance and usefulness were combined into a single variable and reported as being distinct from interest. However, tests of significance were not reported in support of this separation, and a footnote indicated that importance and usefulness did not always factor together. The current study examined these relationships to determine whether children's scores for the three subjective task values were significantly different from each other, both in and between subject areas. The following hypotheses were tested.

1. Children's competence beliefs and subjective task values levels will be significantly different between the four subject areas, with lower levels evident for instrumental music and higher levels for sport.

2. Females will have significantly higher levels of competence beliefs and subjective task values than males in reading and instrumental music, but lower levels for maths and sport.

3. Children's competence beliefs and subjective task values will predict a significant amount of children's achievement in each subject area.
Research by Wigfield et al. (1997) has identified significant relationships between parents’ competence beliefs about their children, teacher ratings of children’s competence (achievement) and children’s own competence beliefs. However, the relationships of parents’ subjective task values to children’s achievement and to children’s subjective task values have not been examined. It was predicted that parents who themselves highly value particular subject areas may invest more time with their children in those subjects, thereby increasing the likelihood that children may hold similar values, regardless of the child’s level of achievement. The following predictions were tested.

4. Parents’ competence beliefs and subjective task values will predict a significant amount of children’s achievement in each subject area.

5. Parents’ competence beliefs and subjective task values will be significantly related to the corresponding competence beliefs and subjective task values of children.

1.6.2. Self-Concept (SDQ)

Children’s self-concept, as measured by the SDQ-I (Marsh, 1990), has been shown to be a multi-faceted construct including both academic and non-academic components. The literature has identified that academic sub-scales (maths and reading) share significant correlations with children’s achievement in related subject areas (as measured by both objective test scores and teacher ratings), and that children’s general school-related self-concept tends to be less strongly correlated with achievement in any particular subject area than the subject-specific scale. For instance, the SDQ-maths scale has been found to be more strongly related to maths achievement than was the SDQ-general school scale. Based on the literature, the following hypothesis was proposed.

6. Children’s self-concept (general school and subject-specific) will be significantly related to their achievement and personal competence beliefs for each subject area, with subject-specific self-concept being more strongly related than general school self-concept.

The current study also tested the relationships between children’s self concept (general school and subject-specific), competence beliefs and achievement. As previously mentioned, the items measuring both constructs are very similar and
consequently it was expected that they would have similar explanatory power for children’s achievement. The following hypothesis was tested.

7. Children’s self-concept (general school and subject-specific) and competence beliefs will significantly predict achievement in each subject area, the majority of that prediction being shared across the predictors.

1.6.3. Achievement-Related Beliefs (ITI General and Subject-Specific)

Children’s implicit theory of intelligence (ITI) has been linked to their motivational response to failure experiences; children with a fixed view of intelligence being more likely to react with a helpless-type response. The literature has not reported any significant gender differences, or the extent to which children’s general intelligence theory relates to their thoughts about achievement in specific subject areas. For instance, do children who respond with a fixed general view of intelligence (entity beliefs) also believe that maths and sport ability are fixed? What is the relationship of achievement-related beliefs to actual achievement in various school subjects? These questions have not previously been addressed.

There has been no evidence reported in previous research to suggest that there are gender differences in children’s ITI beliefs. However, there were several possibilities suggested by the Cain and Dweck (1995) puzzle-solving findings with which to extend ITI research to children’s real-world school achievement. It was hypothesised that children’s general implicit theory of intelligence would be related to their specific beliefs about achievement in school subjects. That is, children with an entity theory of general intelligence will hold similar fixed achievement-related beliefs about their ability in specific school subjects. It was further expected that, because entity theorists have been found to be more likely to react to failure with helpless motivational-type responses, children’s ITI beliefs (general and subject-specific) would be related to their school achievement. Children with incremental views will achieve at a higher level than entity theorists through the exertion of more mastery-oriented behaviours. The current study tested these relationships with the following exploratory hypotheses.

8. There will not be any significant gender differences in children’s general theory of intelligence (ITI) or subject-specific beliefs regarding achievement (ITI-subject-specific).
9. There will be a significant positive relationship between children’s general intelligence theory (ITI) and their subject-specific achievement-related beliefs (ITI-subject-specific).

10. There will be a significant relationship between children’s achievement related beliefs (ITI and ITI-subject-specific) and achievement in each subject area. Children with stronger incremental beliefs will achieve at a higher level than other children.

Whether parents’ ITI beliefs (general and subject-specific) have an effect on children’s school achievement has not currently been reported in the literature. It is plausible that parents with an incremental (malleable) view of intelligence and subject-specific achievement could be more likely to stress to their children the importance of effort and the benefits of regular attention to homework and practice. The following exploratory hypotheses were used to evaluate parents’ achievement-related beliefs.

11. There will be a significant relationship between parents’ achievement-related beliefs (ITI and ITI-subject-specific) and children’s achievement in each subject area. Children of parents with stronger incremental beliefs will achieve at a higher level than other children.

12. There will be a significant positive relationship between parents’ general intelligence theory (ITI) and their subject-specific achievement-related beliefs.

1.6.4. Flow Theory

The flow theory literature has identified a series of significant relationships between adolescents’ perceptions of classroom experience, their emotional response to that experience, the type of relationship existing with their parents and their achievement in various school pursuits. What is not yet known is whether the same relationships will be evident for younger children and whether there are gender and subject area differences.

Using the existing expectancy-value research as a reference point, one could suggest that children will not only have higher subjective task values for maths than for instrumental music, but will also believe their maths skills to be greater than their music skills and will have a better emotional experience during maths
classes. In a similar manner, one could also suggest that females and males may differ in their classroom perceptions and emotional experience for different subject areas. For these reasons, the following hypothesis was proposed.

13. There will be significant differences in children’s perceptions of classroom experience and their emotional reaction to that experience based on gender and subject area.

Previous research on flow has used perceptions of classroom challenge and skill as a grouping variable. Children in the flow group for a subject area have tended to report a better emotional experience during activity in that subject, have described their relationship with their parents in a more positive light, and have also tended to achieve at a higher level in the subject area. Based on previous research the following hypothesis was tested.

14. There will be a significant relationship between children’s flow experience (flow group, emotional reaction to classroom experience, and perceptions of their relationship with parents) and children’s achievement in each subject area.

1.6.5. Cross-Theoretical Integration

The literature review demonstrated that some of the constructs from the different theoretical approaches may overlap. To determine more precisely the prediction of children’s achievement, the final part of the study was designed to combine the significant predictors found in the earlier analyses from each theoretical approach. Analyses were specific to each subject area. It was expected that more of the variance in children’s achievement scores would be predicted by the composite analyses than was predicted by any single theory. Because it was not known which variables would be included as significant unique predictors, the following exploratory hypothesis was tested.

15. For each subject area, more of the variance in children’s achievement would be predicted by the cross-theoretical factors than by factors from a single theoretical approach.
2. Study 1 Method

2.1. Participants

Eighty-four children in grade four (40 females and 44 males, aged 9 – 10 years) participated in the study. One of the children’s parents and their school teachers in the four subject areas being investigated (maths, reading, instrumental music and sport) were also invited to participate. The child participants were enrolled in one of three co-educational private schools in the Melbourne metropolitan region and were from middle to upper-class socio-economic backgrounds. The schools were chosen because they each had a reputation for strong instrumental music programs. It was anticipated that a large proportion of children would be learning a musical instrument. Previous research (Wigfield et al., 1997), using children with minimal instrumental music experience, has indicated that children tend to have much lower competence beliefs and values for music compared to maths, reading and sport. It is not known whether the same relationship applies for children with considerable musical experience.

2.2. Materials

Three questionnaires were used: Children’s Achievement Motivation Questionnaire (Appendix A), the Questionnaire for Parents (Appendix B) and the Questionnaire for Teachers (Appendix C).

2.2.1. Children’s Achievement Motivation Questionnaire

The children’s questionnaire was designed to include questions relevant to the three theoretical approaches to children’s achievement motivation being tested. A further measure of children’s self-concept was included to test the relationships between children’s competence beliefs and self-concept. Both general school self-concept and self-concept specific to each subject area were measured.

2.2.1.1. Expectancy-value theory.

Children’s competence beliefs and subjective task values were evaluated with questions used in previous studies (Eccles, 1984; Eccles, Adler & Meece, 1984; Eccles & Wigfield, 1995; Parsons, Adler & Kaczala, 1982; Wigfield et al., 1997). Wigfield et al. (1997) reported good internal consistency reliabilities ranging from .61 to .92 for each scale with children between grades two and seven.
Children's competence beliefs were tested by similarly worded questions asking children about their current beliefs of their performance in each subject area (i.e., "How good in maths are you? [Not at all good → Very good]"). And their expectancies for future performance (i.e., "How good would you be at learning something new in reading? [Not at all good → Very good]"). Following the procedure employed by Wigfield et al. (1997), five questions each were used to test children's maths, reading and sport competence beliefs, and four were used for music. The item deleted for children's instrumental music competence beliefs referred to how well children were expecting to do during the current school semester. Wigfield et al. (1997) deleted this item because instrumental music was not a compulsory school subject for participants in their study. As this was the case for participants in the current study this item was also deleted.

Questions measuring children's subjective task values comprised three separate scales, each containing two questions. One scale measured perceptions of domain usefulness (i.e., "Compared to most of your other activities, how useful is what you learn in reading? [Not at all → Extremely]"). Another scale measured importance (i.e., "Compared to most of your other activities, how important is it for you to be good at instrumental music? [Not at all → Extremely]"), and the third scale measured interest in the domain ("In general, I find working on maths assignments very [boring → interesting]").

Each question was originally designed to be answered on a 7-point Likert-type scale (see, Wigfield et al., 1997), low values representing a strong negative response and high values representing a strong positive response. However, for the current study this was changed to 11-point end-defined scales (i.e., "0 = Not at all", "10 = Extremely"). This provided participants with a wider range of points to choose, thus encouraging more individual variability in participants' responses. It was anticipated that the greater range would add to scale sensitivity.

2.2.1.2. Self-Concept.

Child participants were asked to complete an amended version of the Marsh (1990) Self Description Questionnaire 1 (SDQ). The SDQ is a 76-item measure of self-concept designed to be administered to children between the ages of eight to 12 years. Children are asked to respond to declarative sentences (i.e., "I look forward to mathematics", "I am a good athlete") by ticking one of five boxes:
False, Mostly False, Sometimes False/Sometimes True, Mostly True, True. There are eight scales within the SDQ which are designed to measure self-concept in three academic areas (maths, reading, and general-school) and five non-academic areas (physical ability, physical appearance, peer relations, parent relations and general-self). Each scale consists of eight positively worded declarative sentences. There are an additional 12 distracter items, with negative wording, randomly inserted in the SDQ to disrupt positive response bias. These items are not included in the measurement of sub-scales.

Norms are available for the SDQ based on responses by 3,562 Australian students in grades two to six. Internal consistency estimates for the SDQ scales vary between coefficient alphas of .80 to .92 with a median of .86. This indicates a good degree of internal consistency for each of the scales. Correlations performed between SDQ scales and academic achievement scores support the distinction between academic and non-academic self-concepts and also demonstrate a distinction between maths and reading self-concepts.

For the purpose of the current study, the SDQ scales for maths, reading and physical abilities scales were used as measures of children’s general competence-related beliefs for the subjects of maths, reading and sport respectively. The SDQ-physical abilities scale was called the SDQ-sport scale throughout the study. In order to provide a measure for the fourth subject under investigation (instrumental music), the author of the SDQ (Marsh, 1990) was approached and consequently approved the inclusion of nine further items in the SDQ pertaining to music. These included eight positively worded items to make up the SDQ-music scale, and one negatively worded distracter item. Each item was based on an equivalent declarative sentence in the SDQ-maths scale. The nine items were randomly distributed among the other SDQ items. The eight making up the SDQ-music scale were as follows: "I look forward to music"; "I get good marks in music"; "I learn things quickly in music"; "I like music"; "I'm good at music"; "I enjoy doing work in music"; "I am interested in music"; "Work in music is easy for me".

Two further SDQ scales were employed in the current study, the SDQ-general school scale and the SDQ-parent relations scale. The SDQ-general school scale measures children's self-concept averaged across all school subjects (i.e., "I am good at all school subjects"), and the SDQ-parent relations scale measures
children’s perceptions of the strength of their relationship with parents (i.e., “I like my parents”, “My parents understand me”).

2.2.1.3. Implicit theories of intelligence.

Children’s implicit theories of intelligence were measured using an adapted form of the Implicit Theories of Intelligence (ITI) scale (Dweck, Chiu & Hong, 1995). The ITI scale consists of three statements about intelligence framed from an entity perspective and asks respondents for their level of agreement along a 6-point scale. The adapted form of the ITI was based on the one developed by Cain and Dweck (1995) for use with young children. The word “intelligence” was replaced from the original ITI with the word “smart” and a brief explanatory statement was included immediately prior to the ITI items. The explanatory statement and ITI items were as follows.

The following three questions ask about your general view of smartness. Smartness has to do with schoolwork. We sometimes call children who do very well on their schoolwork “smart”. I want to see how much you agree or disagree with the following statements about smartness.

1. “You’re a certain amount smart and you can’t really do much to change it”.
2. “How smart you are is something about you that you can’t change very much”.
3. “You can learn new things but you can’t change how smart you really are”.

The questions are usually answered on a six-point scale from “1 = strongly agree” to “6 = strongly disagree”. A mean score for the three items represents the extent of agreement with the entity perspective, lower scores indicating stronger agreement. Dweck et al. (1995) report strong internal reliability statistics across six validation studies, alphas ranging from .94 to .98, with an acceptable two-week test-retest correlation ($r = .80$).

To enable children to respond in the same manner as for the expectancy-value theory items, the response scale was changed to a similar 11-point end-defined scale with positive responses to the statements anchored at the higher end of the scale (“10 = strongly agree”).

An amended version of the ITI, the ITI(b), was also given to children as part of the exploratory investigation of the domain specificity of implicit theories of
intelligence for individual subject areas. The ITI(b) followed the same format as the ITI but asked about domain-specific theories of ability and achievement as applied to maths, reading, music and sport. The wording was slightly changed to allow the words “maths/reading/music/sport ability” to replace the word “smartness” from the original ITI items. For example:

(1) “You have a certain amount of maths ability and you can’t do much to change it”.

(2) “Your music ability is something about you that you can’t change very much”.

(3) “You can learn new things, but you can’t really change your basic sport ability”.

Participants could respond along an 11-point end-defined scale anchored at “0 = Strongly disagree” and “10 = Strongly agree”.

2.2.1.4. The experience of flow.

The experience of Flow has been investigated previously by giving respondents detailed checklists to complete either during or immediately after the activity under investigation (Csikszentmihalyi et al., 1993; Turner, Meyer, Cox, Logan, DiCintio & Thomas, 1998). Because of the procedural and logistic difficulties involved in gaining school approval for this type of testing, due to the method involving substantial interruptions to normal classroom activity, an alternate four-question measure was used. Two questions concerned children’s perceptions of their normal classroom experience in terms of the average challenge involved in lessons in each subject and their perceived level of skill exhibited during lessons. These questions were based on those previously used by Csikszentmihalyi et al. (1993) and Turner et al. (1998), and were as follows;

1. “How challenging do you usually find reading classes?”

2. “How are your reading skills during lessons?”

The first item offered responses along a 10-point end-defined scale anchored at “1 = Low Challenge” and “10 = High Challenge”. The second item offered a similar scale anchored at “1 = Low Skills” and “10 = High Skills”.

The second aspect of the flow experience investigated was children’s emotional experience during activity within a subject area. This was investigated using two declarative statements. The first statement was designed to measure
children's positive affect during normal classroom activity, and the second to measure negative affect. The two items for sport were:
1. "I generally feel happy and alert during sports classes".
2. "I usually feel confused during sports classes".

Responses could be given along an 11-point scale anchored at "0 = Strongly disagree" and "10 = Strongly agree", and the wording was altered to be specific to each subject area.

2.2.2. Questionnaire for Parents

The first page of the Questionnaire for Parents (see, Appendix B) asked general biographical information and gave directions on how to complete the questionnaire. Parents were asked to describe their relationship to the participating child (i.e., mother/father), their current marital status and the highest education level achieved. Parents were also asked to provide the participating child's name and birth-date as well as to indicate whether the child was currently learning, or had previously learnt, a musical instrument. The remaining questionnaire items included questions to measure parents' beliefs based on expectancy-value theory and ITI achievement beliefs.

2.2.2.1. Expectancy-value theory.

Similar questions as those for children were used to measure parents' beliefs about the competence of their child and parents' own subjective task values. There were four questions used to evaluate parents' judgement of children's competence in each subject areas. Three of these questions pertained to current competence beliefs (i.e., "How good is your child at maths?"). The remaining question measured expectancies for future performance (i.e., "How well do you expect your child to do next semester in instrumental music?"). These questions were based on items used previously by Wigfield et al. (1997).

There were three questions used to evaluate parents' subjective task values for each of the subject areas. Questions were designed to capture how subjectively important, useful and interesting parents' believed each subject to be. For example:

1. "Compared to other subjects taught at school, how important do you consider maths?"
2. "Compared to other subjects taught at school, how useful do you consider music?"

3. "How interesting do you find sport?"

Responses for these items could be given on an 11-point semantic differential scale with a response of "0" indicating "Not at all", and a response of "10" indicating "Extremely". Higher scores therefore indicated higher subjective valuation by parents.

2.2.2.2. Implicit theories of intelligence.

Parents were given the three original ITI questions, as outlined for children. The word "intelligence" was used rather than "smart" as used in the children's questionnaire. Parents were also asked about their subject-specific views of ability and achievement through the 12 ITI(b) items, three for each specific subject area, as used in the children's questionnaire.

2.2.3. Questionnaire for Teachers

Because the major interest of this research was focussed on children's school achievement there was one notable operational difficulty in designing the study: the definition and measurement of children's achievement in the four subject areas. Many Australian primary schools, including those participating in the study, do not provide marks or grades for their students and instead utilise a satisfactory/non-satisfactory report system. For this reason school grades were not accessible for this research. Instead, it was decided to employ a teacher rating of children's achievement based on teacher perceptions of each child's current competence as well as expectancies for future performance. This procedure has been employed previously by Wigfield et al. (1997), and while it is acknowledged that this might not provide the most sensitive measure of children's achievement, it was a pragmatic choice anticipated to provide an easily obtainable objective measure of children's performance in each subject area.

The Questionnaire for Teachers (see, Appendix C) first asked teachers to provide general biographical information (i.e., age and subject(s) taught to the participating children). The two key questions on the teacher questionnaire asked about the competence of participating children in each of the four subject areas.
The two questions were based on those previously employed by Wigfield et al. (1997) and were as follows:
1. "Compared to other children how good is this child at reading?"
2. "How well do you expect this child to do next semester in reading?"

The first item asked teachers to place a number between zero and ten next to each child’s name with "0" representing "Much worse than other children" and "10" representing "Much better than other children". The second item had a similar scoring mechanism but "0" represented "Not at all well" and "10" represented "Exceptionally well".

2.3. Procedure

Participants were recruited through the three schools. Initially, a plain language statement (Appendix D) outlining the study was given to children and read to them during school time. Children were asked to take home an envelope for their parents containing a more detailed plain language statement about the research and some sample questions (Appendix E). Also included were two consent forms (Appendices F and G), one for parent participation and one for child participation. Parents were instructed to sign the consent forms and return them to school in the envelope provided. Approximately 40 percent of children returned a consent form.

The ordering of questions on the Children’s Achievement Motivation Questionnaire began with the three ITI questions. Following this were the Expectancy-value theory questions and ITI(b) questions for each subject given separately. Thus, all of the expectancy-value theory and ITI(b) items relating to maths were grouped together as were the items for each of the other subjects. There were two orderings of subject areas and approximately half of the participants completed questionnaires in each subject order. These orders were: (a) maths, reading, instrumental music, sport; and (b) reading, instrumental music, maths and sport. Following this the Flow and SDQ questions were presented.

The children’s questionnaire took approximately 45-50 minutes and was completed as either a single 45 minute session or as two 25 minute sessions, depending on the preference of the schools involved. Questionnaires were completed during normal class time and all questions were read aloud to the child
participants by the researcher. All testing took place during the last third of the school year.

At the completion of the questionnaire, children were given an envelope containing the parent questionnaire and a reply paid envelope. The parent questionnaire requested that the parent who was most involved with educational matters relating to the child participant should complete the questionnaire. The parent questionnaire was designed to be completed in approximately 20 minutes.

During the last few weeks of the school year, teacher questionnaires were distributed to the school teachers involved in teaching the children maths, reading, music and sport. In all cases the same teacher taught both maths and reading to each class group. It was expected that many of the child participants would currently be playing a musical instrument but that a large proportion of these may be learning outside of school hours through private music teachers. For this reason, and because none of the schools involved had compulsory instrumental music classes, it was decided that teacher questionnaires for instrumental music would be given to the general music teacher of each class. Teacher questionnaires for sport were given to the physical education teacher of each class. Along with the questionnaires, each teacher was given a plain language statement (Appendix H), outlining the study, and a consent form (Appendix I). Teachers returned the questionnaire and consent form via a reply paid envelope.
3. Study I Results

All data were collated and analysed using the SPSS statistics package. Initial screening of children’s responses identified one participant who failed to complete any of the 16 Flow items. This participant was omitted from analyses involving flow theory constructs (n = 83). There were 53 missing responses to the 159 items of the children’s questionnaire. Since these appeared to randomly distributed they were replaced with item means.

Seventy-six parents returned questionnaires and, of these, 66 were mothers of participating children and 10 were fathers. Just over 88 percent of participating parents were married at the time of completing the questionnaire and over 80 percent of participating parents reported having tertiary qualifications. Of the 76 children whose parents returned a completed questionnaire, 60 children were currently learning at least one musical instrument and the remaining 16 children had all learnt an instrument prior to the study. Initial screening of parents’ responses identified 31 missing responses of which 24 were for items asking parents to evaluate their child’s competence relative to other children. As there were four items measuring competence beliefs in each subject area, these were replaced by item means. The other seven missing responses appeared to be random and these were also replaced with item means.

Teacher achievement ratings for children were only available for 50 children in maths and reading, 23 children for music and 26 children for sport. Further, one of the music teachers indicated that she had only been teaching the class (12 child participants) for less than a term (approximately 10 weeks) and was unsure of some of the children’s names. For these unfamiliar children, the teacher reported giving moderate achievement ratings.

Data were first analysed separately for each theoretical orientation, both for gender and subject area differences and then in relationship to achievement. Gender and subject area differences were analysed using Analysis of Variance (ANOVA), and Wilk’s Lambda was used to calculate probabilities. An alpha level of .05 was used. Standard multiple regressions were used to evaluate the predictive relationship between each theoretical approach and children’s achievement. These were calculated for each subject area. Following this, cross-theoretical relationships to achievement were tested in each subject area.
3.1. Expectancy-Value Theory

3.1.1. Children’s Competence Beliefs

Children’s competence belief responses for each of the subject areas were summed and individual mean scores calculated. This provided a minimum of zero and a maximum of ten. From these means, overall means and standard deviations were calculated for each subject area according to gender. Results are presented in Table 1.

Table 1
Children’s Competence Beliefs Mean Scores by Subject Area and Gender

<table>
<thead>
<tr>
<th>Subject area</th>
<th>n</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maths</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>7.27</td>
<td>1.61</td>
</tr>
<tr>
<td>Male</td>
<td>44</td>
<td>7.61</td>
<td>1.40</td>
</tr>
<tr>
<td>Reading</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>8.10</td>
<td>1.24</td>
</tr>
<tr>
<td>Male</td>
<td>44</td>
<td>7.55</td>
<td>1.76</td>
</tr>
<tr>
<td>Music</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>7.08</td>
<td>1.89</td>
</tr>
<tr>
<td>Male</td>
<td>44</td>
<td>6.06</td>
<td>2.19</td>
</tr>
<tr>
<td>Sport</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>8.28</td>
<td>1.58</td>
</tr>
<tr>
<td>Male</td>
<td>44</td>
<td>8.31</td>
<td>1.87</td>
</tr>
<tr>
<td>( N = 84 )</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Children’s competence beliefs about sport were higher than for all other subjects regardless of gender. In contrast, music was the subject in which females and males reported the lowest competence beliefs, with the mean score for males being approximately one scale-point lower than that for females. This was the largest gender difference in competence beliefs. For the two academic subjects (maths and reading) the results show that females believed that they were more competent in reading than in maths while male beliefs were the reverse. These
results supported the findings of Wigfield et al. (1997). It is also of note that all mean scores for competence beliefs fell between 7 and 8.4, except for males' music competence beliefs. This indicates that, on average, the grade four children in this sample tended to believe they were quite competent in the four subject areas.

To further investigate gender and subject area differences, a two-way mixed model ANOVA was performed. Children's competence beliefs scores were the dependent variable, with the two independent factors being gender (between-subjects) and subject area (within-subjects). Planned comparisons were also undertaken comparing competence beliefs scores for maths with competence beliefs scores for the other three subject areas. Maths was chosen as the comparison subject area because of its position about midway between the highest and lowest competence belief scores. The results are presented in Table 2.

Table 2
ANOVA and Planned Comparisons for Children's Competence Beliefs Scores by Subject Area and Gender

<table>
<thead>
<tr>
<th>Analyses</th>
<th>F</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Effects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subject area</td>
<td>15.80</td>
<td>3, 80</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Gender</td>
<td>1.33</td>
<td>1, 82</td>
<td>.25</td>
</tr>
<tr>
<td>Interaction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subject area by gender</td>
<td>2.64</td>
<td>3, 80</td>
<td>.06</td>
</tr>
</tbody>
</table>

Planned Comparisons

<table>
<thead>
<tr>
<th>Subject area</th>
<th>F</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maths vs reading</td>
<td>2.75</td>
<td>1, 82</td>
<td>.10</td>
</tr>
<tr>
<td>Maths vs music</td>
<td>10.80</td>
<td>1, 82</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Maths vs sport</td>
<td>15.39</td>
<td>1, 82</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subject area by gender</th>
<th>F</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maths vs reading</td>
<td>4.55</td>
<td>1, 82</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>Maths vs music</td>
<td>6.81</td>
<td>1, 82</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>Maths vs sport</td>
<td>0.71</td>
<td>1, 82</td>
<td>.40</td>
</tr>
</tbody>
</table>

N = 84 (females n = 40, males n = 44)
The interaction result was not significant and indicated that female and male competence beliefs did not differ significantly across the four subject areas. However, since the interaction was close to a significant level, this comparison may be worth testing in future investigations. The main effect for Subject area was found to be significant and demonstrated that children's competence beliefs differed across subjects. Children's competence beliefs for maths were significantly lower than for sport and higher than for music. Competence beliefs for maths and reading were not found to be significantly different. The planned comparisons for subject area by gender indicated that some interaction contrasts were significant. Females and males differed significantly in their competence beliefs for reading and music when compared to maths with females' competence beliefs being higher than males for reading and music and lower for maths.

These results provide some support for the predictions. Consistent with the first hypothesis, the significant main effect for subject area, and the significant subject area planned comparisons indicate that, while children's maths and reading competence beliefs were not different, significant differences were present for children's maths competence beliefs when compared with their music and sport competence beliefs. The second hypothesis also received some support. Females did have significantly higher competence beliefs for reading and instrumental music than males when compared with their maths competence beliefs. However, the near identical sports competence means for females and males failed to support the hypothesised gender difference in the sports domain.

3.1.2. Subjective Task Values

Items measuring the three components of subjective task values (Importance, Usefulness and Interest) were summed for each subject area and means and standard deviations calculated by gender (Range between 0 and 10). The results are presented in Table 3.

The most noticeable subject area difference in children's subjective task values was for instrumental music. In general, music was valued relatively less than any of the other subject areas by children of both genders in terms of importance, usefulness and interest. The one exception was for females, where their Interest mean for maths was slightly lower than their Interest mean for instrumental
music. Another noticeable finding was the very similar means for females and males in the subjects of maths and sport for each of the subjective task values. Females and male means varied by less than half of a scale point. This was also the case for reading Importance and Usefulness. In contrast, females had a higher reading Interest mean than males (just over one scale point). Gender differences for instrumental music were, by comparison, even greater. Female means for all three of the subjective task values for instrumental music were greater than one and a half scale points higher than the respective means for males.

Table 3

Children’s Subjective Task Values Mean Scores by Subject Area and Gender

<table>
<thead>
<tr>
<th>Subject area</th>
<th>n</th>
<th>Importance</th>
<th></th>
<th>Usefulness</th>
<th></th>
<th>Interest</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Maths</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>7.80</td>
<td>2.10</td>
<td>8.06</td>
<td>1.53</td>
<td>6.00</td>
<td>3.07</td>
</tr>
<tr>
<td>Male</td>
<td>44</td>
<td>7.86</td>
<td>1.73</td>
<td>7.92</td>
<td>1.63</td>
<td>5.99</td>
<td>2.77</td>
</tr>
<tr>
<td>Reading</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>8.44</td>
<td>1.51</td>
<td>8.25</td>
<td>2.12</td>
<td>6.88</td>
<td>2.80</td>
</tr>
<tr>
<td>Male</td>
<td>44</td>
<td>8.00</td>
<td>1.95</td>
<td>7.89</td>
<td>2.03</td>
<td>5.78</td>
<td>2.79</td>
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<tr>
<td>Music</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>6.53</td>
<td>2.67</td>
<td>6.39</td>
<td>3.15</td>
<td>6.06</td>
<td>2.65</td>
</tr>
<tr>
<td>Male</td>
<td>44</td>
<td>5.00</td>
<td>2.85</td>
<td>4.59</td>
<td>2.93</td>
<td>3.67</td>
<td>2.78</td>
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<td>Sport</td>
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<tr>
<td>Female</td>
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<td>2.11</td>
<td>8.39</td>
<td>1.99</td>
<td>8.92</td>
<td>1.88</td>
</tr>
</tbody>
</table>

N = 84

To evaluate subject area and gender differences in subjective task values more comprehensively, a three-way mixed model ANOVA was performed with the three factors being gender as a between-subjects factor, and subject area and subjective task values as a within-subjects factors. Planned comparisons were undertaken to compare subjective task values for maths with the other three subject areas. Maths was again chosen as the comparison variable because of its
generally midway position between the highest and lowest means for each of the subjective task values. Further planned comparisons were computed to compare Interest means with each of the other two subjective task values. Interest was chosen as the comparison variable because past research suggests that interest sometimes factors as an independent subjective task value from importance and usefulness (Wigfield, et al., 1997). The ANOVA results are presented in Table 4.

The results indicated significant main effects for subject area, subjective task values and gender. There were also significant interactions between subject area and gender, and between subject area and subjective task values. The significant main effects and interactions involving subject area provided some support for the first and second hypotheses that were further explained by the planned comparisons. There were significant subject area planned comparisons for maths versus music and also maths versus sport. Children’s subjective task values for maths were higher than they were for music and lower than for sport. These results therefore supported the first hypothesis.

The only significant planned comparison involving gender differences was the subject area by gender comparison of maths versus music. Females had higher subjective task value means than males for music but were not different for the other subject area comparisons (see, Table 3). Since the planned subject area by gender comparison for maths versus sport was not significant, these results provided only partial support for the second hypothesis.

The planned comparisons for subjective task values were significant, and the significant comparisons for the subjective task values by subject area interaction further define these differences. There were significant differences between Importance and Interest means and also between Usefulness and Interest means for the maths/music comparison and the maths/sport comparison but not for the maths/reading comparison. This indicates that children’s pattern of responding to the subjective task value of Interest when compared to both Importance and Usefulness was different in maths than it was in music and sport but not different from reading. These results are important for the exploration of the relationships between the three subjective task values and provide some evidence that children’s responses to the interest items for maths, instrumental music and sport may be different from their importance and usefulness responses.
Table 4

ANOVA and Planned Comparisons for Children’s Subjective Task Values Scores by Subject Area and Gender

<table>
<thead>
<tr>
<th>Analyses</th>
<th>F</th>
<th>df</th>
<th>Interactions</th>
<th>F</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main effects</td>
<td></td>
<td></td>
<td>Subject area by gender</td>
<td>3.67</td>
<td>3</td>
</tr>
<tr>
<td>Subject area</td>
<td>33.66</td>
<td>3</td>
<td>80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Values</td>
<td>28.39</td>
<td>2</td>
<td>81</td>
<td>1.10</td>
<td>2</td>
</tr>
<tr>
<td>Gender</td>
<td>4.82</td>
<td>1</td>
<td>82</td>
<td>17.67</td>
<td>6</td>
</tr>
<tr>
<td></td>
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<td>Subject area by values by gender</td>
<td>0.96</td>
<td>6</td>
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<td>Planned Comparisons</td>
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<tr>
<td>Subject area</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Maths vs reading</td>
<td>1.66</td>
<td>1</td>
<td>82</td>
<td>2.10</td>
<td>1</td>
</tr>
<tr>
<td>Maths vs music</td>
<td>41.30</td>
<td>1</td>
<td>82</td>
<td>10.12</td>
<td>1</td>
</tr>
<tr>
<td>Maths vs sport</td>
<td>23.91</td>
<td>1</td>
<td>82</td>
<td>0.02</td>
<td>1</td>
</tr>
<tr>
<td>Values</td>
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<td></td>
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<tr>
<td>Importance vs Interest</td>
<td>53.20</td>
<td>1</td>
<td>82</td>
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<td>1</td>
</tr>
<tr>
<td>Usefulness vs Interest</td>
<td>44.21</td>
<td>1</td>
<td>82</td>
<td>1.33</td>
<td>1</td>
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<tr>
<td>Subject area by values</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Maths vs reading</td>
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</tr>
<tr>
<td>Importance vs Interest</td>
<td>0.02</td>
<td>1</td>
<td>82</td>
<td>0.94</td>
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</tr>
<tr>
<td>Usefulness vs Interest</td>
<td>0.52</td>
<td>1</td>
<td>82</td>
<td>1.45</td>
<td>1</td>
</tr>
<tr>
<td>Maths vs music</td>
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<td></td>
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<td></td>
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<tr>
<td>Importance vs Interest</td>
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<td>1</td>
<td>82</td>
<td>1.60</td>
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<tr>
<td>Usefulness vs Interest</td>
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<td>1</td>
<td>82</td>
<td>0.95</td>
<td>1</td>
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<tr>
<td>Maths vs sport</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Importance vs Interest</td>
<td>63.04</td>
<td>1</td>
<td>82</td>
<td>0.01</td>
<td>1</td>
</tr>
<tr>
<td>Usefulness vs Interest</td>
<td>59.74</td>
<td>1</td>
<td>82</td>
<td>0.19</td>
<td>1</td>
</tr>
</tbody>
</table>

N = 84 (females n = 40, males n = 44) Note: * = p < .05; ** = p < .01; *** = p < .001. The variable “Values” refers to subjective task values.
3.1.3. Predicting Children’s Achievement from Children’s and Parents’ Competence Beliefs and Subjective Task Values

To test whether the expectancy-value theory variables predicted children’s achievement, two multiple regressions were computed for each subject area. For both regressions, children’s achievement was used as the dependent variable. In the first regression, children’s competence beliefs and subjective task values were entered as the independent variables. For the second regression, parents’ competence beliefs and subjective task values were entered as the independent variables. To support hypothesis three and four, results for each regression were expected to provide a significant prediction of children’s achievement. The results summary for maths are provided in Table 5.

Table 5
Standard Multiple Regressions of Children’s and Parents’ Competence Beliefs and Subjective Task Values Scores for Children’s Maths Achievement

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>B</th>
<th>Beta</th>
<th>( r^2 )</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1. Achievement (DV)</td>
<td>....</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Competence</td>
<td>.60(^c)</td>
<td>....</td>
<td>R(^2) = .40</td>
<td>.42(^b)</td>
<td>.42</td>
<td>.10</td>
<td></td>
</tr>
<tr>
<td>3. Importance</td>
<td>.50(^a)</td>
<td>.53(^c)</td>
<td>....</td>
<td>Adj. R(^2) = .34</td>
<td>.28(^a)</td>
<td>.33</td>
<td>.06</td>
</tr>
<tr>
<td>4. Usefulness</td>
<td>.25(^a)</td>
<td>.44(^b)</td>
<td>.59(^c)</td>
<td>....</td>
<td>R = .63(^c)</td>
<td>-.18</td>
<td>-.16</td>
</tr>
<tr>
<td>5. Interest</td>
<td>.41(^b)</td>
<td>.55(^c)</td>
<td>.46(^c)</td>
<td>.33(^b)</td>
<td>.05</td>
<td>.08</td>
<td>.00</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Intercept = 5.41(^a)</td>
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</tr>
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</table>

Parents’ Beliefs \( N = 44 \)

<table>
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<tr>
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<th>3</th>
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<th>B</th>
<th>Beta</th>
<th>( r^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Achievement (DV)</td>
<td>....</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2. Competence</td>
<td>.69(^c)</td>
<td>....</td>
<td>R(^2) = .52</td>
<td>.18(^b)</td>
<td>.65</td>
<td>.37</td>
<td></td>
</tr>
<tr>
<td>3. Importance</td>
<td>.05</td>
<td>.10</td>
<td>....</td>
<td>Adj. R(^2) = .47</td>
<td>.06</td>
<td>.06</td>
<td>.00</td>
</tr>
<tr>
<td>4. Usefulness</td>
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<td>.18</td>
<td>.75(^c)</td>
<td>....</td>
<td>R = .72(^e)</td>
<td>-.21</td>
<td>-.21</td>
</tr>
<tr>
<td>5. Interest</td>
<td>.37(^b)</td>
<td>.32(^a)</td>
<td>.42(^b)</td>
<td>.39(^b)</td>
<td>.15</td>
<td>.22</td>
<td>.04</td>
</tr>
</tbody>
</table>

Note: \(^a\) = p < .05; \(^b\) = p < .01; \(^c\) = p < .001
The results for children’s beliefs (Table 5) indicated significant correlations between achievement and each of the children’s beliefs. Children’s competence beliefs and subjective task values were also all significantly related to each other. The regression on achievement was significant, $F(4, 45) = 7.35, p < .001$. The only two independent variables to provide significant unique contributions to the prediction of children’s maths achievement were children’s Competence beliefs and the subjective task value of Importance. Children’s Competence beliefs uniquely predicted 10 percent of the variability in children’s maths achievement and Importance a further six percent. Shared variability prediction for the four independent variables was 24 percent and jointly they predicted 40 percent (34 percent adjusted) of the variability in maths achievement. These results supported the third hypothesis that children’s expectancy-value theory-related beliefs for maths would predict maths achievement.

The correlations presented in the regression for parents’ maths beliefs on children’s maths achievement indicate that children’s maths achievement was significantly related to parents’ Competence beliefs and Interest but not to parents’ Importance and Usefulness values. There was a significant correlation between parents’ Competence beliefs and Interest, and significant correlations between parents’ Importance, Usefulness and Interest values. The regression was significant, $F(4, 39) = 10.68, p < .001$. The only unique predictor of children’s maths achievement was parents’ Competence beliefs about their child. Parents’ maths Competence beliefs predicted 37 percent of variability in children’s maths achievement with a further 15 percent of variability shared between the four parents’ beliefs. By showing that parents’ competence beliefs and subjective task values predicted children’s maths achievement, these results supported the fourth hypothesis.

The results for reading are presented in Table 6. The regressions for children’s and parents’ beliefs were both significant: Children’s Beliefs, $F(4, 45) = 5.78, p < .01$; Parents’ Beliefs, $F(4, 39) = 4.93, p < .01$. For Children’s Beliefs, reading achievement was significantly correlated with children’s Competence beliefs and Interest. Children’s reading Competence beliefs and subjective task values were significantly interrelated. In the regression the only unique predictor of children’s reading Achievement was children’s Competence beliefs, which accounted for 18 percent of achievement variability. The four independent variables shared in
predicting a further 16 percent of variability and jointly the four independent variables predicted 34 percent (28 percent adjusted) of reading achievement variability. The results supported hypothesis three and were similar to those obtained in the children’s beliefs regression on maths achievement.

Table 6
Standard Multiple Regressions of Children’s and Parents’ Competence Beliefs and Subjective Task Values Scores for Children’s Reading Achievement

<table>
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<tr>
<th>Variables</th>
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<th>B</th>
<th>Beta</th>
<th>sr²</th>
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<tbody>
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<td>Children’s Beliefs (N = 50)</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1. Achievement (DV)</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Competence</td>
<td>.57c</td>
<td></td>
<td></td>
<td></td>
<td>.34</td>
<td>.50b</td>
<td>.53</td>
</tr>
<tr>
<td>3. Importance</td>
<td>.14</td>
<td>.27a</td>
<td></td>
<td></td>
<td>.28</td>
<td>.05</td>
<td>.02</td>
</tr>
<tr>
<td>4. Usefulness</td>
<td>.22</td>
<td>.48c</td>
<td>.50c</td>
<td></td>
<td>.58b</td>
<td>.20</td>
<td>.12</td>
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<td>.40b</td>
<td>.58c</td>
<td>.47c</td>
<td>.56c</td>
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<td>.17</td>
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</table>

Intercept = 4.09

Parents’ Beliefs (N = 44)

<table>
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<th>B</th>
<th>Beta</th>
<th>sr²</th>
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<tbody>
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<td></td>
<td></td>
<td>.34</td>
<td>.28c</td>
<td>.59</td>
</tr>
<tr>
<td>3. Importance</td>
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<td>.27a</td>
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<td>-.63</td>
<td>.12</td>
</tr>
<tr>
<td>4. Usefulness</td>
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<td>.29a</td>
<td>.61c</td>
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<td>.58b</td>
<td>-.129</td>
<td>-.21</td>
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<tr>
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<td>.09</td>
<td>.15</td>
<td>.43b</td>
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<td>.36</td>
<td>.14</td>
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</table>

Intercept = 21.94b

Note: a = p < .05; b = p < .01; c = p < .001

The results for the Parents’ Beliefs correlations indicated that parents’ Competence beliefs about their child was the only one of the four independent variables significantly correlated to children’s reading Achievement. Parents’ Competence beliefs had significant positive correlations with the subjective task values of Importance and Usefulness. Thus, parents who placed higher personal importance and usefulness on reading tended to also believe that their children were more competent at reading. In the Parents’ Beliefs regression, the four independent variables jointly predicted 34 percent (27 percent adjusted) of the
variability in children’s reading Achievement, of which most (32 percent) was uniquely predicted by parents’ competence beliefs. These results were similar to those obtained for maths and again supported the fourth hypothesis.

Calculating regression analyses for instrumental music and sport was problematic because, as previously mentioned, achievement ratings were only available for approximately one-third of the child participants. Music was thought to be particularly problematic because one of the music teachers was relieving a normal staff member during the period of the study and indicated that not all of the students were known to her by name. A standard multiple regression was calculated for music, using children’s music Achievement as the dependent variable and children’s music Competence beliefs and subjective task values as independent variables. The regression was not found to be significant, $F(4,18) = 1.44$, $p = .26$, and it was decided to analyse this data through pair-wise correlations (Pearson’s $r$). Two sets of correlations were calculated, the first between children’s instrumental music Achievement, Competence beliefs and subjective task values. The second was between children’s instrumental music Achievement and parents’ Competence beliefs and subjective task values. The data are provided in Table 7.

### Table 7
Correlations Between Children’s Music Achievement and Children’s and Parents’ Competence Beliefs and Subjective Task Values Scores

<table>
<thead>
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<th>Variables</th>
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<th>3</th>
<th>4</th>
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<th>2</th>
<th>3</th>
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</thead>
<tbody>
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<td></td>
<td></td>
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<td>Parents’ Beliefs</td>
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<td></td>
</tr>
<tr>
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<td></td>
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<td></td>
<td>1. Achievement</td>
<td>....</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Competence</td>
<td>.29</td>
<td>....</td>
<td></td>
<td></td>
<td>2. Competence</td>
<td>.30</td>
<td>....</td>
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</tr>
<tr>
<td>3. Importance</td>
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<td>.71</td>
<td></td>
<td></td>
<td>3. Importance</td>
<td>-.03</td>
<td>.53</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Usefulness</td>
<td>-.01</td>
<td>.62</td>
<td>.82</td>
<td></td>
<td>4. Usefulness</td>
<td>-.05</td>
<td>.53</td>
<td>.82</td>
<td></td>
</tr>
<tr>
<td>5. Interest</td>
<td>.25</td>
<td>.62</td>
<td>.83</td>
<td>.73</td>
<td>5. Interest</td>
<td>.27</td>
<td>.57</td>
<td>.61</td>
<td>.59</td>
</tr>
<tr>
<td></td>
<td>(23)</td>
<td>(84)</td>
<td>(84)</td>
<td>(84)</td>
<td>(23) (76) (76) (76)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: $^c = p < .001$; Brackets contain $n$’s.
The results indicated that children's music Achievement was not significantly related to children's Competence beliefs or subjective task values. Very similar non-significant correlations were found between children’s music Achievement and Parents’ Competence beliefs and subjective task values. These results did not support the third and fourth hypotheses. The lack of significant relationships could reflect either the limitations of sample size and teacher achievement ratings mentioned earlier, an inherent difficulty in evaluating music achievement, or actual weak associations between music achievement and children’s and parents’ beliefs and values.

The larger sample sizes for the correlations between instrumental music Competence beliefs and subjective task values provided the expected relationships. Children and parents’ Competence beliefs were significantly related to their respective subjective task values. Interestingly, the correlations between parents’ music Competence beliefs for their child and their own subjective task values were significant, suggesting that parents who valued music highly also tended to rate their child as more musically competent. For both children’s and parents’ beliefs, there were significant correlations between each of the three subjective task values for instrumental music.

The next analyses calculated separate regressions for children’s beliefs and parents’ beliefs on children’s sport achievement. Children’s sport achievement was the dependent variable for both regressions, and children and parents’ competence beliefs and subjective task values were the independent variables. Results for these analyses are presented in Table 8.

The Children’s Beliefs correlations for sport indicated that, even with the small sample size ($n = 26$), all four independent variables had significant positive linear relationships with children’s sport achievement. Children’s Competence beliefs were significantly correlated with each of the subjective task values and these varc, in turn, significantly related to each other. The regression for Children’s Beliefs was found to be significant, $F(4, 21) = 6.61, p < .01$, whereas the Parents’ Beliefs regression was not significant, $F(4, 20) = 2.11, p = .12$. In the children’s beliefs regression, children’s Competence beliefs for sport was the only significant unique predictor of sports achievement, predicting 12 percent of the variability. Jointly, the four independent variables predicted 44 percent of the variability in sports Achievement and together they shared in predicting 56
percent of Achievement variability. These results provided further support for the third hypothesis.

Table 8
Standard Multiple Regressions of Children and Parents' Competence Beliefs and Subjective Task Values Scores for Children's Sport Achievement

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
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<th>Beta</th>
<th>sr²</th>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Competence .73&lt;sup&gt;c&lt;/sup&gt; ....</td>
<td>R² = .56</td>
<td>1.49&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.71</td>
<td>.12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Importance .61&lt;sup&gt;c&lt;/sup&gt; .86&lt;sup&gt;c&lt;/sup&gt; ....</td>
<td>Adj.R² = .47</td>
<td>-.39</td>
<td>-.20</td>
<td>.01</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Usefulness .41&lt;sup&gt;a&lt;/sup&gt; .59&lt;sup&gt;b&lt;/sup&gt; .62&lt;sup&gt;c&lt;/sup&gt; ....</td>
<td>R = .75&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-.03</td>
<td>-.02</td>
<td>.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Interest .64&lt;sup&gt;c&lt;/sup&gt; .76&lt;sup&gt;c&lt;/sup&gt; .79&lt;sup&gt;c&lt;/sup&gt;.49&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td>.55</td>
<td>.26</td>
<td>.02</td>
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</tr>
</tbody>
</table>

Intercept = 0.42

| Variables                  |   |   |   |   |     |      |     |
|----------------------------|   |   |   |   |     |      |     |
| Parents' Beliefs (N = 25)  |   |   |   |   |     |      |     |
| 1. Achievement (DV) ....   |   |   |   |   |     |      |     |
| 2. Competence .46<sup>a</sup> .... | R² = .30 | .39<sup>a</sup> | .73 | .25 |
| 3. Importance .09 .64<sup>c</sup> .... | Adj.R² = .16 | -1.33 | -.44 | .05 |
| 4. Usefulness .19 .70<sup>e</sup> .81<sup>e</sup> .... | R = .55 | -.06 | -.00 | .00 |
| 5. Interest .00 .20 .58<sup>b</sup>.38<sup>a</sup> |     | .25 | .11 | .01 |

Intercept = 12.11<sup>a</sup>

Note: <sup>a</sup> = p < .05; <sup>b</sup> = p < .01; <sup>c</sup> = p < .001

For Parents' Beliefs about sport the only significant correlation with children's Achievement was parents' Competence beliefs. Parents' competence beliefs, on the other hand, shared significant positive relationships with Importance and Usefulness but not with Interest. The three subjective task values were again significantly related to each other. While the regression was not significant, parents' Competence beliefs did provide a significant unique contribution to the prediction of children's sports achievement, explaining 25 percent of the variability. Overall, these results supported the fourth hypothesis.
3.1.4. Relationships Between Children's and Parents' Beliefs of Competence, Importance, Usefulness and Interest

The last expectancy-value prediction to be investigated was that children's and parents' beliefs about children's competence, and the importance, usefulness and interest values of each subject area would be related (hypothesis 5). Correlations were performed between children's and parents' Competence beliefs and each of the three subjective task values for each subject area. The results are presented in Table 9.

Table 9
Correlations Between Children's and Parents' Expectancy-value Theory-related Beliefs by Subject Area

<table>
<thead>
<tr>
<th>Beliefs</th>
<th>Maths</th>
<th>Reading</th>
<th>Music</th>
<th>Sport</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competence</td>
<td>.51&lt;sup&gt;c&lt;/sup&gt;</td>
<td>.46&lt;sup&gt;c&lt;/sup&gt;</td>
<td>.62&lt;sup&gt;c&lt;/sup&gt;</td>
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<td>.13</td>
</tr>
<tr>
<td>Interest</td>
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<td>.11</td>
<td>.04</td>
<td>-.03</td>
</tr>
</tbody>
</table>

*Note: N = 76; <sup>a</sup>p < .05; <sup>c</sup>p < .001*

There were significant moderate positive correlations between children's and parents' Competence beliefs in each subject area. These results supported part of the fifth hypothesis and are consistent with the findings of Wigfield et al. (1997). For the exploratory investigation of subjective task values (Importance, Usefulness and Interest), the only significant correlation was a weak positive relationship between children's and parent's evaluation of the importance of instrumental music. All other correlations were not significantly different to zero. Because only five of the 16 correlations were significant, the results provided only partial support for hypothesis five and suggest that, while children and parents tended to agree on children's competence in the four subject areas, children's subjective task values tend to remain independent of their parents' values.

3.1.5. Self-Concept (SDQ)

The next analyses tested the hypotheses relating to the relationships between children's self-concept, competence beliefs and achievement in the four subject
areas (hypotheses 6 and 7). The SDQ scales employed were for maths (SDQ-maths), reading (SDQ-read), and physical abilities (SDQ-sport), as well as the newly created music scale (SDQ-music). The SDQ general school scale (SDQ-school) was also included as an overall measure of children’s school-related competence beliefs. The eight items measuring each SDQ scale were summed (range = 8 - 40) and means and standard deviations calculated. The results are presented in Table 10.

Table 10
Children's Self-concept Means and Standard Deviations for SDQ Scales in Each Subject Area and General School

<table>
<thead>
<tr>
<th></th>
<th>SDQ-Maths</th>
<th>SDQ-Read</th>
<th>SDQ-Music</th>
<th>SDQ-Sport</th>
<th>SDQ-School</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>29.71</td>
<td>31.25</td>
<td>24.37</td>
<td>32.57</td>
<td>29.08</td>
</tr>
<tr>
<td>SD</td>
<td>7.46</td>
<td>7.76</td>
<td>9.21</td>
<td>6.21</td>
<td>5.99</td>
</tr>
</tbody>
</table>

N = 84

The means for the SDQ-maths, reading, sport and school scales are within one scale-point of the means reported by Marsh (1990) in his normative sample of 3,562 Australian children. The mean for the exploratory SDQ-music scale was at least four scale-points lower than any of the other reported SDQ scale means and the larger standard deviation for music suggests that there was more variability in children’s responses to the items in this new scale.

It was predicted that children’s self-concept in each subject area, general school self-concept and competence beliefs would be significantly related to achievement in that subject (hypothesis 6). To investigate these relationships, correlations and a standard multiple regression were performed for each subject area. Children’s Achievement ratings were used as the dependent variable in each regression and the SDQ subject-specific scale, SDQ-school scale and children’s Competence beliefs were employed as independent variables. To support hypothesis six it was expected that there would be significant correlations between the SDQ scales and both Achievement and Competence beliefs, relationships being stronger for the subject-specific SDQ scale than the SDQ-school scale. The regressions were expected to be significant, with a large
percentage of Achievement prediction shared between the three independent variables. The results for maths and reading are presented in Table 11, and the results for music and sport are shown in Table 12.

Table 11
Standard Multiple Regression of Children’s Competence Beliefs and SDQ-scales for Maths and Reading Achievement

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>B</th>
<th>Beta</th>
<th>$r^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maths ($N = 50$)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Achievement (DV) ....</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.90</td>
<td>.45</td>
<td>.08</td>
</tr>
<tr>
<td>2. Competence</td>
<td>.60$^c$</td>
<td></td>
<td></td>
<td></td>
<td>R$^2$ = .47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. SDQ-maths</td>
<td>.61$^c$</td>
<td>.71$^c$</td>
<td></td>
<td></td>
<td>Adj.R$^2$ = .43</td>
<td>.04</td>
<td>.10</td>
</tr>
<tr>
<td>4. SDQ-school</td>
<td>.48$^c$</td>
<td>.29$^a$</td>
<td>.69$^c$</td>
<td></td>
<td>R   = .68$^c$</td>
<td>.15</td>
<td>.29</td>
</tr>
<tr>
<td>Intercept</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Reading ($N = 50$)

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>B</th>
<th>Beta</th>
<th>$r^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Achievement (DV) ....</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.36$^b$</td>
<td>.48</td>
<td>.11</td>
</tr>
<tr>
<td>2. Competence</td>
<td>.57$^c$</td>
<td></td>
<td></td>
<td></td>
<td>R$^2$ = .36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. SDQ-reading</td>
<td>.46$^c$</td>
<td>.72$^c$</td>
<td></td>
<td></td>
<td>Adj.R$^2$ = .32</td>
<td>-.05</td>
<td>-.01</td>
</tr>
<tr>
<td>4. SDQ-school</td>
<td>.42$^b$</td>
<td>.41$^b$</td>
<td>.55$^c$</td>
<td></td>
<td>R   = .60$^c$</td>
<td>.12</td>
<td>.23</td>
</tr>
<tr>
<td>Intercept</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: $^a = p < .05$; $^b = p < .01$; $^c = p < .001$

Looking at the maths correlations first, all correlations with maths Achievement were significant and in a positive direction. The results showed that children’s maths achievement and Competence beliefs were related to both the SDQ-maths and the SDQ-school scales, with the SDQ-maths scale having stronger relationships than the SDQ-school scale. The findings therefore supported the sixth hypothesis. Also, the relationship of the SDQ-maths and school scales with children’s maths achievement were towards the upper end of those found in previous research (Marsh, 1990).

The regression on maths Achievement was significant, $F (3,46) = 13.38, p < .001$, with the only significant unique predictor of maths Achievement being children’s maths Competence beliefs, which predicted eight percent of the
variability in Achievement. Jointly, the three independent variables predicted 47 percent (43 percent adjusted) of maths Achievement variability, which means that the majority of variability predicted in the regression (39 percent) was shared between the three independent variables. This result supported hypothesis seven. It is of note that the maths regression predicted seven percent more variability than was predicted by expectancy-value theory alone (see Table 5).

The correlation results for reading show that both of the SDQ scales had significant relationships with children’s reading Competence beliefs and achievement. The correlations for the SDQ-read scale with Competence beliefs and achievement were stronger than the similar relationships for the SDQ-school scale, particularly with children’s competence beliefs. The two SDQ scales shared a significant moderate relationship. By showing that the SDQ-read scale was more strongly related to children’s reading achievement and competence beliefs than the SDQ-school scale, the results supported the sixth hypothesis. The SDQ-read scale correlation with reading Achievement were, like maths, towards the upper end of findings from previous research (Marsh, 1990).

The regression result for reading achievement was significant, \( F (3, 46) = 8.69, \ p < .001 \), and, as with the previous maths regression, children’s Competence beliefs was the only significant unique predictor of Achievement. This measure predicted 11 percent of the variability in reading achievement scores and jointly the three independent variables predicted 36 percent (32 percent adjusted) of variability. Therefore, the majority of the predicted variability of children’s reading Achievement (25 percent) was shared between the three independent variables. These results lent further support to the seventh hypothesis.

The results for music (see Table 12) will be discussed next, but should again be interpreted with caution because of the small sample size and possible unreliability of some teacher achievement ratings. The results for music were puzzling. The SDQ-music scale was significantly related to children’s Competence beliefs but not with their music achievement. Conversely, the SDQ-school scale was significantly related to children’s music achievement but not their Competence beliefs. The results did not therefore support the sixth hypothesis. This was reflected in the regression on music Achievement, which was not significant, \( F (3,19) = 2.23, \ p = .12 \). The result failed to support hypothesis seven.
### Table 12
Standard Multiple Regression of Children's Competence Beliefs and SDQ-scales for Music and Sport Achievement

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>B</th>
<th>Beta</th>
<th>$\sigma^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Music (N = 23)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Achievement (DV) ....</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Competence</td>
<td>.29</td>
<td>....</td>
<td></td>
<td></td>
<td>.50</td>
<td>.34</td>
<td>.09</td>
</tr>
<tr>
<td>3. SDQ-music</td>
<td>-.17</td>
<td>.42$^a$</td>
<td>....</td>
<td></td>
<td>Adj. $R^2$ = .14</td>
<td>-.13</td>
<td>-.31</td>
</tr>
<tr>
<td>4. SDQ-school</td>
<td>.38$^a$</td>
<td>.25</td>
<td>-.01</td>
<td>....</td>
<td>$R^2$ = .51</td>
<td>.17</td>
<td>.29</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Intercept = 7.21</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **Sport (N = 26)** |     |     |     |     |     |      |            |
| 1. Achievement (DV) .... |     |     |     |     |     |      |            |
| 2. Competence | .73$^c$ | .... |     |     | 1.30 | .62 | .08       |
| 3. SDQ-sport | .68$^c$ | .90$^c$ | .... |     | Adj. $R^2$ = .49 | .05 | .07 | .00 |
| 4. SDQ-school | .38$^a$ | .34$^a$ | .37$^a$ | .... | $R^2$ = .74$^c$ | .12 | .14 | .02 |
|                |     |     |     |     | Intercept = - 2.14 |      |            |

Note: $^a = p < .05; ^b = p < .01; ^c = p < .001$

For sport (see Table 12), the variables were all significantly positively correlated. Because the correlations of the SDQ-sport scale with children's sport achievement and Competence beliefs were greater than the similar relationships for the SDQ-school scale, these results fully support hypothesis six. The regression on sport Achievement was significant, $F (3,22) = 8.97$, $p < .001$. There were no significant unique predictors of children's sport achievement. Together, the three independent variables shared in predicting 55 percent (49 percent adjusted) of the variability in children's sport achievement. This pattern of results provide further support for the seventh hypothesis.

### 3.2. Implicit Theories of Intelligence

#### 3.2.1 Gender Differences

To evaluate gender differences in children's general implicit theory of intelligence, the three ITI items were summed and means calculated by gender. T-tests were then performed. The female participants had a slightly higher mean
(M = 4.25, SD = 2.55) than males (M = 3.84, SD = 2.97), however the difference was not significant (t = .68, df = 82, p = .50). Investigation of subject-specific ITI mean scores (ITI-maths, ITI-reading, ITI-music, ITI-sport) revealed a similar pattern of non-significant differences for female and male mean scores. These results supported hypothesis eight. Further analyses of the ITI results combined female and male responses.

3.2.2. Relationships Between ITI General and Subject-Specific Scales (Children and Parents) and Achievement

In order to test the prediction that children’s subject-specific ITI scores would be related to their general theory of intelligence (ITI) (hypothesis 9), correlations (Pearson’s r) were performed between the means for the general ITI scale (general) and each of the subject-specific ITI scales respectively (maths, reading, music and sport). The means, standard deviations and correlations for children’s scores on the ITI-general and subject-specific scales are shown in Table 13.

Table 13
Mean Scores and Correlations of Children’s General ITI Scale with Each Subject-specific ITI Scale

<table>
<thead>
<tr>
<th>Scale</th>
<th>M</th>
<th>SD</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ITI</td>
<td>4.03</td>
<td>2.77</td>
<td></td>
</tr>
<tr>
<td>2. ITI-maths</td>
<td>4.26</td>
<td>3.04</td>
<td>.52*</td>
</tr>
<tr>
<td>3. ITI-reading</td>
<td>4.49</td>
<td>3.13</td>
<td>.56*</td>
</tr>
<tr>
<td>4. ITI-music</td>
<td>4.52</td>
<td>3.36</td>
<td>.45*</td>
</tr>
<tr>
<td>5. ITI-sport</td>
<td>4.10</td>
<td>3.73</td>
<td>.59*</td>
</tr>
</tbody>
</table>

N = 84  Note: *p < .001

It can be seen that the means were similar for all the ITI scales, ranging between 4.03 and 4.52. In support of the prediction there were significant positive linear relationships between the general ITI scale and each of the subject-specific ITI scales. These findings supported hypothesis nine.

To test hypotheses 10 and 11, which suggested that children’s achievement in each subject area would be predicted respectively by children’s and parents’
achievement beliefs (ITI), two multiple regressions were calculated for each subject area. In the first regression for each subject area, Achievement was used as the dependent variable and children's general ITI and subject-specific ITI were used as independent variables. The second regression involved the same dependent variable but with parents' general ITI and subject-specific ITI as independent variables. Correlation results provided in the second regression (parents’ ITI beliefs) were also used to test hypothesis 12, that parents' general theory of intelligence would be related to each of their subject-specific achievement beliefs.

The results for both maths and reading showed that there were no significant correlations between children's achievement scores and either their general or subject-specific ITI scores. Similarly, the regression of children's ITI beliefs on maths and reading achievement were not significant (children’s maths beliefs, $F (2, 47) = 1.37, p = .26$; children’s reading beliefs $F (2, 47) = 0.19, p = .83$). The maths and reading correlations between parents’ achievement-related beliefs and children’s achievement were also non-significant. Again, this was reflected in non-significant regressions for parents’ ITI scores on children’s maths achievement, $F (2, 41) = 0.40, p = .68$, and reading achievement, $F (2, 41) = 0.04, p = .96$. The results did not support hypotheses 10 and 11 in the subjects of maths and reading.

However, parents’ ITI and ITI-maths scales were found to be significantly related, Pearson’s $r = .51, p < .001$, as were parents’ ITI and ITI-reading scales, Pearson’s $r = .51, p < .001$. These results suggest that parent’s general and subject-specific achievement beliefs were related and, therefore, supported hypothesis 12.

For music, the regression was anticipated to be problematic because of the small number of children for whom achievement ratings were obtained. However, the regression for children’s achievement beliefs was found to be significant, $F (2, 20) = 3.82, p < .05$. In contrast, the regression for parents’ achievement-related beliefs was not, $F (2, 19) = 0.40, p = .67$. The results for the children’s achievement-related beliefs regression on music achievement are presented in Table 14.

The correlation results for children’s ITI beliefs show that music Achievement had a significant negative relationship with the ITI-music scale. Because all the
ITI items were worded in an entity direction, this negative relationship can be interpreted as meaning that children who theorised that music ability was incremental tended to achieve at a higher level. The ITI-music scale was the only unique predictor, predicting 26 percent of the variability in children's music achievement scores. Jointly, the two independent variables predicted 28 percent of the variability in music achievement. These results provided some support for the tenth hypothesis.

Table 14
Standard Multiple Regressions of Children’s ITI Music Achievement Beliefs on Music Achievement

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>B</th>
<th>Beta</th>
<th>( r^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children’s Beliefs (N = 23)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Achievement (DV)</td>
<td>....</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. ITI</td>
<td>-.14</td>
<td>....</td>
<td>Adj.( R^2 = .20 )</td>
<td>.09</td>
<td>.09</td>
<td>.01</td>
</tr>
<tr>
<td>3. ITI-music</td>
<td>-.52(^b)</td>
<td>.41(^a)</td>
<td>....</td>
<td>R = .53(^a)</td>
<td>-.51(^b)</td>
<td>-.56</td>
</tr>
<tr>
<td>Intercept = 13.63(^c)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) = p < .05; \(^b\) = p < .01; \(^c\) = p < .001

Parents' general and subject specific ITI beliefs about achievement were not found to be significantly correlated with children's music achievement. This result did not support hypothesis 11. However, there was a significant correlation between parents' ITI and ITI-music scales, Pearson's \( r = .39, p < .05 \), providing further support for the twelfth hypothesis.

The regression results for sport followed a similar pattern to that found for music. The regression of children's sport achievement-related beliefs on sport achievement was significant, \( F (2,23) = 4.09, p < .05 \). The results are presented in Table 15.

As with music, the sport results show a significant negative correlation between children's sport achievement and the ITI-sport scale, but not between sport achievement and the general ITI scale. Children's ITI-sport scale provided the only significant unique contribution to the prediction of sport achievement. The ITI-sport scale predicted 26 percent of the variability in sport achievement.
the same percentage as the joint prediction. Children with a more incremental view of sport achievement thus tended to achieve at a higher level than other children, although children’s general intelligence theory was not associated with different achievement levels. These results were supportive of hypothesis 10.

Table 15
Standard Multiple Regression of Children’s ITI Achievement Beliefs for Sport Achievement

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>B</th>
<th>Beta</th>
<th>sr²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children’s Beliefs (N = 26)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Achievement (DV)</td>
<td>....</td>
<td></td>
<td></td>
<td>R²  = .26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. ITI</td>
<td>.05</td>
<td>....</td>
<td>Adj.R² = .20</td>
<td>.57</td>
<td>.37</td>
<td>.10</td>
</tr>
<tr>
<td>3. ITI-sport</td>
<td>-.41ᵃ</td>
<td>.53ᵇ</td>
<td>....</td>
<td>R = .51ᵃ</td>
<td>-.76ᵇ</td>
<td>-.60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Intercept = 14.37ᶜ</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ᵃ = p < .05;ᵇ = p < .01;ᶜ = p < .001

Parents’ achievement-related beliefs were not found to be significantly correlated with children’s sport achievement, and the parents’ achievement beliefs regression on children’s sport Achievement was not significant, F (2,22) = 0.55, p = .59. Neither parent ITI scale provided a significant unique prediction of children’s sport achievement. However, there was a significant positive relationship between parents’ ITI and ITI-sport scales providing further support for hypothesis 12.

3.3. Flow Experience

There were three aspects of the flow experience investigated in this study. The first was children’s perceptions of classroom experience in terms of the usual level of challenge experienced during lessons in each subject (Challenge) and their perceived level of subject-specific skills during lessons (Skills). The second aspect was children’s general emotional response to classroom experience in each subject. This was measured by asking children how happy and alert they generally felt (Happy) and also their feelings regarding confusion during lessons (Clear). The confusion item was reverse-scored. The third aspect was children’s
perceptions of their relationship with parents. The analyses first tested the prediction that there would be subject area and gender differences in the first two aspects of flow theory (classroom experience and classroom emotion).

3.3.1. Perceptions of Classroom Experience

Separate means and standard deviations were calculated in each subject area for children's perceptions of classroom Challenge and Skills according to gender. These results are presented in Table 16. The results indicate that for each subject area, children of both genders had higher means for Skills than for Challenge. This suggests that children, on average, perceived their skills to be greater than the challenge of lessons in each subject. It is also of note that for maths, reading and music, the gender with the lowest Challenge mean also had the highest Skills mean.

Table 16
Mean Perceptions of Classroom Experience (Challenge and Skills) by Subject Area and Gender

<table>
<thead>
<tr>
<th>Subject area</th>
<th>n</th>
<th>Challenge</th>
<th></th>
<th>Skills</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Maths</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>5.20</td>
<td>2.22</td>
<td>7.35</td>
<td>1.98</td>
</tr>
<tr>
<td>Male</td>
<td>43</td>
<td>4.58</td>
<td>2.83</td>
<td>7.84</td>
<td>1.95</td>
</tr>
<tr>
<td>Reading</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>2.88</td>
<td>2.45</td>
<td>8.55</td>
<td>1.60</td>
</tr>
<tr>
<td>Male</td>
<td>43</td>
<td>3.47</td>
<td>2.59</td>
<td>8.03</td>
<td>2.04</td>
</tr>
<tr>
<td>Music</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>3.80</td>
<td>2.39</td>
<td>7.45</td>
<td>2.16</td>
</tr>
<tr>
<td>Male</td>
<td>43</td>
<td>4.31</td>
<td>2.82</td>
<td>6.02</td>
<td>3.09</td>
</tr>
<tr>
<td>Sport</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>4.05</td>
<td>2.42</td>
<td>8.43</td>
<td>1.81</td>
</tr>
<tr>
<td>Male</td>
<td>43</td>
<td>4.55</td>
<td>2.85</td>
<td>8.67</td>
<td>1.67</td>
</tr>
</tbody>
</table>

N = 83
From an examination of the means for Challenge in each subject area, it is apparent that female and male means were quite similar, varying by less than one scale point. Both genders rated reading classes as the least challenging of the four subject areas and maths as the most challenging. For Skills, both genders had similar means for each of maths, reading and sport varying by less than two-thirds of a scale point. For music however, the female Skills mean was almost one and a half scale points higher than the male mean.

To further investigate these differences in children's perceptions of classroom experience, a $2 \times 4 \times 2$ mixed model ANOVA was performed with Gender (between-subjects), Subject area (within-subjects) and perceptions of classroom experience (Perceptions; within-subjects) as the three factors. Subject area planned comparisons were also computed using maths as the comparison subject and the results are presented in Table 17.

There were significant main effects for both subject area and perceptions of classroom experience, but no main effect for gender. There was also a significant interaction between subject area and perceptions of classroom experience as well a significant three-way interaction between subject area, perceptions of classroom experience and gender. Interpretation of these significant effects becomes more meaningful through examination of the planned comparisons.

The only significant planned comparisons involving gender were the maths/reading and maths/music comparisons in the three-way interaction. While females had higher Challenge and lower Skills means than males for maths (see Table 18), the reverse was the case for reading and music. There was no gender effect for the maths/sport comparison of this three-way interaction.

The planned comparisons for the interaction of subject area and perceptions of classroom experience provided significant maths/reading and maths/sport comparisons but the maths/music comparison was not significant. Children, on average, perceived maths classes as more challenging than reading and sport but rated their reading and sport skills as higher than their maths skills. For the subject area planned comparisons, significant effects were found for the maths/reading and maths/music comparisons but not for the maths/sport comparison. Meaningful interpretation of these results is difficult because the subject area comparisons involve an averaged combination of Challenge and
Skills means reflecting children’s overall perceptions of classroom experience. This combined variable does not take into account the significant differences between Challenge and Skills discussed previously. However, there is enough evidence from these results to indicate that children’s perceptions of classroom experience differed between subject areas and between males and females. These results supported hypothesis 13 for children’s perceptions of lessons.

Table 17
ANOVA and Planned Comparisons for Perceptions of Classroom Experience (Challenge and Skills) by Subject area and Gender

<table>
<thead>
<tr>
<th>Analyses</th>
<th>F</th>
<th>df</th>
<th></th>
<th>F</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main effects</td>
<td></td>
<td></td>
<td>Interactions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subject area</td>
<td>10.29c</td>
<td>3, 79</td>
<td>Subject area by Gender</td>
<td>1.51</td>
<td>3, 79</td>
</tr>
<tr>
<td>Perceptions</td>
<td>246.72c</td>
<td>1, 81</td>
<td>Perceptions by Gender</td>
<td>1.38</td>
<td>1, 81</td>
</tr>
<tr>
<td>Gender</td>
<td>0.01</td>
<td>1, 82</td>
<td>Subject area by Perceptions</td>
<td>9.99c</td>
<td>3, 79</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Subject area by Perceptions by Gender</td>
<td>2.87a</td>
<td>3, 79</td>
</tr>
</tbody>
</table>

Planned Comparisons

<table>
<thead>
<tr>
<th>Subject area</th>
<th></th>
<th>Subject area by Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maths vs reading</td>
<td>8.58b</td>
<td>1, 81</td>
</tr>
<tr>
<td>Maths vs music</td>
<td>19.94c</td>
<td>1, 81</td>
</tr>
<tr>
<td>Maths vs sport</td>
<td>1.07</td>
<td>1, 81</td>
</tr>
<tr>
<td>Subject area by Perceptions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maths vs reading</td>
<td>23.21e</td>
<td>1, 81</td>
</tr>
<tr>
<td>Maths vs music</td>
<td>0.00</td>
<td>1, 81</td>
</tr>
<tr>
<td>Maths vs sport</td>
<td>10.35b</td>
<td>1, 81</td>
</tr>
</tbody>
</table>

N = 83 (females n = 40, males n = 43) Note: * p < .05, ** p < .01, *** p < .001. The variable “Perceptions” refers to children’s perceptions of classroom experience in terms of Challenge and Skills.

3.3.2. Emotional Response to Classroom Experience

To test for subject area and gender differences in children’s emotional response to classroom experience (hypothesis 13), means and standard deviations were first calculated according to gender and subject area for the two items measuring
children’s emotional response to classroom experience (Happy and Clear). These
are presented in Table 18.

Table 18
Mean Emotional Response to Classroom Experience (Happy and Clear) by
Subject Area and Gender

<table>
<thead>
<tr>
<th>Subject area</th>
<th>n</th>
<th>Happy M</th>
<th>SD</th>
<th>Clear M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maths</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>6.55</td>
<td>2.93</td>
<td>7.20</td>
<td>2.68</td>
</tr>
<tr>
<td>Male</td>
<td>43</td>
<td>6.60</td>
<td>2.94</td>
<td>7.35</td>
<td>3.18</td>
</tr>
<tr>
<td>Reading</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>7.88</td>
<td>2.56</td>
<td>8.80</td>
<td>1.65</td>
</tr>
<tr>
<td>Male</td>
<td>43</td>
<td>6.80</td>
<td>2.91</td>
<td>8.21</td>
<td>2.77</td>
</tr>
<tr>
<td>Music</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>6.05</td>
<td>2.98</td>
<td>6.95</td>
<td>2.80</td>
</tr>
<tr>
<td>Male</td>
<td>43</td>
<td>3.06</td>
<td>3.54</td>
<td>5.81</td>
<td>3.33</td>
</tr>
<tr>
<td>Sport</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>9.43</td>
<td>1.24</td>
<td>8.70</td>
<td>2.13</td>
</tr>
<tr>
<td>Male</td>
<td>43</td>
<td>9.12</td>
<td>2.37</td>
<td>8.40</td>
<td>3.01</td>
</tr>
</tbody>
</table>

N = 83

The Happy and Clear means for music for both genders were lower than for
any of the other subject areas, particularly in the case of males. This suggests that
children tended to report a less positive emotional response to music classes than
to lessons in the other subjects under investigation. For maths, reading and music,
children’s means for Clear were higher than the corresponding Happy means.
The reverse of this applied for sport, which was the subject area in which children
reported their highest level of happiness. For Clear, children’s means for reading
and sport were higher than for the other two subjects indicating that children
generally felt less confused during reading and sport lessons than maths and music
lessons.
To investigate the significance of these differences a three-way mixed model ANOVA was performed with the three factors being Gender (between-subjects), Subject area (within-subjects) and emotional response to classroom experience (Emotions)(within-subjects). Planned comparisons were also undertaken comparing responses for maths with each of the other three subject areas. The results are presented in Table 19.

Table 19
ANOVA and Planned Comparisons for Emotional Response to Classroom Experience (Happy and Clear) by Subject Area and Gender

<table>
<thead>
<tr>
<th>Analyses</th>
<th>F</th>
<th>df</th>
<th></th>
<th></th>
<th>F</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Main effects</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Subject area</td>
<td>35.72a</td>
<td>3, 79</td>
<td>Subject area by Gender</td>
<td>3.31a</td>
<td>3, 79</td>
<td></td>
</tr>
<tr>
<td>Emotions</td>
<td>10.75b</td>
<td>1, 81</td>
<td>Emotions by Gender</td>
<td>1.81</td>
<td>1, 81</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>7.41b</td>
<td>1, 81</td>
<td>Subject area by Emotions</td>
<td>10.28c</td>
<td>3, 79</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Interactions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planned Comparisons</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subject area</td>
<td></td>
<td></td>
<td>Subject area by Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maths vs reading</td>
<td>10.77b</td>
<td>1, 81</td>
<td>Maths vs reading</td>
<td>2.38</td>
<td>1, 81</td>
<td></td>
</tr>
<tr>
<td>Maths vs music</td>
<td>17.26c</td>
<td>1, 81</td>
<td>Maths vs music</td>
<td>9.52b</td>
<td>1, 81</td>
<td></td>
</tr>
<tr>
<td>Maths vs sport</td>
<td>50.79a</td>
<td>1, 81</td>
<td>Maths vs sport</td>
<td>0.53</td>
<td>1, 81</td>
<td></td>
</tr>
<tr>
<td>Subject area by Emotions</td>
<td></td>
<td></td>
<td>Subject area by Emotions and Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maths vs reading</td>
<td>1.30</td>
<td>1, 81</td>
<td>Maths vs reading</td>
<td>0.23</td>
<td>1, 81</td>
<td></td>
</tr>
<tr>
<td>Maths vs music</td>
<td>4.75a</td>
<td>1, 81</td>
<td>Maths vs music</td>
<td>2.88</td>
<td>1, 81</td>
<td></td>
</tr>
<tr>
<td>Maths vs sport</td>
<td>9.92b</td>
<td>1, 81</td>
<td>Maths vs sport</td>
<td>0.01</td>
<td>1, 81</td>
<td></td>
</tr>
</tbody>
</table>

N = 83 (females n = 40, males n = 43) Note: * p < .05, ** p < .01, *** p < .001. The variable “Emotions” refers to emotional response to classroom experience in terms of Happy and Clear.

The results indicated that there were significant main effects for Subject area, Emotions and Gender. There were also significant interactions between Subject area and Gender, and also between Subject area and Emotions. Examination of the planned comparisons indicates that the only significant comparison involving
Gender was for the maths/music comparison of the Subject area by gender interaction. Females and males had a different pattern of responses for Happy and Clear in music than they did in maths. While both genders had similar Happy and Clear means for maths (see Table 18), the female mean for music was higher than the corresponding male mean. That is, males had a less positive emotional response to music classes than females when compared to both genders' emotional response to maths classes.

All three planned comparisons for subject area were significant indicating that children's emotional response to classroom experience in maths was different from their emotional response to lessons in the other three subjects. The means in Table 18 indicate that children reported a generally more positive emotional experience during lessons in reading and sport than they did in maths and a less positive emotional experience than maths during music lessons. Further to this, the significant planned comparisons for the subject area by emotions interaction of maths with both music and sport indicates that children's pattern of responses for Happy and Clear differed between these subject areas. The means for Happy and Clear (see Table 18) show that, when compared to children's maths responses, the music means for Happy were considerably lower than the Clear means and the sport means for Happy were higher than the Clear means. Taken as a whole, these results provided further support for hypothesis 13 by indicating substantial subject area and gender differences in children's emotional response to classroom experience.

3.3.3. Relationship Between Flow and Achievement

To investigate the relationship between flow and achievement in each of the subject areas (hypothesis 14), children were first grouped into either non-flow or flow groups. This was done following the procedure previously employed by Turner et al. (1998). Children's scores for each aspect of perceptions of classroom experience (Challenge and Skills) were standardised for each subject area. Children scoring above zero for both Challenge and Skills were classified as experiencing lessons as high challenge and high skill environments. These participants were placed in the flow group for that subject area and all other participants were grouped as non-flow. The new grouping variable created for each subject area was labeled Flow. There was a different sample of participants
classified in the flow group for each subject area (except for five female and one male participant, who were classified in the flow group for each of the subject areas).

The two items measuring the emotional experience of lessons in each subject (Happy and Clear) were summed and means calculated for each participant, representing overall affect for each subject area. The new combination variables representing children’s emotional response to lessons in each subject area were labelled Emotion. The third flow measure under exploratory investigation was children’s perceived relationship with their parents as measured by the SDQ-parent scale. Means and standard deviations for children’s overall emotional response to classroom activity and the SDQ-parent scale in each subject area by Flow are presented in Table 20.

Table 20
Means and Standard Deviations for Children’s Emotional Response to Classroom Activity and SDQ-parent by Flow Group

<table>
<thead>
<tr>
<th>Variables</th>
<th>Non-Flow</th>
<th>Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n  M    SD</td>
<td>n  M    SD</td>
</tr>
<tr>
<td>Maths</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotion</td>
<td>58 6.43 2.39</td>
<td>25  8.08 1.77</td>
</tr>
<tr>
<td>SDQ-parent</td>
<td>58 34.41 5.05</td>
<td>25 34.80 5.77</td>
</tr>
<tr>
<td>Reading</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotion</td>
<td>72 7.89 2.08</td>
<td>11  8.01 1.89</td>
</tr>
<tr>
<td>SDQ-parent</td>
<td>72 34.46 5.26</td>
<td>11 35.00 5.33</td>
</tr>
<tr>
<td>Music</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotion</td>
<td>71 5.11 2.82</td>
<td>12  6.92 2.27</td>
</tr>
<tr>
<td>SDQ-parent</td>
<td>71 34.18 5.43</td>
<td>12 36.58 3.48</td>
</tr>
<tr>
<td>Sport</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotion</td>
<td>64 9.03 1.60</td>
<td>19  8.50 2.13</td>
</tr>
<tr>
<td>SDQ-parent</td>
<td>64 34.08 5.56</td>
<td>19 36.05 3.72</td>
</tr>
</tbody>
</table>

N = 83  Note: The SDQ-parent M varies because each flow group had a different sample of children.
The results indicate that children in the flow group had higher Emotion mean scores for maths, reading and music than children in the non-flow group, the difference being greater than one and a half scale points for maths and music. However, for sport, children in the flow group had an Emotion mean approximately half a scale point lower than the non-flow group. The parent relationship results indicated that children in the flow group had higher means in each subject area than non-flow children. The differences were approximately two scale points for music and sport and half a scale point for maths and reading.

It had been predicted that the three flow variables (Flow, Emotion and SDQ-parent) in each subject area would predict children’s achievement in that subject. Investigation of these relationships was carried out through standard multiple regressions. The regression for each subject area used children’s achievement as the dependent variable and Flow, Emotion and the SDQ-parent scale as independent variables. Once again the sample size for the music and sport regression were thought to be problematic ($n = 23$ and $26$ respectively). The results for the maths regression are presented in Table 21.

Table 21
Standard Multiple Regression of Flow, Emotion and SDQ-parent on Children’s Maths Achievement

<table>
<thead>
<tr>
<th>Variables</th>
<th>Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1. Achievement (DV)</td>
<td></td>
</tr>
<tr>
<td>2. Flow</td>
<td>.25$^a$</td>
</tr>
<tr>
<td>3. Emotion</td>
<td>.50$^c$</td>
</tr>
<tr>
<td>4. SDQ-parent</td>
<td>-.04</td>
</tr>
</tbody>
</table>

Note: $N = 49$. $^a = p < .05; ^b = p < .01; ^c = p < .001$

The correlation results for the maths regression indicate that Flow and Emotion were both significantly related to maths achievement but that the SDQ-parent scale was not. The Flow, Emotion and SDQ-parent measures were not significantly related to each other. In other words, children achieving at a higher level in maths were more likely to come from the flow group and also to report
their emotional experience during maths classes in a more positive way. However, just being in the flow group did not correspond to a better emotional experience during classes. The regression was significant, F (3,45) = 6.00, p < .01, and the Emotion scale was the only significant unique predictor of maths achievement. Jointly, Flow, Emotion and the SDQ-parent scale predicted 29 percent (24 percent adjusted) of the variability in maths achievement of which Emotion, on its own, predicted 22 percent. These results supported hypothesis 14. However, the non-significant relationships involving the SDQ-parent scale suggest that children’s perceptions of parent relationships were not adding significantly to the prediction of maths achievement.

The regression results for reading are presented in Table 22.

Table 22
Standard Multiple Regressions of Flow, Emotion and SDQ-parent on Children’s Reading Achievement

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>B</th>
<th>Beta</th>
<th>(sr^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Achievement (DV) ....</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Flow</td>
<td>.17</td>
<td>....</td>
<td></td>
<td></td>
<td>R²  = .18</td>
<td>1.86</td>
<td>.18</td>
</tr>
<tr>
<td>3. Emotion</td>
<td>.38b</td>
<td>-.03</td>
<td>....</td>
<td></td>
<td>Adj. R² = .13</td>
<td>.75b</td>
<td>.39</td>
</tr>
<tr>
<td>4. SDQ-parent</td>
<td>.06</td>
<td>-.07</td>
<td>.23</td>
<td>....</td>
<td>R = .42a</td>
<td>-.01</td>
<td>-.02</td>
</tr>
</tbody>
</table>

Intercept = 7.48a

Note: \(N = 49\). a = p < .05; b = p < .01; c = p < .001

The correlation results indicated that children’s reading achievement was significantly related to Emotion but not to Flow or the SDQ-parent scale. Flow, Emotion and the SDQ-parent scale were not significantly correlated with each other. The regression on reading achievement was significant, \(F (3,45) = 3.30, p < .05\), with Emotion as the only significant unique predictor. Emotion predicted 15 percent of the variability in children’s reading achievement and the three independent variables shared in predicting another three percent of variability. Hypothesis 14 was supported by these results which demonstrated that children’s emotional experience of reading lessons related to their achievement.
The results for the music regression are presented in Table 23. The regression of flow variables on music Achievement was not significant, $F(3,19) = 0.29, p = .83$, and there were no significant correlations or unique predictors. These results suggest that children's music achievement was not related to flow group, emotional experience during lessons or perceptions of relationships with parents and, therefore, did not support hypothesis 14. Once again, however, the small sample size should be borne in mind.

Table 23
Standard Multiple Regressions of Flow, Emotion and SDQ-parent on Children's Music Achievement

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>B</th>
<th>Beta</th>
<th>$r^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Achievement (DV)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Flow</td>
<td>.12</td>
<td></td>
<td></td>
<td></td>
<td>.04</td>
<td>.55</td>
<td>.08</td>
</tr>
<tr>
<td>3. Emotion</td>
<td>.18</td>
<td>.23</td>
<td></td>
<td></td>
<td></td>
<td>.28</td>
<td>.16</td>
</tr>
<tr>
<td>4. SDQ-parent</td>
<td>.09</td>
<td>.10</td>
<td>.11</td>
<td></td>
<td>.21</td>
<td>.03</td>
<td>.06</td>
</tr>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8.23</td>
<td></td>
</tr>
</tbody>
</table>

Note: N = 23. $^a = p < .05; \ ^b = p < .01; \ ^c = p < .001$

The results for the sport regression are presented in Table 24. The regression on children's sport achievement was not significant, $F(3,22) = 2.26, p = .11$. However, Emotion was a significant unique predictor, predicting 18 percent of the variability in children's sport achievement. The correlations indicate that children's sport achievement had a significant positive relationship with Emotion but not with Flow or the SDQ-parent scale. Flow, Emotion and the SDQ-parent scale were not found to be significantly related to each other. Considering the small sample size for this analysis, hypothesis 14 was only partially supported through the relationship between children's emotional experience of sport lessons and their sport achievement.
Table 24
Standard Multiple Regression of Flow, Emotion and SDQ-parent on Children’s Sport Achievement

<table>
<thead>
<tr>
<th>Correlations</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>B</th>
<th>Beta</th>
<th>( r^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variables</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Achievement (DV)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Flow</td>
<td>.12</td>
<td>....</td>
<td></td>
<td>R(^2) = .24</td>
<td>.23</td>
<td>.02</td>
<td>.00</td>
</tr>
<tr>
<td>3. Emotion</td>
<td>.42(^a)</td>
<td>.14</td>
<td>....</td>
<td>Adj.R(^2) = .11</td>
<td>.95(^b)</td>
<td>.43</td>
<td>.18</td>
</tr>
<tr>
<td>4. SDQ-parent</td>
<td>.15</td>
<td>.16</td>
<td>-.06</td>
<td>....</td>
<td>R = .49</td>
<td>.27</td>
<td>.24</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Intercept = -4.30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: N = 26. \(^a\) = p < .05; \(^b\) = p < .01; \(^c\) = p < .001

3.4. Cross-Theoretical Relationships to Achievement

The results reported thus far have explored relationships within each theoretical outlook and between each theory and children’s achievement in the four subject areas. This resulted in a series of unique predictors of achievement in each subject area from each theoretical outlook. To investigate the relative strength of the unique predictors from each theory further, standard multiple regressions were performed for each subject area. An exploratory hypothesis (hypothesis 15) had been proposed that more of the variance in children’s achievement in each subject area would be predicted in the cross-theoretical analyses than had previously been predicted in the single theory analyses.

3.4.1. Maths

The unique predictors of children’s maths achievement from expectancy-value theory were children’s own Competence beliefs, the subjective task value of Importance and parents’ competence beliefs about their child (Parent Competence). The ITI theory items did not provide any significant predictors of children’s maths achievement and the one unique predictor from Flow theory was children’s emotional response to classroom activity (Emotion). These four independent variables (Competence, Importance, Parent Competence, and Emotion) were used in a standard multiple regression on children’s maths achievement and the results are presented in Table 25.
Table 25
Standard Multiple Regression of Unique Predictors of Children’s Maths Achievement

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>B</th>
<th>Beta</th>
<th>( r^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Achievement (DV)</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>.42</td>
<td>.22</td>
<td>.03</td>
</tr>
<tr>
<td>2. Competence</td>
<td>.64(^c)</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>R(^2) = .66</td>
<td>.41(^b)</td>
<td>.25</td>
</tr>
<tr>
<td>3. Importance</td>
<td>.51(^c)</td>
<td>.47(^b)</td>
<td>...</td>
<td>...</td>
<td>Adj. R(^2) = .62</td>
<td>.28(^c)</td>
<td>.51</td>
</tr>
<tr>
<td>4. Parent Competence</td>
<td>.72(^a)</td>
<td>.55(^e)</td>
<td>.23(^a)</td>
<td>...</td>
<td>R (\approx) .81(^e)</td>
<td>.06</td>
<td>.04</td>
</tr>
<tr>
<td>5. Emotion</td>
<td>.48(^b)</td>
<td>.34(^b)</td>
<td>.44(^b)</td>
<td>.48(^b)</td>
<td>Intercept = -.45</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) = p < .05;  \(^b\) = p < .01;  \(^c\) = p \leq .001;  N = 43

The results indicate that all correlations were significant and that Parents’ Competence beliefs about their child had the strongest correlation with children’s maths achievement. The regression was significant, F (4,38) = 18.08, p < .001. The significant unique predictors of maths achievement were the subjective task value of Importance and Parent Competence beliefs. The Importance children placed on maths achievement uniquely predicted four percent of the variability in maths Achievement and Parent Competence beliefs about their child uniquely predicted 16 percent of maths achievement variability. Jointly, the four independent variables predicted 66 percent (62 percent adjusted) of the variability in children’s maths achievement with the shared component of predicted variability being 46 percent.

Because the cross-theoretical regression predicted more of the variability in children’s maths achievement than either theory alone (expectancy-value theory was the most predictive with 52 percent of the variability explained in the parents’ beliefs regression, see Table 5), these results supported hypothesis 15. It was surprising that children’s own maths competence beliefs were not uniquely predictive of their achievement, given the strong correlation between the two measures. However, children’s competence beliefs may have been explaining the same variability in maths achievement as was explained by the Importance and Parent Competence measures.
3.4.2. Reading

Three significant unique predictors of children’s reading achievement were identified in the earlier analyses, two from expectancy-value theory and one from flow theory. The predictors were children’s reading competence beliefs (Competence), parents’ beliefs about their child’s reading competence (Parent Competence) and children’s emotional response to classroom experience (Emotion). There were no unique predictors from ITI theory. The three unique measures were employed as independent variables in a regression on children’s reading achievement. The regression results are presented in Table 26.

Table 26
Standard Multiple Regressions of Unique Predictors of Children’s Reading Achievement

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>B</th>
<th>Beta</th>
<th>( r^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Achievement (DV)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Competence</td>
<td>.44&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td>.48</td>
<td>.17</td>
<td>.01</td>
</tr>
<tr>
<td>3. Parent Competence</td>
<td>.51&lt;sup&gt;c&lt;/sup&gt;</td>
<td>.66&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
<td></td>
<td>.17</td>
<td>.37</td>
<td>.07</td>
</tr>
<tr>
<td>4. Emotion</td>
<td>.34&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.57&lt;sup&gt;c&lt;/sup&gt;</td>
<td>.53&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
<td>.06</td>
<td>.04</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Intercept = 5.56</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: \( N = 43. \) \( ^a = p < .05; ^b = p < .01; ^c = p < .001 \)

All of the correlations were significant, as was the regression, \( F (3,39) = 5.09, p < .01 \). There were no significant unique predictors of children’s reading achievement and the three independent variables shared in predicting 28 percent (23 percent adjusted) of the variability in children’s reading achievement. This result was above the 18 percent of reading achievement predicted by flow theory (see Table 21), but well below the 36 percent predicted by the SDQ and children’s competence beliefs (see Table 11). It was also below the 34 percent predicted by both children’s and parents’ beliefs in the expectancy-value theory regressions (see Table 6). Therefore, these results did not support hypothesis 15.
3.4.3. Music

From the previous analyses of children's music achievement, the only significant unique predictor of children's music achievement had been the ITI-music scale, thus making investigation of hypothesis 15 impossible in this subject area. As mentioned earlier, the small number of music teacher responses and the lack of valid teacher ratings for some of the students could have compromised these analyses. In order to investigate cross-theoretical relationships at some level, an exploratory regression analysis was carried out using parents' beliefs about the instrumental music competence of their child as the dependent variable (Parent). This variable was chosen because it reflects an external assessment of children's current and future performance capability. Also, in the previous analyses for maths and reading this was the variable most strongly correlated with teacher Achievement ratings. Independent variables were chosen from each theoretical orientation based on the significant predictors found for maths and reading. From expectancy-value theory, children's Competence beliefs and the Importance placed on music achievement were employed as well as the SDQ-music scale. From flow theory, the Emotion scale was used because it had been a significant predictor of both maths and reading achievement. Children's ITI-music scale was also employed because of its significant correlation with music achievement. Results for the regression are presented in Table 27.

The correlation results were all significant except for those involving the ITI-music scale. The regression was also significant, $F(5,69) = 10.01$, $p < .001$. Competence, Importance and the SDQ-music scale each uniquely predicted some of the variability in parent's music competence beliefs (Parent) about their child. Children's own music Competence beliefs predicted 19 percent of the variability while Importance and the SDQ-music scale each uniquely predicted four percent. The five independent variables jointly predicted 42 percent (38 percent adjusted) of the variability in parent's music Competence beliefs and shared in predicting 15 percent of the variability.

While these results did not provide any direct support for hypothesis 15, there was an indication from the correlations that children who believed themselves more competent at music also had a more positive music self-concept, placed greater importance on music achievement and had a more positive emotional experience of lessons. These children were also likely to be rated by their parents
as significantly more competent in music. Future research would need to investigate whether similar results would occur with a larger sample of children.

Table 27
Standard Multiple Regression of Cross-theoretical Variables on Parents’ Music Competence Beliefs About Their Child

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>B</th>
<th>Beta</th>
<th>r²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Parent (DV)</td>
<td>.59c</td>
<td>.42</td>
<td></td>
<td></td>
<td></td>
<td>2.44</td>
<td>.64</td>
<td>.19</td>
</tr>
<tr>
<td>2. Competence</td>
<td>.27b</td>
<td>.67c</td>
<td>.38</td>
<td></td>
<td></td>
<td>-.73</td>
<td>-.29</td>
<td>.04</td>
</tr>
<tr>
<td>3. Importance</td>
<td>.47c</td>
<td>.57c</td>
<td>.65c</td>
<td></td>
<td></td>
<td>.24</td>
<td>.29</td>
<td>.04</td>
</tr>
<tr>
<td>4. SDQ music</td>
<td>.02</td>
<td>.12</td>
<td>.04</td>
<td>.08</td>
<td></td>
<td>.12</td>
<td>.06</td>
<td>.00</td>
</tr>
<tr>
<td>5. ITT-music</td>
<td>.37b</td>
<td>.59c</td>
<td>.60c</td>
<td>.69c</td>
<td>-.08</td>
<td>-.07</td>
<td>-.03</td>
<td>.00</td>
</tr>
<tr>
<td>Intercept</td>
<td>7.80b</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: N = 75. a = p < .05; b = p < .01; c = p < .001; Parent refers to parents’ beliefs about the music competence of their child.

3.4.4. Sport

During the earlier analyses the unique predictors of children’s sport achievement had been children’s own competence beliefs (Competence: expectancy-value theory), their theories about sport achievement (ITT-sport) and their emotional reaction to lesson experience (Emotion). These three measures were used as independent variables in a regression on children’s sport achievement. The results are provided in Table 28.

The results indicate that all correlations were significant except for the ITT-sport/Emotion relationship. The regression was also significant, F (3,22) = 9.23, p < .001. Children’s sport Competence beliefs was the only significant unique predictor of children’s sport Achievement. Of the 56 percent (50 percent adjusted) of variability in children’s sport Achievement predicted jointly by the three independent variables, 25 percent was predicted by children’s own Competence beliefs and another 31 percent was shared between the independent variables. In the single theory analyses, the greatest prediction of sport Achievement variability was for children’s beliefs in expectancy-value theory (56 percent. See Table 8). As the current cross-theoretical regression did not predict
more of the variability in children’s sport achievement, these results did not support hypothesis 15 for sport.

Table 28

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>B</th>
<th>Beta</th>
<th>sr²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Achievement (DV)</td>
<td>....</td>
<td></td>
<td></td>
<td></td>
<td>R² = .56</td>
<td>1.32ᵇ</td>
<td>.63</td>
</tr>
<tr>
<td>2. Competence</td>
<td>.73ᵉ</td>
<td>....</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. ITI-sport</td>
<td>-.41ᵇ - .49ᵇ</td>
<td>....</td>
<td>Adj. R² = .50</td>
<td>-.03</td>
<td>-.08</td>
<td>.00</td>
<td></td>
</tr>
<tr>
<td>4. Emotion</td>
<td>.42ᵃ</td>
<td>.39ᵃ</td>
<td>-.13</td>
<td>....</td>
<td>R = .75ᶜ</td>
<td>.36</td>
<td>.17</td>
</tr>
</tbody>
</table>

Intercept = .51

ᵃ = p < .05; ᵇ = p < .01; ᶜ = p < .001; N = 26
4. Study 1 Discussion

The study demonstrated that children’s school achievement is associated with various personal beliefs (both implicit and explicit), values, perceptions and emotions. It was also shown that relationships exist between the three theoretical approaches tested, and suggests that integrating theoretical approaches may provide a more adequate explanation of children’s achievement motivation than single theory analyses. The study identified gender, subject area and parents’ beliefs as key factors in the prediction of children’s school achievement. For maths, reading and sport, expectancy-value theory/self-concept provided the strongest prediction of children’s achievement followed by flow theory, perhaps reflecting the development of the former theory to predict achievement and the later to primarily predict continued involvement and interest. Children’s implicit theory of intelligence and subject-specific achievement beliefs were associated with their achievement in instrumental music and sport, but not in maths and reading. However, the significant ITI results for instrumental music and sport may be misleading due to limited achievement data being available and questionable reliability for some of the music achievement ratings. To lend coherence to the discussion of the results, the interpretation will focus first on each theoretical approach separately and then on the cross-theoretical findings.

4.1. Expectancy-Value Theory and Self-Concept

4.1.1. Children’s Expectancy-Value Theory Beliefs

In viewing the overall findings for children’s competence beliefs and subjective task values, there appear to be several important elements. There was support for expectancy-value theory across each of the subject areas. The theory, as originally proposed by Eccles et al. (1983), was supported in each subject area with consistent relationships between how competent children felt in each subject area and their subjective task values for that subject, as well as between the three subjective task values. There were also subject area and gender differences, some of which supported previous research by Wigfield et al. (1997).

Children’s competence beliefs about their ability in instrumental music and their subjective valuation of that subject were lower than their beliefs and values for the other three subject areas (except that females had similarly low interest in maths). This pattern of results extends Wigfield et al.s (1997) American findings
to Australian children enrolled at schools with strong reputations for their music programs. All of the child participants had been involved in instrumental music lessons either at the time of the study or at some prior stage. Therefore, it seems that, regardless of the level of involvement with instrumental music lessons, children may tend to devalue instrumental music relative to other subject areas. In support of previous research (Wigfield et al., 1997), children believed themselves to be more competent at sport than the other subject areas and also expressed higher subjective task values, particularly interest, for sport.

Gender differences in children’s expectancy-value theory beliefs provided some support to the findings in Wigfield et al.’s (1997) American study. Females tended to have higher competence beliefs and subjective task values than males for reading and instrumental music. However, in contrast to the Wigfield et al. (1997) findings, females and males were found to have generally similar competence beliefs and subjective task values for maths and sport, suggesting that previous results favouring males in these subjects may not be universal. Australian female students may be experiencing primary school in a more positive light overall than males that provides them more positive school experiences than their male peers. Whether this pattern applies equally to other school subject areas and/or represents an invariant result for Australian grade four students is worthy of further investigation. If the pattern of beliefs is typical, the extent of any changes over time is also worth future investigation as it may indicate that educational changes would be necessary for the improvement of the school experience of male students.

4.1.2. Expectancy-Value Theory and Achievement

The relationship of children’s competence beliefs and subjective task values with achievement in three of the subject areas generally followed the predictions based on previous research (Wigfield et al., 1997). For maths, reading and sport, children’s competence beliefs and subjective task values significantly predicted their achievement in these subjects, with a large proportion of the predicted variance shared between the expectancy-value theory factors. The exception in these results was for instrumental music where children’s beliefs and values were not associated with achievement. However, as previously mentioned, lack of reliable achievement data could have impacted on this result.
A large percentage of the variance in children’s achievement for maths, reading and sport, was predicted jointly by children’s competence beliefs and subjective task values. This suggests that children’s competence beliefs and subjective task values for maths, reading and sport tended to be measuring, in large part, similar variance in children’s achievement. Unique predictors were also found for these subjects. For reading and sport, children’s competence beliefs provided some singular prediction of achievement, indicating that knowing how competent children believed themselves to be provided a unique prediction of their achievement. For children’s maths achievement, their competence beliefs and the importance placed on maths achievement both contributed uniquely to the prediction.

In support of expectancy-value theory (Eccles et al., 1983), the general trend in these findings for maths, reading and sport was for children who believed themselves to be more competent at a subject and also valued that subject more highly to also be achieving at a higher level. It also seems that while children’s competence beliefs tend to be more highly related to achievement than children’s subjective task values, competence beliefs and subjective task values appear to measure much of the same variance in children’s achievement. For maths achievement, it is possible that the importance children place in that subject may also be an important predictor of achievement in its own right. In contrast, the findings for music indicated that children’s competence beliefs and subjective task values for music were not related to achievement, although there were reasons to suspect the validity of these findings.

4.1.3. Parents’ Competence Beliefs and Values

Parents’ beliefs about the competence of their child in maths, reading and sport were significantly related to children’s competence beliefs and also to children’s achievement. These findings are consistent with previous research on American children (Wigfield et al., 1997), and indicate that parents’ have similar beliefs about children’s competence as do the children themselves and their teachers. However, for instrumental music, parents’ competence beliefs were similar to children’s beliefs but were not related to teacher ratings of children’s competence beliefs. While the lack of parent and teacher agreement on children’s music competence was not supportive of previous research (Wigfield, et al., 1997), this
could have again been because of the lack of reliability of the instrumental music achievement data. Investigation of this relationship with a larger sample appears warranted.

The relationship between parents’ subjective task values and children’s beliefs and achievement has not previously been investigated. The current research found that parents’ subjective task values for each of the subject areas were generally unrelated to children’s subjective task values or to children’s achievement. Indeed, of the four subject areas the only significant relationship was between parents’ interest in maths and children’s maths achievement. The sample specificity of this single significant relationship could be tested in future research.

The general non-significance of these results indicated that parents’ subjective task values for the four subject areas were not related to grade four children’s values or achievement in those subjects. This suggests that the social influence of parents’ subjective task values may have little impact on the development of children’s beliefs. Further to this, it could be argued that children in grade four tend to have developed task-specific values independent of their parents’ values. There is also a possible theoretical difference between competence beliefs and subjective task values hinted at in these results. That is, while it has been theorised that competence beliefs are developed during early childhood through social comparison processes and feedback from significant others (see Wigfield et al., 1997), the development of subjective task values may occur within children through a process quite independent of parents’ values.

4.1.4. Self-Concept

Marsh and colleagues (Marsh, et al., 1983; Marsh, et al., 1985; Marsh & Craven, 1991; Marsh, 1989, 1990), have described children’s self-concept as consisting of multiple dimensions, some of which are associated with children’s school achievement. In the current investigations of these relationships, children’s mean self-concept scores for the maths, reading, sport (SDQ-physical abilities scale) and general school SDQ-I scales were similar to the Australian norms calculated by Marsh (1990) for grade four students. For maths, reading and sport, the predicted relationships between children’s self-concept and their school achievement was obtained. That is, the subject-specific and general school
aspects of children's self-concept were related to their maths, reading and sport achievement, with the subject-specific aspect having a stronger relationship with achievement in each subject area. The findings for maths and reading therefore fully support the findings of Marsh and colleagues. In contrast, the significant relationship between children's general school self-concept and their sport achievement has not been previously been reported and would need further investigation to establish the consistency of this relationship.

The findings supported the multi-dimensional nature of children's self-concept. Children have a sense of themselves in relation to general school activity that is related to their achievement in specific subject areas. As well as this general dimension of self-concept, children also have more subject-specific dimensions that tend to be more closely aligned with their achievement in specific subject area. This suggests that the application of children's self-concept in achievement-motivation analyses would be better served using children's subject-specific self-concept rather than the more general school self-concept.

To this end, the current study extended the scope of previous studies by also examining children's music self-concept. Children's mean scores on the SDQ-music scale were lower than their mean scores on the other SDQ-I scales. This finding supported the expectancy-value theory findings of Wigfield et al. (1997), who found that children believed that they were not as competent at music as they were at maths, reading and sport. It appears likely, therefore, that not only do children have lower beliefs about their music competence but also have a generally lower music self-concept. In contrast to the other subject areas however, children's music achievement was not related to their music self-concept but was related to their general school self-concept. While these results did not support the adequacy of the SDQ-music scale as a measure of children’s music self-concept, this may have been because of the problematic music achievement data. Further investigation of this scale would appear warranted with larger samples and more reliable achievement data.

4.1.5. Children's Self-Concept, Competence Beliefs and Achievement

As predicted, children’s self-concept in maths, reading, music and sport were significantly related to their competence beliefs for the respective subject area. Importantly, the correlations between these measures for maths, reading and sport
were all strong (between $r = .71$ and .90). This provided an indication that variability in children's subject-specific self-concepts for maths, reading and sport were similar to the variability in their competence beliefs in the same subject area. The relationship between children's music self-concept and their music competence beliefs was not as strong as the other subject areas but was still significant. Given the small number of children included in the music analysis, this finding provided some support for the adequacy of the SDQ-music self-concept scale.

As predicted, the majority of the prediction of variance in children's achievement in maths, reading and sport, was shared by the three measures of children's competence beliefs, subject-specific self-concept and general school self-concept. This provided further evidence that similarities do exist between the two constructs of children's self-concept (general school and subject specific) and competence beliefs for maths, reading and sport, although there may be subject area differences in these relationships. For the academic subjects of maths and reading, a small unique contribution to the prediction of children's achievement came from their competence beliefs but not from their self-concept. This suggests that, for maths and reading, while children's competence beliefs and specific self-concept may be similar constructs, there could also be an aspect of children's competence beliefs that is more closely associated with their school achievement than is the case for their subject-specific self-concept.

4.2. Implicit Theories of Intelligence

4.2.1. Gender Differences

The study found no evidence to indicate that females and males in grade four differed in their implicit theories of intelligence. This finding lent some support to the proposed implicit nature of these beliefs (Diener & Dweck, 1978; Dweck & Elliott, 1983; Cain & Dweck, 1995), by showing that children's ITT beliefs follow different gender patterns than their reading and music competence beliefs and subjective task values. This suggests that children's intelligence theories may be independent of their other beliefs specific to school subject areas. Whether these relationships change with age is yet to be investigated.
4.2.2. General and Subject-Specific ITI Beliefs

As well as children's general theory of intelligence, there were four exploratory ITI scales investigated in the study, one referring specifically to children's achievement-related beliefs for each subject-area. When children's responses for these four exploratory scales were each compared to their response to the general ITI scale (Cain & Dweck, 1995), moderate strength relationships were evident. That is, children who believed intelligence was a fixed entity also tended to believe that maths, reading, music and sport achievement was similarly fixed, and the reverse of this for incremental theorists. However, there is an alternative reading to these findings.

Because the wording of the subject-specific ITI scale items were very similar to the general ITI scale items, one could have expected strong relationships to exist. The moderate strength found for these relationships suggests that there could be important differences for some children between their general theory of intelligence and their subject-specific theories of achievement. Further testing would be needed to establish whether it is possible for a child to hold entity beliefs about general intelligence but, at the same time, hold incremental beliefs about achievement in a specific subject area.

4.2.3. ITI Beliefs and Achievement

The relationships between children's general ITI beliefs and their achievement in the four subject areas did not support the predictions. There were no significant relationships between children's general ITI beliefs and their achievement in any of the subject areas. Children doing well in any subject area were just as likely to hold entity beliefs about intelligence as they were to hold incremental beliefs. There are at least four possibilities why this could have been the case. For example, Cain and Dweck (1995) found that children's achievement beliefs did not tend to develop a coherent pattern until grade five. The students in the current study completed the questionnaire towards the end of their grade four year and it could be that their intelligence beliefs were not sufficiently developed to relate to school achievement. Whether these findings replicate with older children, adolescents and adults is a matter for future investigation.

Another possibility is that the use of the ITI in the current study was not appropriate. Previous research has employed the ITI as a grouping variable (Cain
& Dweck, 1995), whereas the current study used the ITI as a continuous measurement scale. Although it appears unlikely, this may have had a confounding effect on the results. Third, it could be argued from the current findings that the effects found in previous ITI research, using experimentally manipulated puzzle tasks, do not generalise to children's achievement in the real world experience of school. The final possibility, as discussed in the introduction, is that children's overall beliefs about achievement (entity/incremental) may not be the same as their beliefs about achievement in specific activities. The findings of the current study on participants' subject-specific achievement beliefs bear on this possibility.

Children's subject-specific ITI beliefs were found to be related to their achievement in music and sport but not in maths and reading. The findings suggested that for music and sport, children with more malleable views of achievement in each subject area also tended to achieve at a higher level than other children. In contrast, children holding fixed and malleable views of achievement in maths and reading did not differ in their achievement level. As mentioned previously, it could be argued that children considered achievement in these two subjects, being non-academic in the traditional sense, differently from achievement in the academic subjects of maths and reading. In support of this, considering that children's general theory of intelligence (ITI) was not related to their achievement in any of the subject areas, the findings suggest that children's general achievement beliefs may have important differences to their subject-specific achievement beliefs in some subject areas. Lack of achievement data for music and sport may also have impacted these results.

Children's achievement in each of the subject areas and parents' general and subject specific theories of intelligence were not found to be related. While it had been proposed that parents who view intelligence as a malleable attribute may be more likely to stress the importance of effort to their children, this was not reflected in children's achievement in the four subject areas. It had also been argued that parents with malleable views of achievement in each of the subject areas may increase the likelihood that their children would perform better in that subject than children of parents with fixed views of achievement. These possibilities were was not supported by the findings. This suggests that parents'
beliefs about intelligence and achievement have little influence on children’s school achievement.

4.3. Flow Theory

4.3.1. Gender and Subject Area Differences

In support of the predictions, gender and subject area differences were found for children’s perceptions of classroom activity and for their emotional reaction to classroom experience. The gender differences suggest that while females and males have fairly similar experiences during maths and sport classes, females may have a better experience than males during reading and music lessons. These findings sit comfortably with the earlier findings for expectancy-value theory and self-concept, with females also believing themselves more competent at reading and music, having a more positive self-concept and also valuing these subjects more than males. However, there were also subject area differences affecting the interpretation of these results.

For all of the subject areas, children tended to rate their skills during classes far higher than they did the perceived challenge of the same lessons. This was particularly pronounced for reading classes which was rated the least challenging and, along with sport, the subject area in which children rated their personal skill level highest. This suggests a possibility that fourth grade children may consider lesson challenge and skills as opposite ends of a fulcrum. A class where personal skills are high therefore tends to be less challenging. For reading, it may be that children in fourth grade generally feel that they can read already and no longer need to learn how. Hence, reading is no longer based around new concepts, just extensions of what is already known, leading to lower perceptions of challenge and higher skills perceptions than for classes in other subjects. This possibility, while not examined specifically in this thesis, could be investigated in future research.

Children’s emotional experience of lessons were most positive for sport, while music was the subject in which children reported their least positive emotional experience, this being particularly pronounced for males. Overall, the gender and subject area differences for flow theory measures indicate that not only do children believe lessons in different subject areas vary in challenge and skills, but
they also tend to report a better emotional experience for subjects in which they believe their skills are higher.

4.3.2. Flow Theory and Achievement

It had been predicted, based on previous research (Csikszentmihalyi et al., 1993; Turner et al., 1998), that children’s achievement in each subject area would be predicted by their experience of flow (challenge/skills), emotional experience of lessons and their perceptions of parents. The predictions were supported for maths and reading achievement, but not for music and sport. The non-significant findings for music and sport may be more indicative of sample size and data reliability than actual relationships to children’s achievement in these subject areas. For the prediction of children’s maths and reading achievement, children’s emotional reaction to classes provided the only unique contribution from the flow theory constructs. However, the achievement predictions for flow theory also mask inherent weaknesses in the direct relationships between the three flow theory constructs and children’s achievement. These will be discussed separately.

Children’s self-concept of their relationship with parents was not associated directly with children’s achievement in any of the subject areas. These findings did not support those of Csikszentmihalyi et al. (1993), for talented adolescents in their area of talent. While it is difficult to draw firm conclusions why the differentiation did not apply to fourth graders’ school achievement, there were several possibilities. Perhaps preadolescent children school achievement does not require positive relationships with parents to provide a comfortable environment that fosters opportunities and encourages the development of school-related skills. In a similar vein, perhaps the inclusion of the family differentiation aspect which, combined with family integration, was found to predict continued excellence in adolescents (Csikszentmihalyi et al., 1993), would also predict achievement in fourth grade children. Alternatively, preadolescent children may require different aspects of parenting than teenagers to foster achievement at school.

A final possibility is that the focus of the current thesis, on an average sample of children, was qualitatively too different from the select group of talented adolescents studied by Csikszentmihalyi et al. (1993) to differentiate children’s achievement, over the short term, based on perceptions of their relationship with parents. For instance, it could be that preadolescent children’s achievement may
be predicted from their parent relationship self-concept if the time frame was longer (i.e., two to three years), and/or if the sample of children was limited only to those already performing at a high level in a subject area. Grade four children with positive perceptions of their relationship with parents may be developing study methods that, while not related to grade four school achievement, are continued at later ages. As children become more independent, the study habits that were developed earlier could provide a mechanism to increase the school achievement of these children beyond other children with initially less positive parent relationship perceptions. These possibilities could be investigated in future research.

While parent relationships were not predictive of children’s achievement, there was more support for the predictions from the other flow theory constructs. Flow group children for maths were found to have higher maths achievement than non-flow children, but there were no flow group differences in achievement for reading, music and sport. Therefore, only the maths result supported the hypothesised relationship between flow group and achievement that was based on the findings of Csikszentmihalyi et al. (1993). The positive flow group finding for maths, but not the other subject areas, suggests that there may be subject area differences in the relationship between children’s perceptions of lesson challenge/skills and their achievement. The maths relationship could indicate that achievement in this subject is more reliant on the match between challenge and skills perceptions than it is for the other subject areas. This could perhaps reflect the generally more structured format of maths lessons compared to lessons in reading, music or sport. For instance, maths lessons are normally a progressive approach through one or more books in which problems are ordered in difficulty and usually have a single correct answer. This structured approach provides gradual increases in problem difficulty that may diminish the challenge versus skill fulcrum mentioned earlier, meaning that even children who are doing comparatively well are still feeling challenged by the new material covered during lessons.

Children’s emotional reaction to lessons were related to their achievement in maths, reading and sport. Children who generally felt more emotionally positive about these classes also tended to achieve at a higher level. This finding extended the previous findings for talented adolescents (Csikszentmihalyi et al., 1993) to an
average preadolescent sample. While there is a causal link implied in the findings (children who feel more positive in classes in a subject area go on to perform at a higher level), it is arguable whether this is the case. It seems just as plausible that the link of emotions to future achievement may be dependent upon previous achievement in a subject. However, this could be tested through interventions designed specifically to provide positive emotional experiences during lessons for lower performing students in a subject area and evaluating any changes in their emotional reactions to classes in that subject.

While the flow theory constructs tested in the study were successful in predicting children’s achievement in maths and reading, and children’s emotional reaction to classes was positively related to maths, reading and sport achievement, there was a disturbing lack of significant relationships between flow constructs. There were no significant relationships between flow group, children’s emotional reaction to classes and children’s perceptions of their relationship with parents. Thus, further investigation is required to better understand the relationships between children’s achievement in various school subjects, their perceptions of classroom challenge and skills, and their emotional reaction to classroom experience in those subjects. How these relationships differ between subject areas, and whether these relationships change with age are further research possibilities.

4.4. Cross-Theoretical Relationships

The main aim of the study was to investigate cross-theoretical relationships in relation to children’s achievement in each of the four subject areas. Because these investigations were exploratory, the only hypothesis offered was that combinations of significant predictors found for each theoretical perspective would predict more of the variance in children’s achievement in each subject area than had been predicted by the individual theories. The music findings, based on parents’ competence beliefs rather than achievement ratings provided by teachers, were not directly related to the hypothesis but served as a point of discussion.

The findings indicated that maths was the only subject area that supported the predictions by explaining more of the variance in children’s achievement than had been explained by the single theory analyses. The integrated sport analysis predicted the same amount of variance in children’s achievement beliefs as had
been predicted by children’s expectancy-value beliefs, and the integrated reading prediction was less than had been predicted by the expectancy-value theory for both children’s and parents’ beliefs. The findings for reading and sport, while unexpected, may be understood as a consequence of excluding children’s and parents’ subjective task values that were not unique predictors in the expectancy-value regressions.

Although the hypothesis was only supported by the maths findings, there are several findings of particular interest. One common finding to all of the subject areas was that more of the prediction of variability in children’s achievement was shared between the cross-theoretical constructs than was uniquely predicted by a single construct. This implies that the integrated variables were, in large part, predicting a similar aspect of the variance in children’s achievement.

This proposition was further supported by the relationships between constructs from each theoretical perspective. For each of the subject areas, the unique predictors identified in the single theory analyses were also related to each other (the exception being children’s subject-specific ITI beliefs for music and sport). For instance, the maths findings suggest that children’s beliefs about their competence, the importance they placed on maths, their emotional reaction to classes and their parents’ beliefs about their competence were all related. Similarly, for reading there were significant relationships between children’s competence beliefs, emotional experience of lessons, and parents’ beliefs about their competence. In contrast, the findings for sport showed that children’s competence beliefs were related to their emotional experience of lessons and their sport achievement beliefs (ITI-sport), but that their emotional experience of lessons was not related to their sport achievement beliefs. For music the cross-theoretical findings indicated that there were significant relationships between children’s competence beliefs, the importance they placed on music, their music self-concept and their emotional reaction to classes. However, children’s music achievement beliefs (ITI-music) were not related to any of the other constructs.

For each subject area these findings imply that for fourth grade children, some of the expectancy-value theory and flow theory constructs are related. For sport there was a further relationship between expectancy-value theory and ITI theory constructs. This pattern of results reflect subject area differences in the cross-theoretical relationships between constructs predicting achievement (and in music,
the constructs predicting parents’ competence beliefs). The consistency of these differences will be tested with another sample in Study 2. The strong relationship between children’s competence beliefs and their emotional experience during lessons in each subject area, suggests that the dominant expectancy-value theory may benefit from incorporating an emotional dimension in modeling children’s school achievement motivation.

Because relationships between only some of the constructs from each perspective were examined in the composite analyses, the relationships between other constructs from the theories have yet to be tested. For instance, are children’s beliefs about the usefulness of reading related to their emotional experience during reading lessons. Including more constructs from each theory could also improve the predictive power of an integrated approach to account for children’s achievement in other subjects than just maths. These aspects will be examined more fully in Study 2.

While the current study provided evidence that there were relationships between some aspects of expectancy-value theory and flow theory for preadolescent children, particularly in the subjects of maths and reading, there were some problematic issues. Because the participant numbers were small, especially the low number of teacher achievement rating for sport and music, the generalisability of the findings are limited. Also, because of the low number of achievement ratings, significant gender differences found in several theoretical constructs that could not be included in the analyses predicting children’s achievement. There was also no evidence provided in the study of the stability of these beliefs over time and whether the relationships found are generalisable to other preadolescent populations. One way to further examine these relationships, both between theories and to children’s achievement, would be through structural equation modeling of the two theories identified in this study as being most predictive of children’s achievement.

5. Study 2 Introduction

The second study was designed to extend on Study1 by further investigating the two theoretical perspectives to children’s achievement motivation found to be
most explanatory of children achievement: expectancy-value theory and flow theory. ITI theory was not investigated in the second study because of the lack of substantial relationships to children's achievement found in the first study. The second study, of children in grade five, employed a longitudinal design with two periods of data collection.

The main aim was to explore the relationship between a range of children's beliefs, perceptions and emotions and children's school achievement. The subject areas investigated in the second study were maths, reading, and instrumental music. Investigation of sport was not included on practical grounds. The study was designed to develop and evaluate structural equation models of children's achievement motivation based on the existing literature and informed by results from the first study. The procedure employed was to develop exploratory models using Time 1 data and to evaluate these models with confirmatory models with Time 2 data. While the main interest was in determining satisfactory composite-theory models for each subject area, individual models for expectancy-value theory and flow theory were also evaluated.

5.1. Expectancy-Value Theory Models

Research on expectancy-value theory has identified significant relationships between children's beliefs about their competence in a domain, their subjective valuation of a domain, and their achievement in that domain (Eccles et al., 1983; Eccles et al., 1989; Wigfield et al., 1991; Wigfield et al., 1997). These series of beliefs have also been shown to have gender differences depending on the domain under investigation, although, as found in the first study, these gender differences have not always been stable.

While it is known that children's expectancy-value theory beliefs are related to each other and to parent and teacher competence beliefs, less is known about the structure and strength of these relationships and whether they change for various domains. Looking initially at children's expectancy-value related beliefs, the first study found that for maths and reading, children's achievement was uniquely predicted by children's competence beliefs and, for maths, by the importance children placed on the subject. However, there was also a large percentage of the overall achievement prediction shared between children's competence beliefs and subjective task values. These results suggest that children's competence beliefs
and subjective task values are measuring a large part of the same variability in children’s achievement with competence beliefs and, to a lesser extent, importance beliefs, being particularly significant.

However, deeper relationships between children’s competence beliefs and values are more problematic. For instance, there was some evidence in the first study that children’s competence beliefs in a domain and their self-concept in that domain were strongly related. This was attested by the strong correlations between these measures and the large percentage of shared variance in the prediction of children’s achievement for maths and reading. There is also uncertainty about the relationships between the three values components proposed in expectancy-value theory. Some studies have found that children’s subjective task values of importance and usefulness tend to factor together into a single element separate from interest (Eccles et al., 1989; Wigfield et al., 1991), while others have reported that this is not always the case (Wigfield et al., 1997).

The second study aimed to investigate the range of children’s competence beliefs and subjective task values in structural equation models for each subject area. It was proposed to start at Time 1 with a model in which children’s competence beliefs, as measured by Wigfield et al.’s (1997) competence belief items and children’s subject-specific self-concept, were designated as one factor. Children’s subjective task values, consisting of children’s importance beliefs, usefulness beliefs, and interest in the subject area, were designated as the second factor. The models would be evaluated for their goodness-of-fit to the data and appropriate modifications made in successive models. While it was not possible to make specific hypotheses, it was expected that there would be a separate factor for children’s competence beliefs, and that children’s subjective task values would provide either one, two or three factors: a single subjective task values factor consisting of importance, usefulness and interest, a two-factor solution with one factor consisting of a combination of importance and usefulness and the other factor being interest, or a three factor solution with one factor each for importance, usefulness and interest.

Based on the success of the expectancy-value theory measurement models for children’s beliefs, it was planned to use the exploratory structural models to evaluate the relationship between expectancy-value theory and children’s achievement. Additionally, it was planned to include in this model children’s
gender and parents' beliefs about their child's competence in each subject area. Females have been found to have higher competence beliefs and subjective task values than males for reading and instrumental music (Wigfield et al., 1997), while for maths the results have been less consistent. Whereas Wigfield et al. (1997) found that males had higher competence beliefs and values than females for maths, no significant gender differences were found in Study 1. Therefore, it was expected that in Study 2 there would be significant gender differences for reading and instrumental music, females having significantly higher competence beliefs and subjective task values than males. No firm predictions were made about gender differences for maths.

Children's competence beliefs in a domain have been found to be related to parents' beliefs. In fact, Wigfield et al. (1997) found children's competence beliefs were more closely aligned with mothers' beliefs about children's competence than with teachers' beliefs. It was proposed that the social impact of parents' competence beliefs about children in each of the subject areas should be included in the expectancy-value theory structural models through relationships with both children's competence beliefs and achievement. It was expected that both relationships would be significant.

5.2. Flow Theory Models

Flow theory (Csikszentihalyi et al., 1993) proposes that individuals experience flow when they perceive an activity to be both high in challenge and matched with high personal skills. These experiences are thought to provide positive emotional reactions that motivate individuals' further engagement in the activity. It was also proposed that family relationship characteristics are important factors in encouraging adolescents to seek out flow experiences. For instance, adolescents' continuing outstanding achievement in a domain has been found to be related to prior perceptions of challenge and skill when engaged in the domain, the emotional experience of domain activity, and relationships with parents (Csikszentihalyi et al., 1993).

Study 1 investigated these relationships with a sample of primary school children, using school achievement as the dependent measures. Significant relationships were identified for children's achievement in maths, reading and sport with their emotional response to classroom experience and, for maths, also
with their perceptions of the challenge and skill in average lessons. No relationships were found between achievement and children’s perceptions of their relationship with parents. Gender differences were evident, with females tending to report better emotional experiences during normal reading and music classes.

There has been little research into the relationships between flow theory constructs, especially with younger children. In Study 1, the parent relationship construct was not found to be related to the other measures. This was omitted from Study 2. In Study 1, children in the flow group were found to be achieving at a higher level in maths but not the other subjects, but there was a puzzling lack of relationships between flow group and children’s emotional experience during classes. Inclusion of the flow group construct in Study 2 provided an opportunity to test the consistency of the pattern of results found in Study 1. In contrast, the two measures of children’s emotional experience during normal classes investigated in Study 1, happiness and confusion, were found to be significantly related to each other and to children’s achievement. These measures were included in Study 2. It was proposed to explore the relationships between flow group, emotion and achievement further through models based on Csikszentmihalyi et al.’s (1993) theoretical outline.

The flow theory model initially proposed for investigation in each subject area was sequential. It lead from flow group, based on children’s challenge and skill perceptions, to children’s emotional experience during normal lessons, and finally from there to children’s achievement. To examine further the gender differences found in Study 1, it was proposed that gender should be allowed to co-vary with children’s emotional experience of lessons. It was also proposed that gender should initially have a predictive relationship to children’s achievement in each subject area. Theoretical modifications were considered only after investigation of the adequacy of this exploratory model for each subject area.

5.3. Composite-Theory Models

It was planned that the Time 1 exploration of composite models for each subject area would be based on combining the structural models developed for each theory. Because it was not known how the earlier single theory models would eventuate, no firm hypotheses were able to be offered. However, there were some expectations based on results from previous research and Study 1. All
of the expectancy-value theory measures have been found to be related to each other and to children's achievement in maths, reading and music. Similarly, Study 1 identified that the flow theory measure of children's emotional experience of lessons was related to their achievement in maths and reading, their competence beliefs in maths, reading and music, the importance they placed on maths and music, and their music self-concept. It therefore seemed reasonable to assume that most of the factors from expectancy-value theory would be related to children's emotional experience of lessons (flow theory).

The flow grouping measure was not found to be related to any of the expectancy-value theory constructs (except maths achievement) in Study 1, and was therefore not expected to be related in Study 2. For this reason it was proposed that if the relationship between children's perceptions of flow and their emotional experience of lessons was significant in the flow theory models, resulting in the inclusion of the flow factor in the integrated models, no further relationships would be added to this measure for the initial integrated models.

For all other factors included in the integrated models, it was determined that there were no theoretical grounds for assigning directional relationships. For instance, there was no reason to assume that children's competence beliefs would cause their emotional reaction to classes. Therefore, with the exception of the flow group to emotion path, the initial model investigation allowed for covariance paths between all of the constructs included in the model.

6. Study 2 Method

6.1. Participants

The participants for the study were 141 grade five children, one parent of each child and their school teachers in the subjects of maths, reading, and instrumental music/music. Seventy-four of the child participants were females and the other 67 were males. Their mean age was 10.09 years at the first round of data collection (Time 1), and approximately five months older at Time 2. Children were enrolled in one of seven private schools in the metropolitan areas of Melbourne and Adelaide and were thus taken to represent children from middle to upper socio-economic backgrounds. Three of the schools were coeducational, and there were two female-only schools and two male-only schools. All of the schools had reputations for strong instrumental music programs and it was expected that many
of the children would be learning a musical instrument at the time of the study. Completed questionnaires were received from 133 parents, consisting of 108 mothers and 25 fathers.

6.2. Materials

The method of data collection at Time 1 was through questionnaires. Children and parents completed the same questionnaires employed in Study 1. These were the Children's Achievement Motivation Questionnaire (Appendix A), and the Questionnaire for Parents (Appendix B). At Time 2, children and parents completed shorter versions of the Children's Achievement Motivation Questionnaire (Appendix J) and the Questionnaire for Parents (Appendix K). Shorter versions were employed to minimise the time commitment for participants. Teachers completed the Questionnaire for Teachers (Appendix C) at both Time 1 and Time 2.

The amended Time 2 Children's Achievement Motivation Questionnaire concerning expectancy-value theory had five questions measuring children's competence beliefs in each subject area (except music which had four questions), and two questions each measuring children's beliefs about the importance, usefulness and interest of each subject area. The flow theory questions for each subject area consisted of one question for each of the following: challenge of lessons; skill level during lessons; happiness and alertness during lessons, and confusion during lessons.

The 85 items of the SDQ (Marsh, 1990; with nine additional music self-concept items) were excluded at Time 2. This modification was considered appropriate since test-retest data suggests that children's self-concept remains relatively stable over time (Marsh, Smith, Barnes & Butler, 1983). For example, Marsh et al. (1983), investigated a a sample of 671 grade four to six students and found a six-month SDQ test-retest correlation mean of $r = .65$, over the total SDQ scores.

The items excluded from the Time 2 Questionnaire for Parents were those measuring parents' subjective task values and achievement beliefs (ITI general and subject-specific). These items had been shown to be unrelated to children's achievement in Study 1. The Time 2 Questionnaire for Parents thus contained 12 questions concerning parents' beliefs about the competence of their child across
the three subject areas, four questions for each subject area. Biographical information was also gathered including questions to identify parents’ marital status and relationship with the child participant, as well as questions about the child’s instrumental music involvement.

The Questionnaire for Teachers (Appendix C), contained only two questions for each subject area. These concerned children’s current competence and the expected level of their achievement during the following semester.

6.3. Procedure

Child participants were recruited through the seven schools involved in the study. The researcher initially attended during class time and provided each child with a copy of a plain language statement (Appendix M), which was also read aloud to potential participants. The children were given the opportunity to ask any questions about the conduct of the study and those that were interested in participating were requested to take home an envelope for their parents. This contained a more detailed plain language statement (Appendix N) and two consent forms to be signed by parents. One consent form was for parental participation and the other for child participation (Appendices O and P respectively). The consent forms were returned to the school in an envelope provided and were collected by the researcher.

There were two data collection periods. For children and parents, Time 1 data collection occurred during the early part of the school year, either in the first school term or early in the second term. Time 2 data collection took place towards the end of term three or early in term four, approximately five months later.

Time 1 data collection for children initially took place during school time and in class groups. A quiet room was chosen and the researcher read the first four pages of the questionnaire to the children. At the completion of these first pages the children were told that they could continue at their own pace if they preferred. The questionnaires took between 25 and 45 minutes to complete. At the completion of the questionnaire, participants were thanked for their participation and given a sealed envelope containing a Questionnaire for Parents and a reply paid envelope which they were asked to take home for their parents. The Questionnaire for Parents took approximately 20 minutes to complete.
Towards the end of the second school term teachers were given an envelope containing a plain language statement (Appendix Q), a consent form (Appendix R) the Questionnaire for Teachers (Appendix C), and a reply paid envelope. It was estimated that the questionnaires would take less than 15 minutes to complete.

Time 2 data collection followed the same procedure employed in the first data collection period except that children and parents were given the shortened versions of the questionnaires (Appendices J and K). Children’s questionnaires took from 10 to 20 minutes to complete and it was estimated that the parent questionnaires could be completed in approximately five minutes. Towards the end of term four, teachers were given an envelope containing the Questionnaire for Teachers (Appendix C) and a reply paid envelope. Again it was expected that the teacher questionnaire would take less than 15 minutes to complete.
7. Results

7.1. Data Screening

Of the original 141 child participants in the study, one subsequently withdrew from the study and a further five were not available at Time 2 data collection. These children had either left their respective schools or were away on extended holidays. This left a final sample size of 135 children.

There were 156 items in the first children’s questionnaire. For the 43 items relating to expectancy-value theory there were 12 missing responses. Examination of these missing values did not indicate any systematic pattern of missing responses and these were replaced by item means. For the 85 items of the SDQ, one child did not respond to any of the SDQ questions and another participant did not respond to seven consecutive items (the final page of SDQ items). Examination of expectancy-value results for the former child indicated scores quite close to the means and it was decided to replace this child’s missing SDQ responses with mean scores. For the latter child participant, the seven missing items were also replaced with item means. There were a further 25 apparently random missing responses, with a maximum of two for any individual SDQ item. Because each sub-scale of the SDQ comprised eight items, these missing values were replaced with item means.

For the 15 ITI items, there were nine missing responses (three for the general ITI scale and three specific for each subject area). One participant did not respond to the three general ITI items and these were replaced with item means. The other six missing values were replaced with the participant’s mean score for the other two items of the specific ITI scale.

There were two participants who failed to respond to the first page (nine items) of the 16 Flow items and another participant who did not respond to any questions on the second page (six items). Apart from these there were only a further two missing responses to the Flow questions. All of the missing responses were replaced with item means.

7.2. Model Estimation

All model estimations were conducted using AMOS and used maximum likelihood estimates calculated from covariance matrices. Unless otherwise stated, the path coefficient between each latent variable and its related measured
variable(s) was set at one so as to assign latent variables a metric. In presenting results, only the standardised parameter estimates are reported.

Structural equation modelling using AMOS provides many goodness-of-fit statistics, none of which provide a definitive test of significance. The recommended practice is to report several goodness-of-fit statistics to establish the adequacy of a model (Tabachnick & Fiddell, 1996). Eight goodness-of-fit statistics were used: the likelihood ratio chi-square ($\chi^2$), the normed chi-square ($\chi^2/df$), the Goodness-of-Fit Index (GFI), the Adjusted Goodness-of-Fit Index (AGFI), the Tucker-Lewis Index (TLI), the Comparative Fit Index (CFI), the Root Mean-square Residual (RMR), and the Root Mean-Square Error of Approximation (RMSEA). Although there are many different goodness-of-fit statistics available (Tabachnick & Fidell, 1996; Arbuckle, 1997), these eight were considered appropriate for the sample size and number of parameters in the current study. A model providing acceptable goodness-of-fit statistics for the majority of measures was taken to represent a good model for the current study.

Interpretation of the eight goodness-of-fit statistics was based on criteria recommended by Tabachnick and Fidell (1996), and Schumacker and Lomax (1996). $\chi^2$ with an associated probability greater than .05 indicates a good fitting model and this is the statistic reported most commonly in structural equation research. Tabachnick and Fidell (1996) also recommend the $\chi^2/df$ as a good secondary measure of model fit with results less than 2.0 indicating good model fit. The GFI, AGFI, TLI and CFI should be greater than 0.90 to indicate reasonable model fit and above 0.95 suggests a good fit (Schumacker & Lomax, 1996). An acceptable RMR value is less than 0.05, and values above this level, when other indicators are acceptable, suggests distribution anomalies in the data (i.e. outliers or skewness. Schumacker & Lomax, 1996). The final statistic, the RMSEA, should again be less than 0.05, although values between 0.90 and 0.95 can also indicate a satisfactory fit. RMSEA values greater than 1 may indicate over-fit in the model (Schumacker & Lomax, 1996). An IFI value greater than .9 is considered representative of a good fitting model.
7.3. Maths Time 1

7.3.1. Data Preparation and Assumptions

All variables were first screened for normality and univariate outliers. A number of extreme univariate values were detected. There were two extreme low values identified for Importance and another two for Usefulness. One participant had low values for both of these scales. Following the procedure recommended by Tabachnick and Fidell (1996), these scores were raised to one scale-point lower than the normal distribution minimum. Two extreme low values were also identified in each of the teacher achievement rating scales (Teach1 and Teach2), and were from the same participant identified with extreme values for Importance and Usefulness. These values were also raised to one scale-point lower than the minimum normal distribution for each variables. After these transformations, Importance and Usefulness were identified as having moderately weak negative skew. Moderately weak kurtosis was also present in several variables. It was decided that, for ease of interpretation, none of the variables would be transformed.

The predictor variables were then tested for multivariate normality. One multivariate outlier was identified above the cutoff criterion of $D^2 = 32.91$, $p < .001$. Data for this participant was deleted from further analyses. All subsequent analyses used 134 participants. The data then conformed to the distribution assumptions required by AMOS (Arbuckle, 1997).

7.3.2. Expectancy-value Theory Measurement Model

The analyses first evaluated the measurement model based on Wigfield et. al’s (1997) expectancy-value theory. This theory predicts a differentiation between a factor measuring children’s competence beliefs (measured using Competence and SDQmath scales) and a factor measuring subjective task values (measured using Importance, Usefulness and Interest scales). Modification indices were requested and the initial model is presented in Figure 1.

The initial measurement model for expectancy-value theory did not adequately fit the data, $\chi^2 (4) = 55.49$, $p < .001$, $\chi^2/df = 13.87$, GFI = .87, AGFI = .52, RMR = .37, RMSEA = .31, TLI = .66, and CFI = .86. None of the goodness-of-fit statistics supported the model. For the Competence beliefs factor, the two measured variables had strong path coefficients (standardised regression weights),
but the results for the Values factor were more difficult to interpret. The path coefficients for the three Values components suggest that this factor was largely a measure of children’s interest in maths, the importance and usefulness variables having far smaller loadings. This was also borne out by the larger squared multiple correlation and smaller error variance for Interest when compared to those for Importance and Usefulness.

![Diagram](image)

**Figure 1.** Initial measurement model for expectancy-value theory for maths - Time1. Comp (children’s maths competence beliefs), SDQ-m (SDQ-maths scale), Imp (maths importance), Use (maths usefulness), Int (interest in maths).

A second measurement model was then evaluated in which interest (Int) was separated from the other subjective task values and associated with a new latent variable (Interest). To enable error variance to be calculated for the latent variable Interest, the two separate items summed to calculate the Int variable (Like1 and Like2) were used as indicators of children’s interest in maths (Interest). The second measurement model for expectancy-value theory with this amendment is presented in Figure 2.
Figure 2. Measurement model for expectancy-value theory for maths - Time1. Comp (children's maths competence beliefs), SDQ-m (SDQ-maths scale), Imp (maths importance), Use (maths usefulness), Like1 (interested in maths), Like2 (likes maths): *** $p < .001$

The model fit indices indicated that this model was closer to an accurate description of the data than the initial model, $\chi^2 (6) = 15.42, p = .02, \chi^2/df = 2.57$, GFI = .97, AGFI = .88, RMR = .15, RMSEA = .11, TLI = .95 and CFI = .98. While acceptable results were achieved for the GFI, TLI and CFI, the other results were outside of acceptable limits. The standardised factor loadings for Competence beliefs were almost identical to those in the initial model, however the loadings for the Values factor on Imp and Use were substantially higher. As expected, the new factor of Interest was strongly defined by the measured variables Like1 and Like2.

While this model was close to providing a good fit with the data, modification indices provided by AMOS suggested that the model could be significantly improved by adding a path from Values to Comp. Theoretically, the addition of this path would change the Values factor from a mixture of children’s perceptions of the importance and usefulness of maths, to also include a component of maths competence beliefs. Because Competence beliefs and Values were significantly related to each other a model including this path was examined. The final
measurement model for expectancy-value theory for maths is presented in Figure 3.

![Diagram of measurement model](image)

**Figure 3.** Final measurement model for expectancy-value theory for maths - Time1. Comp (children's maths competence beliefs), SDQ-m (SDQ-maths scale), Imp (maths importance), Use (maths usefulness), Like1 (interested in maths), Like2 (likes maths): * p < .05, ** p < .001

Model fit indices for the final measurement model for expectancy-value theory were, $\chi^2(5) = 8.35, p = .14, \chi^2/df = 1.67$, GFI = .98, AGFI = .92, RMR = .14, RMSEA = .07, TLI = .98 and CFI = .99. These figures supported the final measurement model as a satisfactory description of the data, although it should be noted that the RMSEA was just outside of a satisfactory result and the RMR was considerably above the .05 maximum required. The two unsatisfactory results could be reflecting skewness of some of the data and the small sample size. Of most interest was the make-up of the Values construct compared to the previous model. The path coefficient from Values to Comp was low but significant and adding this path in the current model led to negligible changes in the other variables measuring Values. These results supported the notion that children's subjective task values (Values) for maths were composed largely of how important achievement in maths was perceived to be and how useful they thought the subject to be, but also included a small component of how competent they perceived themselves to be at maths. The path coefficients for the variables
measuring Competence beliefs and Interest remained similar to the values achieved in the previous model. The correlational relationships between latent expectancy-value variables also remained similar.

7.3.3. Structural Model for Expectancy-Value Theory

The next analysis applied the expectancy-value theory measurement model of children's beliefs into a structural equation model predicting children's maths achievement. Gender, while not expected to be significantly related to children's maths achievement, was introduced into this model. Gender was coded as “1 = male” and “2 = female”. Correlation paths were created leading from Gender to each of Competence beliefs, Values and Interest, and directional paths were included leading from Gender and each of the expectancy-value latent variables to Achievement.

The social influence of parents' beliefs about the maths competence of children (Par) was also included. Parental beliefs were modeled as a mediating factor. A directional path was constructed from children's maths Competence beliefs to parents' competence beliefs and also from there to Achievement. By adding these paths it was anticipated that the significance of the path from parents' competence beliefs to children's maths achievement would indicate the extent to which parents' beliefs informed the prediction of children's maths achievement.

Consecutive models were calculated in which non-significant paths were removed individually, starting with directional paths to achievement and then correlations. The path coefficient with the smallest Critical ratio was removed at each step, the first being the path from Values to Achievement (Path coefficient = 0.04, Critical ratio = 0.29), followed by paths from Gender to Achievement (Path coefficient = 0.08, Critical ratio = 1.02), and Interest to Achievement (Path coefficient = -0.77, Critical ratio = -1.62). None of the estimated correlations with gender were significant and therefore gender was removed from the model (Gender and Interest, $r = -0.03$, Critical ratio = -0.32; Gender and Values, $r = .10$, Critical ratio = 1.11; Gender and Competence beliefs, $r = -0.12$, Critical ratio = -1.34). At no stage did the modification indices suggest that a previously removed path should be re-included.

Upon the removal of non-significant paths, results provided by AMOS indicated the model could be significantly improved by allowing the error
variances of children’s competence beliefs (Comp) and parents’ competence beliefs (Par) to correlate. Because these two measures consisted of similar items with slight changes in the wording to reflect their applicability to children or parents and, because comparative items were measured using the same response scales, it was deemed theoretically acceptable to assume that similar error variances would occur. The final model for expectancy-value theory for the prediction of children’s maths achievement at Time 1 is presented as Figure 4.

![Diagram](image)

**Figure 4.** Final expectancy-value theory model for maths - Time1. Comp (children’s maths competence beliefs), SDQ-m (SDQ-maths scale), Imp (maths importance), Use (maths usefulness), Like1 (interested in maths), Like2 (likes maths), Par (parent competence rating), Teach1 and Teach2 (teacher competence ratings); * p < .05; ** p < .01; ***p < .001: Numbers in italics represent estimated correlations

The goodness of fit statistics were supportive of the adequacy of the model, $\chi^2(20) = 30.68, p = .06, \chi^2/df = 1.53$, GFI = .95, AGFI = .90, RMR = .18, RMSEA = .06, TLI = 0.98 and CFI = 0.99. The RMR was the only statistic not to support the model and could be reflecting skew in some of the data and the relatively small sample size. Achievement was defined by teacher competence ratings (Teach1 and Teach2) and these loaded fairly evenly on the latent Achievement variable. Both had squared multiple correlations (reliability) greater than .90, indicating that they were reliable measures of the Achievement factor.
Overall, the final expectancy-value theory model predicted 39 percent of the variance in children’s maths achievement. Children’s Competence beliefs and parents’ competence beliefs (Par) were found to have significant paths leading to Achievement and were significantly related to each other, as were the error variances associated with each variable. It was notable that the path coefficient from Par to Achievement was larger than that from Competence beliefs to Achievement. This result suggests that parents’ beliefs about the maths competence of their children may have been more closely aligned with teacher competence ratings than were children’s own beliefs about their maths competence. While children’s maths Values and Interest were not significant predictors of maths Achievement, the significant positive correlations with each other and with children’s Competence beliefs found in the measurement model were maintained in the current model.

Overall, the structural model for maths, based on expectancy-value theory, provided many elements supportive of the findings of Wigfield et al. (1997). Children’s competence beliefs and subjective task values were related to each other and, together with parents’ competence beliefs, provided a substantial prediction of children’s maths achievement. Although no test of significance was conducted, the path coefficient from children’s Competence beliefs to parents’ competence beliefs (Par) was over twice as large as the path from children’s Competence beliefs to Achievement. This suggests that children’s maths competence beliefs were closer to parent beliefs than teacher beliefs and therefore lends some support to similar findings in the Wigfield et al. (1997) study.

7.3.4. Flow Theory

The measurement model for Flow was analysed next. Following the same procedure that was employed in the first study, children’s responses for their perceptions of the challenge in an average maths class (Chall) and their skills during classes (Skill) were both standardised. Participants scoring greater than positive one for both variables were classified as experiencing flow during maths classes. Examination of the data revealed that only one participant fitted into this category. To enable flow grouping to be used, it was decided to relax the a-priori grouping procedure and use standardised scores above zero as the classification cut-off. Children scoring zero or less for both variables were placed in the non-
flow group (coded as "1"), and those scoring more than zero for both variables were placed in the flow group (coded "2"). The new variable created was labeled as Flow. There were 23 children in the flow group. These children can be described as reporting above average levels of challenge and skill during normal maths classes.

For the emotional component of the flow experience, children's reported level of happiness during maths classes (MathHap) and level of confusion during classes (reverse scored and labeled as MathClear) were related to the latent variables Happy and Clear respectively. Because of insufficient variables to calculate a measurement model for flow (single measured variables for the latent variables Happy and Clear), a structural equation model was evaluated in which Flow group was correlated with Happy and Clear. Happy and Clear were also correlated with each other as well as being predictors of maths Achievement. Gender was also included through correlations with Happy and Clear and a directional path to Achievement.

The model, as proposed, was unidentified and some additional constraints were imposed on the latent variables Happy and Clear. So that some error variance could be associated with these variables and, following AMOS modeling advice obtained by the researcher (P. Holmes-Smith, personal communication, August 14, 2000), error variances and factor loadings were estimated for Mathhap and MathClear. The procedure employed to estimate error variance was the variance of the variable multiplied by one minus a reliability estimate. The factor loadings were estimated as the standard deviation of each variable multiplied by the square root of the reliability estimate. Because each variable was not expected to be perfectly reliable but was expected to be a good measure of the factors Happy and Clear, a reliability estimate of .8 was chosen for both variables. MathHap had a variance of 7.78 and a SD of 2.79, while MathClear had a variance of 6.95 and a SD of 2.64. These calculations provided error variances for MathHap and MathClear of 1.56 and 1.39 respectively, and factor loadings of 2.49 and 2.36. These constraints were imposed and the structural equation model for flow calculated, the results of which are presented in Figure 5.
Figure 5. Initial flow model, including gender, for maths achievement - Time 1. MathHap (happiness during maths classes), Flow (grouping variable as flow or non-flow), MathClear (confusion during maths classes - reverse scored), Gender (1 = males; 2 = females), Teach1 and Teach2 (teacher competence ratings): * p < .05; ** p < .01; *** p < .001: Numbers in italics represent estimated correlations.

The results provided support for the model as an acceptable representation of the data, $\chi^2 (5) = 3.46, p = .63$, $\chi^2$/df = 0.69, GFI = .99, AGFI = .96, RMR = .03, RMSEA = .00, TLI = 1.02 and CFI = 1.00, although the normed chi-square and TLI results suggests that the model may have been tending towards over-fit. The model accounted for 12 percent of the variance in children’s maths achievement and it is of note that many of the paths were not significant, including every path connected with gender. The latent variables Happy and Clear were the only significant predictors of children’s maths achievement and had identical path coefficients, indicating equivalent contributions to the prediction. Happy and Clear were also significantly related to each other. Flow was significantly correlated with Happy but not with Clear or gender. This suggests that children reporting perceptions of above average challenge and skills during normal maths lessons tended also to respond that their experience of classes was happier than other students, but reported similar levels of confusion.

To determine if the model could be improved the non-significant paths were removed sequentially in a series of further models, the path with the lowest critical ratio being removed at each stage. The path from gender to achievement
was removed first, followed by the correlations between gender and Happy, gender and Clear, Flow and Clear and, finally Flow and gender. The final flow model for maths achievement is presented as Figure 6.

![Flow model diagram](image)

**Figure 6.** Final flow model for maths achievement - Time1. MathHap (happiness during maths classes), Flow (grouping variable as flow or non-flow), MathClear (confusion during maths classes - reverse scored), Gender (1 = males; 2 = females), Teach1 and Teach2 (teacher competence ratings): * p < .05; ** p < .01; *** p < .001: Numbers in italics represent estimated correlations.

Goodness-of-fit statistics for the final flow model indicated that the model was a good representation of the data, $\chi^2 (5) = 3.78$, $p = .58$, $\chi^2/df = 0.76$, GFI = .99, AGFI = .97, RMR = .06, RMSEA = .00, TLI = 1.01 and CFI = 1.00. Once again, the normed chi-square and TLI results were tending towards over-fit but both statistics were slightly improved compared to the previous model. Removing the non-significant paths did not affect the prediction of children's maths achievement, 12 percent of the variance being predicted by the final model. This contrasts with the 39 percent predicted by the expectancy-value theory structural model for maths.

7.3.5. Composite Maths Model – Time 1

While the previous exploratory analyses for expectancy-value theory and flow theory had produced acceptable models, the next step was to investigate an integrated model combining the final models for each theory. The final
expectancy-value theory model for children's maths achievement had accounted for 39 percent of the variance in children's maths achievement and the final flow model had accounted for 12 percent. It was predicted that the composite model would predict more of the variance in maths achievement than either independent model. The results of the initial composite analysis, in which correlations were included for each pair of latent variables, are presented in Figure 7.

The results generally supported the adequacy of the composite model, $\chi^2 (40) = 52.86, p = .08, \chi^2/df = 1.32$, GFI = .94, AGFI = .89, RMR = .17, RMSEA = .05, TLI = 0.98 and CFI = 0.99. While the AGFI and RMR statistics were outside of adequate bounds, the AGFI was only just outside of the minimum required (.90) and the RMR may again have reflected the presence of some skewed data and a small sample size. Consistent with expectations, the composite model predicted 47 percent of the variance in children's achievement in maths, eight percent more than expectancy-value theory alone.

There were several paths to Achievement that changed substantially in the composite model from those found in the single theory models. In the final expectancy-value model (Figure 4) the paths from Competence beliefs and Par to Achievement had been .26 and .44 respectively, indicating that parents' beliefs were a better predictor than children's beliefs. However, in the current composite model the path coefficients were in the reverse order suggesting that the inclusion of the flow variables helped children's competence beliefs explain more variance in maths achievement than did parents' beliefs.

In the final flow theory model (figure 6), Happy and Clear had virtually equivalent path coefficients to Achievement (.23 and .22 respectively), whereas in the current model the path from Clear was no longer significant and the path from Happy changed to a significant negative value. These results suggest that Clear was more strongly related to expectancy-value theory variables than to children's maths achievement (particularly to Competence beliefs, estimated correlation = .42), and that Happy was involved in a suppressor situation in which its relationship with one or more of the other variables was non-linear. Examination of scatter plots of MathHap with Teach1 and Teach2 showed a tendency for some children judged as not very competent at maths by their teacher to report feeling quite happy during lessons, and for other students who were judged quite competent at maths to report little happiness during lessons. These types of non-
linear relationships may help explain the negative path coefficient from Happy to Achievement once the correlations from Happy to expectancy-value variables were taken into account.

Figure 7. Initial composite model for maths achievement - Time1. Comp (children's maths competence beliefs), SDQm (SDQ maths scale), Imp (maths importance), Use (maths usefulness), Like1 (interested in maths), Like2 (likes maths), MathHap (happiness during maths classes), Flow (grouping variable as flow = 2 and non-flow = 1), MathClear (confusion during maths classes - reverse scored), Teach1 and Teach2 (teacher competence ratings): Numbers in italics represent estimated correlations: * p < .05; ** p < .01; *** p < .001
It is also of note that several correlational paths were not significant in the composite model. The most noticeable of these was the path between Flow and Happy, a path that had been significant in the final flow model (Figure 10). This probably reflects a change in the structure of the latent Happy variable from the earlier model to account for correlations with expectancy-value variables and the negative path to Achievement. There was also a non-significant path between Clear and Values and the observed correlations for expectancy-value variables with Happy were all stronger than the corresponding correlation with Clear.

Further models were calculated in which non-significant paths were removed sequentially, commencing with the directional path between Clear and Achievement and then the correlational path between Clear and Values. The non-significant path between Flow and Happy was maintained on theoretical grounds. Upon running the model with paths omitted, modification indices suggested that the model could be substantially improved if Flow was allowed to correlate with children's Competence beliefs and this path was included in the final composite model that is presented as Figure 8.

The goodness-of-fit statistics supported the model as a good representation of the data, $\chi^2 (10) = 49.24, p = .18, \chi^2/df = 1.20, \text{GFI} = .95, \text{AGFI} = .90, \text{RMR} = .19, \text{RMSEA} = .04, \text{TLI} = .99$ and $\text{CFI} = .99$. The alterations from the initial model (Figure 7) indicated that the final model provided a better fit with slightly improved results for the chi-square probability, the normed chi-square, GFI, AGFI, TLI and RMSEA. The final model accounted for 46 percent of the variance in children's maths achievement and the strongest path to Achievement was children's own Competence beliefs. The path from Happy to Achievement was negative as in the initial model and the new correlation between Competence beliefs and Flow was significant and positive. This suggests that children in the flow group (those reporting above average levels of challenge and skills associated with maths lessons) tended to believe themselves more competent than non-flow children.
Figure 8. Final composite model for maths achievement - Time1. Comp (children's maths competence beliefs), SDQm (SDQ maths scale), Imp (maths importance), Use (maths usefulness), Like1 (interested in maths), Like2 (likes maths), MathHap (happiness during maths classes), Flow (grouping variable as flow = 2 and non-flow = 1), MathClear (confusion during maths classes - reverse scored), Teach1 and Teach2 (teacher competence ratings). Numbers in italics represent estimated correlations: * p < .05; ** p < .01; *** p < .001
7.4 Maths Time 2

7.4.1. Data preparation and Assumptions

Initial screening of the Time 2 data identified one child respondent as failing to complete any of the 11 expectancy-value items. Investigation of the correlation between Time 1 and Time 2 responses for the four expectancy-value scales indicated Pearson’s r’s between .64 and .48 (average = .56) and, because of the small sample size it was decided to replace this respondents’ missing values with their Time 1 responses. There was one other missing value for an expectancy-value item and this was replaced with the item mean. For the flow theory responses there was only one missing value and this was also replaced with the item mean.

Twenty-two parents did not respond to the Time 2 questionnaire. Because the sample size was already towards the lower limit required for analyses using AMOS these missing data were replaced by the Time 1 responses. There is some evidence to suggest that parents’ beliefs about the competence of their children in various subjects remain fairly stable over time (Wigfield et al., 1997). From the remaining Time 2 parent questionnaires there were a further 13 missing items that were replaced with item means.

Examination of the data revealed that several variables had extreme low values present. Three extreme values for Imp2 were raised to one scale point lower than the minimum for the normal distribution of this variable. Two of these participants also had extreme values for Use2 and the same procedure was employed on these results. One parent also rated their child’s maths competence extremely low and this value was similarly raised. All of the variables exhibited some degree of negative skew, ranging from weak to moderate, and positive kurtosis was present for Usefulness and both teacher ratings (Teach3 and Tcach4). However, these variables were not transformed because they appeared to be quite a reasonable approximation of the distribution in the population and interpretability of results was considered an important consideration. A test for multivariate outliers did not uncover any multivariate exceptions.
7.4.2. Expectancy-Value Theory Measurement Model

To provide some indication of the robustness of the models developed from Time 1 data, the final models developed at Time 1 were evaluated with confirmatory analyses using the Time 2 data. The first confirmatory analysis undertaken was on the final measurement model obtained for expectancy-value theory (Figure 3). This model can be viewed as Figure 9.

![Diagram](image.png)

Figure 9. Confirmatory measurement model for expectancy-value theory for maths-Time2. Comp2 (maths competence beliefs), SDQ-m (SDQ-maths scale), Imp2 (maths importance), Use2 (maths usefulness), Like3 (interested in maths), Like4 (likes maths): *p < .05; **p < .01; ***p < .001: Numbers in italics represent estimated correlations.

The results indicated that the model was a good fit, $\chi^2 (5) = 5.97, p = .31, \chi^2/df = 1.19$, GFI = .99, AGFI = .94, RMR = .11, RMSEA = .04, TLI = 0.99 and CFI = 1.00, although the RMR value was once again larger than required for a good fit. However, as a confirmatory model and bearing in mind the relatively small size of the sample, there is enough evidence to support the general existence of these three constructs in children's beliefs about maths at Time 2. These results supported the prediction. Similar to the Time 1 results the Competence beliefs factor was more strongly related to Interest than to Values, with Interest and Values sharing a moderate relationship.

When compared to the Time 1 results (figure 3), the Time 2 results for the expectancy-value measurement model speak of a similar but generally stronger
model. The most notable differences were the smaller contribution of the SDQ-m scale to Competence beliefs at Time 2, the smaller correlation between Competence beliefs and Interest ($r = .91$ at Time 1 and $r = .75$ at Time 2), and the larger correlation between Competence beliefs and Values ($r = .40$ at Time 1 and .52 at Time 2).

7.4.3. Structural Model for Expectancy-Value Theory

The next confirmatory analysis was for the final expectancy-value theory model for maths at Time 2. The structural equation model developed at Time 1 (Figure 4) was transposed to Time 2 data. An initial run of this model identified a negative error variance of .04 for Teach3. The iterative procedure employed by AMOS sometimes produces this result and following the recommended process (P. Holmes-Smith, personal communication, August 14, 2000), this was adjusted by setting the variance as positive to the same degree. The model is presented in Figure 10.

Figure 10. Confirmatory expectancy-value theory model (including parents' beliefs) for maths - Time 2. Comp2 (maths competence beliefs), SDQ-m (SDQ-maths scale), Imp2 (maths importance), Use2 (maths usefulness), Like3 (interested in maths), Like4 (likes maths), Par (parent competence rating), Teach3 and Teach4 (teacher competence ratings * $p < .05$; ** $p < .01$; *** $p < .001$: Numbers in italics represent estimated correlations.
The results were supportive of the model as a good representation of the data, $\chi^2(21) = 25.89, p = .21, \chi^2/df = 1.23$, GFI = 0.96, AGFI = 0.91, RMR = .12, RMSEA = .04, TLI = .99, and CFI = .99. The only non-supportive result was the RMR and, once again, this could be reflecting skewness and kurtosis present in some of the data. The model at Time 2 accounted for 54 percent of the variance in children's maths achievement, a higher proportion than the 39 percent accounted for at Time 1.

There were many similar results to those obtained at Time 1. There were significant path coefficients from children’s Competence beliefs and parents’ competence beliefs (Par) to maths Achievement, the path coefficient from parents’ beliefs again larger than from children’s competence beliefs. All three of the expectancy-value latent variables were significantly related to each other, Competence beliefs having a higher estimated correlation with Interest than with Values. Taken together, these results supported the prediction and provided evidence that the expectancy-value model developed at Time 1 was also appropriate at Time 2. The main differences at Time 2 were minor and included a non-significant correlation between the error variances for children’s and parent’s competence beliefs (Comp2 and Par), and a reduction in the estimated correlation between the latent variables of Competence beliefs and Interest from $r = .91$ at Time 1.

### 7.4.4. Flow Theory Structural Model

A confirmatory analysis was then carried out on the Time 2 data using the model developed at Time 1 (Figure12). Error variances and factor loadings were calculated for children’s emotional experience in maths classes (MathHap2 and MathClear2). MathHap2 had a variance of 7.40, $SD = 2.72$, and MathClear2 had a variance of 6.66 and $SD = 2.58$. Reliability estimates for both variables were estimated at .8, and the calculated error variance and factor loading for MathHap2 were 1.48 and 2.43, and for MathClear were 1.33 and 2.31. Flow grouping was determined following the same procedure employed at Time 1 (children with standardised scores greater than one for perceptions of both classroom challenge and classroom skill), and were coded as either “non-flow = 1 ($n = 107$), or “flow = 2” ($n = 27$). The model is presented in Figure 11.
Figure 11. Confirmatory flow model for maths achievement - Time2. MathHap2 (happiness during maths classes), Flow2 (grouping variable as flow or non-flow), MathClear2 (confusion during maths classes - reverse scored), Teach3 and Teach4 (teacher competence ratings): * p < .05; ** p < .01; *** p < .001: Numbers in italics represent estimated correlations.

The goodness-of-fit statistics mostly provided support for the model, $\chi^2 (4) = 5.68, p = .22, \chi^2/df = 1.42$, GFI = 0.98, AGFI = 0.94, RMR = 0.11, RMSEA = .06, TLI = 0.99, and CFI = 1.00, although once again the RMR was outside of acceptable limits. Overall, the confirmatory flow model accounted for 27 percent of the variance in children's maths achievement, more than twice as much than was predicted in the Time 1 model (12 percent). Consistent with the Time 1 results there were significant estimated correlations between Happy and Clear, and between Happy and Flow2. The path from Clear to Achievement was also significant. There were also some differences in the confirmatory Time 2 model when compared to the Time 1 model.

For the Time 2 model, the path coefficient between Happy and Achievement was very weak and not significant (Path coefficient = .03, p > .05, compared with Path coefficient = .23, p < .05, at Time 1), while the path between Clear and Achievement was stronger (.22 at Time 1). Along with these changes the estimated correlation between Happy and Clear more than doubled from that attained at Time 1 (r = .55, compared with r = .24 at Time 1). While the Time 2 differences point to possible changes for a model of best fit (i.e., removal of the
path from Happy to Achievement), the model provided strong confirmation of the flow model developed at Time 1.

7.4.5. Composite Maths Model – Time 2

Even though the Time 2 confirmatory flow model suggested that the path between Happy2 and Achievement was not significant, it was decided that the first integrated model to be investigated would be based on the composite model developed at Time 1 (Figure 8), and used as a confirmatory analysis. In the Time 1 model the path from Happy to Achievement was included but the path from Clear to Achievement was omitted. The first run of the model identified a negative error variance for Teach3 that was adjusted by setting this as positive at the same level (.07). Results for the confirmatory Time 2 composite maths model are presented in Figure 12.

There was support for the confirmatory model from some of the goodness-of-fit statistics, $\chi^2/df = 1.72$, GFI = 0.92, TLI = 0.95, and CFI = 0.97, while others were not supportive, $\chi^2 (42) = 72.13$, $p = .003$, AGFI = 0.85, RMR = .45, RMSEA = .07. Of the non-supportive results the AGFI and RMSEA were close to an acceptable level. The chi-square probability and RMR, on the other hand, were considerably outside the accepted limits. However, bearing in mind the small sample size and large number of variables in the model, these results still lent some support to the confirmation of the model developed at Time 1. The model predicted 64 percent of the variance in children’s Time 2 maths Achievement, considerably higher than the 46 percent predicted in the same Time 1 model.

There were significant positive paths from children’s Competence beliefs and parents’ competence beliefs (Par2) to maths Achievement and, unlike the Time 2 expectancy-value model (Figure 10), the path coefficient from children’s competence beliefs was greater than that from parents’ beliefs. This suggests that adding flow theory items in the composite model added to the predictive power of children’s competence beliefs to account for children’s maths achievement. The latent Happy variable also provided a significant path to maths Achievement and, as in the Time 1 composite model, this path was negative in direction. Considering that this path was not significant in the Time 2 flow model (Figure 11), this result was again surprising (at Time 1 this was a significant positive path in the final flow model). As with the Time 1 model this result suggested that once
Figure 12. Confirmatory composite model for maths achievement - Time2. Comp2 (children's maths competence beliefs), SDQm (SDQ maths scale), Imp2 (maths importance), Use2 (maths usefulness), Like3 (interested in maths), Like4 (likes maths), MathHap2 (happiness during maths classes), Flow2 (grouping variable as flow = 2 and non-flow = 1), MathClear2 (confusion during maths classes - reverse scored), Teach3 and Teach4 (teacher competence ratings): Numbers in italics represent estimated correlations: * p < .05; ** p < .01; *** p < .001

correlations between Happy and the expectancy-value variables had been taken into account, Happy provided a unique contribution to the prediction of maths Achievement for those children responding to MathHap2 in the opposite direction
to most other participants. That is, children who had low values for other variables but high values for MathHap2, and children with low MathHap2 responses but high responses for other variables.

There were also two non-significant correlation paths in the confirmatory composite model. The first of these was between Happy and Flow2, a path that had been significant in the final Time 2 flow model, and this result repeated the outcome found at Time 1. The other non-significant correlation was between Competence beliefs and Flow2, although it should be noted that the outcome for the current analysis was close to the estimated correlation of \( r = .10 \) found in the Time 1 model. The path from Clear to Achievement that had been significant in the Time 2 flow confirmatory model (Path coefficient = .50) was not included in the composite model. Surprisingly, modification indices provided by AMOS did not indicate that the model would be substantially improved by including this path, this result also mirroring the Time 1 results.

7.5. Reading Time 1

7.5.1. Data Preparation and Assumptions

Following the same procedure employed for the Time 1 maths analyses, data were screened first for univariate normality. Extreme values were present for four of the variables and in each case the values were lower than the majority of participants. There were two extreme values for both the Importance and SDQread variables, six extreme values for Interest and seven extreme values for Clear. Of the missing responses, one participant had extreme values for three of the variables, two participants had extreme values for two of the variables and the remainder were all single extreme responses. As there were no obvious patterns to the extreme values they were all raised to one scale point lower than the normal distribution minimum.

Multivariate normality was assessed next. Two multivariate outliers were identified above the Mahalanobis distance of \( D^2 = 32.91, p < .001 \), and these participants were omitted from further analyses (\( N = 133 \)). One of these participants had low values for reading (Importance, Usefulness and Interest), but was rated by parent, teacher and self as being quite competent at reading. The other participant rated their reading competence far higher than did their parent or teacher.
After adjustments for univariate and multivariate normality, all of the variables had some degree of negative skew ranging from small (minimum skew = -.63, SE = .21) to moderate (maximum skew = -1.35, SE = .21). Positive kurtosis was present for reading Importance (Kurtosis = 1.99, SE = .42), indicating that most children thought achieving in reading was very important (71 participant responses between 8 and 9.5). However, as none of these were extreme, further analyses were conducted without transformations and were taken to accurately represent the distribution in the sample.

7.5.2. Expectancy-Value Theory Measurement Model

The reading analyses commenced with an evaluation of the measurement model for expectancy-value theory. It had been proposed that the academic subjects of maths and reading would have similar models and, therefore, the expectancy-value theory measurement model for maths (Figure 6) was used as the template for the Time 1 measurement model for reading. The maths results had provided a distinction between the latent variables of Values, consisting of importance and usefulness, and Interest, consisting of interest in and likability of the subject, and the initial measurement model for reading employed the same distinction between Values (Imp and Use) and Interest (Like1 and Like2). The final measurement model for maths also included a path from Values to Competence beliefs and this path was also included in the reading measurement model. The results for this model are presented in Figure 13.

The goodness-of-fit statistics were supportive of the expectancy-value model, \( \chi^2 (5) = 3.02, p = .70, \chi^2/df = 0.61, GFI = .99, AGFI = .97, RMR = .09, RMSEA = .00, TLI = 1.02, \) and CFI = 1.00, although the normed chi-square and and TLI results point to the possibility of an over-fitting model, and the RMR was slightly above the acceptable level. There were moderate to strong positive correlations between all three of the latent variables, the strongest, as with the maths analysis, being between Competence beliefs and Interest. These results supported expectancy-value theory as a concept related to children's beliefs about reading and suggested that children who believed themselves competent at reading also tended to value it more in terms of importance and usefulness and were more interested than children with lower reading competence beliefs.
The measured variables of Competence and SDQ-reading had significant loadings on the Competence beliefs factor with the SDQ-reading scale providing a slightly better description of this factor. This is evident by the higher path coefficient and squared multiple correlation. As with the maths results, the Values factor was more closely aligned with Importance than with Usefulness but both had significant path coefficients, although the squared multiple correlation (reliability) for Usefulness was lower than any other of the measured variable. The loadings on Interest suggested that the Like2 scale was more important for the definition of this factor than Like1, again a similar result to that found for maths. It should also be noted that the error variance associated with Like1 was far greater than any of the other measured variables, perhaps contributing to its low squared multiple correlation (reliability).

![Diagram](image)

Figure 13. Measurement model for expectancy-value theory for reading - Time1. Comp (reading competence beliefs), SDQ-r (SDQ-reading scale), Imp (reading importance), Use (reading usefulness), Like1 (interested in reading), Like2 (likes reading): * * p < .05; ** * p < .01; *** * p < .001

7.5.3. Structural Model for Expectancy-Value Theory

The next analysis applied the expectancy-value theory measurement model of children's beliefs into a structural equation model predicting children's reading achievement. Gender was expected to be significantly related to children's reading achievement and was introduced at this stage (coded as "1 = male" and "2 = female"). Correlation paths were created from Gender to each of Competence
beliefs, Values and Interest, and a directional path was added leading from Gender to Achievement. Directional paths were also added from each of the expectancy-value latent variables to Achievement.

Parents’ beliefs about the reading competence of their children (Par) were also included with directional paths drawn from children’s Competence beliefs to Par, and from Par to reading Achievement. Also, because reading models were expected to be similar to those found for maths, error variances for children’s and parents’ competence beliefs were allowed to co-vary.

Upon running the model, the path from Interest to Achievement was found to be non-significant (Path coefficient = 0.04, Critical Ratio = 0.12), as was the path from Values to Achievement (Path coefficient = -0.12, Critical Ratio = -0.82). These paths were removed and the final expectancy-value model for reading achievement is presented in Figure 14.

![Diagram](image)

**Figure 14.** Final expectancy-value theory model (including parents’ beliefs) for reading - Time1. Comp (reading competence beliefs), SDQ-r (SDQ-read scale), Imp (reading importance), Use (reading usefulness), Like1 (interested in reading), Like2 (likes reading), Par (parent competence rating), Teach1 and Teach2 (teacher competence ratings): * p < .05; ** p < .01; *** p < .001: Italics represent estimated correlations.

The results suggested that the model was a good fit for the data, $\chi^2 (25) = 29.69, p = .24, \chi^2/df = 1.19$, GFI = .96, AGFI = .91, RMR = .10, RMSEA = .04, TLI = 0.99 and CFI = 0.99, the only non-supportive goodness-of-fit statistic being the RMR. The model predicted 38 percent of the variance in children’s reading
achievement. The path from children's Competence beliefs to parents' beliefs (Par) was significant, as was the path from parents' beliefs to children's Achievement. The correlation between error variances for children's and parents' competence beliefs was also significant. These results supported the predictions and indicated significant relationships between children's and parents' beliefs about children's reading competence.

The three significant predictors of reading achievement were children's Competence beliefs, parents' competence beliefs (Par) and gender. Unlike the expectancy-value models for maths, the strength of the Competence beliefs to Achievement path coefficient was greater than that from parents' competence beliefs (Par) to Achievement. The path from gender to Achievement had the smallest path coefficient and was also negative in direction. This negative relationship was further investigated through examination of the means for females and males on both measured teacher variables of achievement.

Females had lower achievement ratings than males on both teacher scales. For Teach1, females had $M = 7.41, SD = 1.88 (n = 70)$, and males, $M = 7.89, SD = 1.83 (n = 63)$, and for Teach2, females had $M = 7.84, SD = 1.68$, and males, $M = 8.38, SD = 1.80$. This result was surprising in light of past research indicating that females tend to out-perform males in reading achievement throughout most of the school years (Eccles, 1984; Marsh, 19??).

As well as higher achievement rankings for males, gender also had significant positive correlations with all three of the expectancy-value latent variables, indicating that females tended to score higher than males on each of the expectancy-value latent variables. Taken together, these results suggest that females tended to believe that they were more competent at reading, placed higher value on reading and were more interested than males, but were achieving at a lower level according to teacher ratings. As these results were unexpected, a closer examination of the pattern of teacher responses was undertaken.

Only three of the schools involved in the study were co-educational, having combined classes of females and males, the remaining schools being single-sex (two were females only and two were males only). Achievement means were calculated by gender for type of school (co-educational or single sex), the results being displayed in Table 29. The results indicated that in co-educational schools, females received higher reading achievement means than males but quite similar
means to those given to females in female only schools. However, teachers in male only schools tended to rate their students' achievement higher, by more than one scale-point, than did teachers in co-educational or female only schools. From these results it is not possible to decide why this differentiation between male only schools and the other schools existed. It could be argued that the students participating in the study from male only schools tended to be, on average, better readers than other participants. Alternatively, it could also be argued that the teachers' perception of reading ability in the male only schools differs from that of teachers in co-educational or female only schools. This is worthy of future investigation but results for reading should be treated with caution because there may be a confounding influence from the male only school achievement ratings.

Table 29.
Means and Standard Deviations for Reading Achievement by Gender and Type of School

<table>
<thead>
<tr>
<th>Type of School</th>
<th>Females</th>
<th>Males</th>
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<td>SD</td>
</tr>
<tr>
<td>Co-educational</td>
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<td>1.90</td>
</tr>
<tr>
<td>Females only</td>
<td>7.33</td>
<td>1.88</td>
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<tr>
<td>Males only</td>
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Teach2

<table>
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<th>Males</th>
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<td>SD</td>
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</tr>
<tr>
<td>Females only</td>
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<td>1.63</td>
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<td>Males only</td>
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7.5.4. Structural Model for Flow Theory

The structural model for flow theory was analysed next. Following the same procedure as employed for the maths analyses, children's scores for their perceived level of challenge of average reading classes and their perceived level
of skill during lessons were both standardised. Children scoring greater than zero for both variables were classified in the “flow” group with all other children placed in the “non-flow” group. There were 112 students classified as non-flow (coded as 1) and 21 classified as in flow (coded as 2). The new variable created by these two groups was labeled Flow.

Development of the final Time 1 flow model for reading conformed to the same procedure employed during development of the maths model. That is, children’s reported levels of happiness (ReHap) and confusion (reverse scored and labeled ReClear) during lessons were associated with latent variables titled Happy and Clear respectively. Error variances and factor loadings were calculated for these relationships based on an estimated reliability for each measured variable of .08. The error variance calculated for ReHap was 1.45, and for ReClear was 0.74. Factor loadings were 2.45 and 1.71 respectively. These results were inserted into the model. Because it was anticipated that there would be significant gender effects for reading, this being supported by significant results for gender in the expectancy-value model, gender was included at this stage.

A saturated model was evaluated in which the predictor variables were correlated with each other and each also had a directional path leading to reading achievement. A negative error variance was obtained for Teach2 that was adjusted by constraining it to a positive variance at the same level (.08). A series of models were then evaluated in which non-significant paths were removed sequentially, the lowest path coefficient being removed at each stage. The final model is presented as Figure 15.

The results showed that Clear was the only significant predictor of children’s reading achievement and that the model provided a good description of the data, $\chi^2 (9) = 11.02, p = .27, \chi^2/df = 1.23$, GFI = .97, AGFI = .94, RMR = .09, RMSEA = .04, TLI = 0.99 and CFI = 1.00. The RMR was the only non-satisfactory statistic and the model predicted 19 percent of the variance in children’s reading Achievement. Happy and Clear shared a significant positive estimated correlation and both were significantly associated with Flow. In other words, children in the flow group tended to report feeling happier and less confused during reading lessons than non-flow children. Interestingly, while gender was not a significant predictor of reading achievement or associated with children’s reported level of confusion during lessons (Clear), there was a significant positive correlation
between gender and Happy with females tending to report feeling happier during reading classes. These results provided some support for the predictions, although the non-significance of the paths from Happy to Achievement, and gender to both

**Figure 15.** Final flow model, including gender, for reading achievement - Time1. ReadHap (happiness during reading classes), Flow (grouping variable as flow or non-flow), ReadClear (confusion during reading classes - reverse scored), Gender (1 = males; 2 = females), Teach1 and Teach2 (teacher competence ratings): *p < .05; **p < .01; ***p < .001: Numbers in italics represent estimated correlations Clear and Achievement did not fully support the predictions.

When compared to the models developed in the maths flow analyses, the final flow model for reading at Time 1 was more similar to the Time 2 maths model (Figure 11) than the Time 1 model (Figure 6). There was a very similar estimated correlation between Happy and Clear (r = .55 for maths Time 2), as well as the non-significant paths from Happy to Achievement. There were also significant correlations between Flow and both Happy and Clear, a result similar to the maths Time 2 model. The major difference for the current reading analysis was the significant correlation between gender and Happy, which was not present in the maths analyses. Overall, these results suggest that during reading classes, children who perceived more challenge and greater personal skills than average also reported feeling happier and less confused, and females also tended to report feeling happier than males.
7.5.5. Composite Reading Model – Time 1
The composite Time 1 reading model was developed following the same procedure employed for the maths Time 1 analysis. That is, the final measurement models for expectancy-value theory and flow theory were combined and cross-theory relationships drawn between all variables except parents’ reading competence beliefs (Par). Through a series of models, two non-significant paths were removed, first between Clear and Achievement (Path coefficient = 0.10, Critical ratio = 0.94), and then Flow and Happy (estimated r = - 0.00, Critical ratio = - 0.04). The non-significance of the Clear to Achievement path that had been significant in the earlier flow theory model (Figure 15) was similar to the maths Time 2 result. This again suggested that Clear had stronger relationships with expectancy-value constructs than with reading achievement. The near zero correlation between Flow and Happy suggested that, for reading, children were equally happy regardless of whether they were in the flow or non-flow groups. Further modifications to the model were made by adding a correlational path between Competence beliefs and Flow, the same as had been included in both final composite maths models. The final composite Time 1 model for reading, with all of the above modifications, is presented as Figure 16.

The results provided general support for the model, $\chi^2(48) = 61.07, p = .10$, $\chi^2/df = 1.27$, GFI = .94, AGFI = .88, RMR = .15, RMSEA = .05, TLI = 0.98 and CFI = 0.99, although the AGFI was just outside of the acceptable range and RMR statistic was considerably higher than the .05 maximum. The composite model accounted for 37 percent of the variance in children’s reading Achievement, very similar to the amount predicted by expectancy-value theory alone (38 percent). The strongest predictor of Achievement was children’s Competence beliefs followed by parents’ beliefs (Par) and, similar to the final expectancy-value model for reading (Figure 14). Gender provided a significant negative path to Achievement, highlighting higher average achievement scores for males.

The relationships between expectancy-value and flow theories were quite complex. Of the two latent flow variables, Happy had stronger correlations with each of the three latent expectancy-value variables than did Clear. The weakest between-theory correlation was between Clear and Values, the path that had also been non-significant in both final composite models for maths. The measured Flow variable was significantly related to Competence beliefs, suggesting that
children in the flow group believed themselves more competent at reading than non-flow children.

Figure 16. Final composite model for reading achievement - Time1. Comp (reading competence beliefs), SDQr (SDQ-reading scale), Imp (reading importance), Use (reading usefulness), Like1 (interested in reading), Like2 (likes reading), ReadHap (happiness during reading classes), Flow (grouping variable as flow = 2 and non-flow = 1), ReadClear (confusion during reading classes - reverse scored), Teach1 and Teach2 (teacher competence ratings): Numbers in italics represent estimated correlations: *p < .05; **p < .01; ***p < .001
Surprisingly, the estimated correlation between Flow and Clear that had been significant in the flow measurement model (Figure 15) was no longer significant in the composite model (Critical ratio = 1.25). When compared to the maths composite models for Time 1 and Time 2, the percentage of variance in achievement predicted in the reading model was well below the 46 and 61 percent predicted respectively by those models (Figures 8 and 12). However, the reading model provided similar relationships between theories and was a good fit for the data.

### 7.6. Reading Time 2

#### 7.6.1. Data Preparation and Assumptions

Screening of children’s Time 2 reading data identified three missing values for flow theory items. These missing values were from three separate participants and were replaced by item means. As previously mentioned in the maths Time 2 data preparation, 22 parents did not respond to the Time 2 questionnaire and the same procedure was employed for the Time 2 reading analyses. That is, Time 1 parent data was used to replace these missing responses. For the Time 2 parent questionnaires that had been returned there were 14 missing values. Examination of these missing values did not identify any pattern and these were replaced with item means. One teacher did not respond to the Time 2 reading questionnaire and the missing values for the five children in this class were replaced with their Time 1 teacher competence ratings.

Evaluation of univariate normality commenced with the identification of extreme values for each variable (except for children’s perceptions of Challenge and Skill in reading classes which were used as flow grouping variables).

Extreme outliers were identified for children’s level of confusion during classes ($n = 7$; reverse scored and labeled ReClear), children’s reading competence ($n = 2$; Comp), reading importance ($n = 1$; Imp) and reading usefulness ($n = 1$; Use). There were also three extreme values for the first teacher competence rating (Teach). Of these extreme values, all of them were lower than the average value and two children had two extreme values each, the others all being extreme values for individual participants. All of the extreme values were adjusted by raising them to one scale-point lower than the normal distribution. Upon making these adjustments all of the variables had some degree of negative skew, ranging from
weak (Skew = -.40, SE = .21, for interest in reading [Like3]), to strong (Skew = -1.43, SE = .2, for Use2). A significant positive kurtosis was also present for Use2, Kurtosis = 1.87, SE = .42. All of the skew and kurtotic variables were, however, thought acceptable for analysis using AMOS, especially in light of the need for accurate interpretation and comparison with other results.

Multivariate outliers in the data were again evaluated using Mahalanobis distance and one case was identified through this procedure. This participants' data had also been identified as a multivariate outlier in the Time 1 analysis and was again omitted from further analyses. This left a final sample size of 134 participants.

7.6.2. Expectancy-Value Theory Measurement Model

Using the same procedure as the maths analyses, Time 2 models were used to confirm the robustness of the models developed at Time 1, commencing with the expectancy-value measurement model. No modifications to the Time 2 models were contemplated until the final expectancy-value model. As with the maths analyses, the SDQ scale (SDQreading) from Time 1 was used in the Time 2 models. The first Time 2 model evaluated the confirmation of the Time 1 expectancy-value measurement model for reading (Figure 13), and is presented as Figure 17.

The goodness-of-fit statistics provided limited support for the model, $\chi^2 (5) = 18.60, p < .01, \chi^2/df = 3.72, GFI = .96, AGFI = .82, RMR = .29, RMSEA = .14, TLI = 0.88 and CFI = 0.96. Only the GFI and CFI were in the acceptable range. This result did not fully support the hypothesised robustness of the Time 1 model but all other parameters were similar to those estimated at Time 1. The Competence beliefs factor was quite well described by the two measured variables although the SDQ-reading scale was less reliable than in the Time 1 analysis (Figure 20) where the squared multiple correlation was .90. There had been a similar reduction in the reliability of the SDQ-maths scale at Time 2 and the Time 2 SDQ-reading reduction could again be due to the collection of data for the SDQ scales at Time 1 only.

The Values factor was more evenly measured by the two variables than it had been at Time 1, this being reflected in the higher reliability figures, particularly for Use2, than had been attained at Time 1 (Time 1, Use = .30). The results for
the Interest factor were similar to those obtained at Time 1 and estimated correlations between the latent variables were all positive and significant. The correlation between Competence beliefs and Interest was particularly strong. The significant estimated correlations between Values and the other two factors were weaker (by approximately $r = .20$) than those obtained in the Time 1 reading model.

![Diagram](image)

**Figure 17.** Confirmatory measurement model for expectancy-value theory for reading - Time2 (children’s beliefs). Comp2 (reading competence beliefs), SDQ-r (SDQ-reading scale), Imp2 (reading importance), Use2 (reading usefulness), Like3 (interested in reading), Likc4 (likes reading): $*** p < .001$

While Time 2 confirmation of the expectancy-value measurement model of children’s reading beliefs had only achieved limited support, the confirmatory structural model for expectancy-value theory for reading achievement was examined before exploring any modifications.

### 7.6.3. Structural Model for Expectancy-Value Theory

The Time 1 expectancy-value model was transposed to Time 2 data and a structural equation calculated, the results being presented in Figure 18. The goodness-of-fit statistics provided moderate support for the adequacy of the model, $\chi^2 (25) = 49.56, p < .01, \chi^2/df = 1.98$, GFI = .94, AGFI = .86, RMR = .20, RMSEA = .09, TLI = 0.95 and CFI = 0.97. While the chi-square probability did
not provide support for the model, the normed chi-square, taking account of the
degrees of freedom, suggests that the model was an adequate representation of the
data. The non-supportive AGFI and RMSEA results were only just outside of
acceptable limits and the RMR could again be reflecting skew data and the small
sample size. Bearing in mind the non-significant gender paths that had been
included in the confirmatory model this result generally supported the
confirmatory prediction and the model accounted for 41 percent of the variance in
children's reading achievement. This was quite similar to the 38 percent found
for the same model for reading at Time 1.

Figure 18. Confirmatory expectancy-value theory model (including parents' beliefs) for
reading - Time2. Comp2 (reading competence beliefs), SDQ-r (SDQ-read scale), Imp2
(reading importance), Use2 (reading usefulness), Like3 (interested in reading), Like4
(likes reading), Par (parent competence rating), Teach3 and Teach4 (teacher competence
ratings): * p < .05; ** p < .01; *** p < .001: Italicics represent estimated correlations

There were many similarities between the Time 2 model and the model
developed at Time 1. Children's Competence beliefs were again the main
significant predictor of reading Achievement with a lesser prediction from
parent's beliefs. The path between children's Competence beliefs and parents'
competence beliefs (Par) was significant and there was also a significant
correlation between error variances associated with children's and parents'
competence beliefs (Comp2 and Par). The three expectancy-value latent variables
all shared significant positive estimated correlations and the paths from latent variables to their respective measured variables were all significant.

There were also some important differences between the Time 1 and Time 2 analyses, particularly involving gender. The first of these was the non-significant Time 2 path from gender to reading Achievement that had been a significant negative coefficient in the Time 1 analysis. Examination of the correlations between gender and both teacher competence rating scales indicated that females tended to have slightly higher means than males for both scales (Teach3, females $M = 7.73$, males $M = 7.63$; Teach4, females $M = 8.06$, males $M = 7.78$), a result much closer to the expected gender difference than found at Time 1. Along with this, the estimated correlations between gender and the three expectancy-value latent variables were all positive but non-significant (Gender/Competence beliefs, Critical Ratio $= 1.80$; Gender/Values, Critical Ratio $= 1.34$; Gender/Interest, Critical Ratio $= 1.80$), although the correlations with Competence beliefs and Interest were approaching a significant level. However, the strength of these correlations were close to those that had been attained at Time 1 (estimated Time 1 $r$'s $= .21$, .20 and .24 respectively) and were retained for the composite model.

7.6.4. Flow Theory Structural Model

The structural flow theory confirmatory model was analysed next. Determination of the flow model employed the same procedure used at Time 1. That is, children's ratings on their perceived level of challenge and skill associated with average reading lessons were each standardised, children scoring above zero on both variables being classified in the flow group and all other participants in the non-flow group (Flow2). Using this procedure, 16 children were classified in the flow group and 118 in the non-flow group (six children were in the reading flow group at Time 1 and Time 2).

Children's emotional experience during lessons was gauged through their level of reported happiness during lessons (ReadHap2) and confusion during lessons (reverse scored and labeled, ReadClear2). Error variances and factor loadings were calculated for ReadHap2 ($SD = 2.55$, Variance $= 6.52$) and ReadClear2 ($SD = 2.00$, Variance $= 0.58$) in a similar manner to previous flow analyses, based on a reliability estimate of .8. Error variances and factor loadings were inserted into a confirmatory model that was based on the Time 1 model (Figure 15). During the
first run of the confirmatory model the iterative procedure employed by AMOS produced a negative error variance for Teach4. This was corrected by setting this error variance at positive .08, and the model was analysed again.

The goodness-of-fit statistics produced for the confirmatory model were, $\chi^2(9) = 24.97, p < .001$, $\chi^2/df = 2.78$, GFI = .94, AGFI = .86, RMR = .30, RMSEA = .12, TLI = 0.93 and CFI 0.96. The GFI, TLI and CFI were the only supportive statistics and the model accounted for 11 percent of the variance in children’s reading achievement. Also, the estimated correlation between Clear and Flow was not significant ($r = .07$). These results provided limited support for the confirmatory nature of the model developed at Time 1 and modifications to the model were investigated. The non-significant correlation path between Clear and Flow was removed and a further path from Happy to Achievement was included in the final Time 2 reading model for flow. This final flow model can be viewed as Figure 19.

![Flow Model](image)

**Figure 19.** Final flow model, including gender, for reading achievement - Time2. ReadHap2 (happiness during reading classes), Flow2 (grouping variable as flow or non-flow), readClear2 (confusion during reading classes - reverse scored), Gender (1 = males; 2 = females), Teach3 and Teach4 (teacher competence ratings): *p < .05; **p < .01; ***p < .001: Numbers in italics represent estimated correlations.

The results provided strong support for the final Time 2 flow model as a good description of the data, $\chi^2(9) = 15.71, p = .07$, $\chi^2/df = 1.75$, GFI = .96, AGFI = .91, RMR = .03, RMSEA = .08, TLI = 0.97 and CFI 0.98, and the model.
predicted 18 percent of the variance in children's Time 2 reading achievement. This was similar to the 19 percent predicted in the Time 1 reading model (Figure 15). Happy was a significant predictor of children's reading Achievement, and Clear, while not a significant predictor, was very close with a Critical Ratio = 1.93.

There were significant estimated positive correlations between Happy and Clear, Happy and Flow2, and Happy and Gender. These results suggest that children reporting higher happiness during reading classes also felt less confused during lessons and were also more likely to be female and from the flow group. There was no evidence to suggest that Flow2 or Gender were linearly related to Clear, children's reported level of confusion therefore not being associated with gender or their experience of lessons in terms of challenge and skill.

7.6.5. Composite Reading Model – Time 2

Because the Time 2 reading models for flow theory had been different from the Time 1 model, confirmation of the composite Time 1 model was not possible. Instead, the final Time 2 models for expectancy-value and flow theories were combined in the composite model and between-theory correlations included between all variables. The initial analysis of the composite model provided an inadmissible result owing to the covariance matrix not being positive definite. Changes to the model were evaluated through modification indices provided by AMOS and a further directional path was added from Values to Like03.

Theoretically, adding this path provided a description of reading Values that included a component of children's interest in the subject. Because this seemed close to the conception of subjective task values offered by Wigfield et al. (1997), another model was evaluated in which this path was included. The results for the final composite reading model for Time 2 are presented in Figure 29.

The covariance matrix was admissible and the results generally supported the model as an adequate description of the data. $\chi^2 (48) = 68.09, p = .03, \chi^2/df = 1.42, GFI = .93, AGFI = .87, RMR = .14, RMSEA = .06, TLI = 0.97$ and $CFI = 0.98$. Bearing in mind the sample size, skewness of some of the data and the number of variables in the model, it was not surprising that the chi-square probability and AGFI were just outside of acceptable limits. The RMR was again considerably above the .05 maximum required but the rest of the results,
particularly the normed chi-square, suggested that the model was an acceptable representation. Forty-one percent of the variance in children's reading achievement at Time 2 was predicted through the model, equal to that predicted by expectancy-value theory alone (Figure 18). Similar to the Time 1 reading result, this did not support the prediction that the composite model would be a stronger predictor of achievement than either theory on its own.

Children's Competence beliefs were again the main predictor of achievement followed by parent's beliefs (Par), and the path coefficients were identical to those in the final expectancy-value theory structural model at Time 2 (Figure 18). Looking at the expectancy-value theory component of the composite model, the new path from Values to Like3 was small (compared to other coefficients loading on Values) but significant. When compared to the final Time 2 expectancy-value model (Figure 27), the new path slightly reduced the estimated correlation between Values and Interest (reduced by .07), and also the path coefficient from Interest to Like3 (reduced by .14). This suggests that the new Values factor defined by the variables was quite similar to the old factor except that it was better differentiated from the Interest factor.

As with the Time 1 reading results, the estimated between-theory correlations were all significant and the correlations between Happy and the expectancy-value factors were all greater than the commensurate correlations with Clear. For both Happy and Clear the strongest correlation was with Interest, followed by Competence beliefs and Values, the same order as found in the Time 1 composite model (Figure 24). The estimated correlation between Happy and Interest was particularly strong and this suggests that children's emotional experience during lessons was most closely associated with their interest in the subject. It should be noted that again gender was not significantly related to reading achievement or expectancy-value latent variables, although the estimated correlations with Competence beliefs and Interest approached significance (Critical ratios of 1.89 and 1.79 respectively).

While it was not possible to confirm the composite model developed for reading at Time 1, the Time 2 composite model had many more similarities than differences from the Time 1 model. In particular, the expectancy-value components of the composite model were similar to that developed at Time 1. The relationships between expectancy-value and flow components followed a
similar pattern to that developed at Time 1, and the significant paths to children’s reading achievement were the same for each model.

Figure 20. Final composite model for reading achievement - Time2. Comp2 (reading competence beliefs), SDQ-r (SDQ-reading scale), Imp2 (reading importance), Use2 (reading usefulness), Like3 (interested in reading), Like4 (likes reading), ReadHap2 (happiness during reading classes), Flow2 (grouping variable as flow = 2 and non-flow = 1), ReadClear2 (confusion during reading classes - reverse scored), Teach3 and Teach4 (teacher competence ratings): Numbers in italics represent estimated correlations: * $p < .05$; ** $p < .01$; *** $p < .001$
7.6. Music Time 1

7.6.1. Data Preparation and Assumptions

All data were first screened for univariate normality. Only one extreme univariate outlier was identified, a participant who was rated with comparatively low competence by their teacher (Teach2). This value was raised to one scale-point below the normal distribution for this variable. No significant skew or kurtosis was noted for any of the variables. Multivariate normality was then tested using the same procedure employed during the maths and reading analyses. No multivariate outliers were identified and all variables were considered suitable for analyses using AMOS.

7.6.2. Expectancy-Value Theory Measurement Model

Following the same procedure employed for the maths and reading analyses, the first music model was an evaluation of the measurement model for expectancy-value theory evaluating factors of Competence beliefs, Values and Interest. The results for the music measurement model are presented as Figure 21.

![Diagram of measurement model](image)

**Figure 21.** Measurement model for expectancy-value theory for music - Time1 (children’s beliefs). Comp (music competence beliefs), SDQ-mu (SDQ-music scale), Imp (music importance), Use (music usefulness), Like1 (interested in music), Like2 (likes music): *** p < .001.
The results indicated that the model was a good fit for the data, $\chi^2 (6) = 4.96$, $p = .55$, $\chi^2/df = 0.83$, GFI = .99, AGFI = .96, RMR = .09, RMSEA = .00, TLI = 1.01, and CFI = 1.00, with only the RMR result being slightly above acceptable bounds. The normed chi-square result points to the possibility of an over-fitting model but that was not supported by the TLI. All three of the expectancy-value factors were represented quite evenly by their two respective measured variables, as shown by the similar significant path coefficients for each factor and similar squared multiple correlations for the related measured variables. The three latent expectancy-value variables were significantly interrelated. These relationships were all strong, particularly that between Competence beliefs and Interest.

7.6.3. Structural Model for Expectancy-Value Theory

The next analysis applied the music measurement model for expectancy-value theory to a structural model predicting children’s music achievement. Gender was included in the model through correlations with the expectancy-value latent variables and a directional path leading to music achievement. Paths were also included from the three latent expectancy-value variables to music Achievement. Parent’s beliefs about children’s competence in music were also included with a directional path leading from children’s Competence beliefs to parents’ beliefs (Par), and a second path leading from Par to Achievement. In line with the similar models for maths and reading, error variances for children and parents competence beliefs were allowed to correlate since similarly worded questions and response scales were present in both questionnaires.

Several models were evaluated in which non-significant paths were removed sequentially. The first path removed was the path from Values to Achievement (Path coefficient = 0.02, Critical Ratio = 0.07), and then the path from Interest to Achievement (Path coefficient = -0.46, Critical Ratio = -0.33). The results for the final expectancy-value theory model for music achievement are presented as Table 22.

Goodness-of-fit statistics indicated that the model was a good representation of the data, $\chi^2 (26) = 17.52$, $p = .89$, $\chi^2/df = 0.67$, GFI = .98, AGFI = .95, RMR = .10, RMSEA = .00, TLI = 1.02, and CFI = 1.00, although, as with the previous model, the normed chi-square result provided some evidence of over-fit. The
model predicted 24 percent of the variance in children’s music achievement. The significant positive predictors of music achievement were children’s Competence beliefs and parents’ competence beliefs (Par), whilst gender was a negative predictor. The path from children’s Competence beliefs to parents’ beliefs (Par) was significant and the error variance correlations between these variables was also significant.

![Diagram](image)

**Figure 22.** Final expectancy-value theory model for music - Time1. Comp (music competence beliefs), SDQ-mu (SDQ-music scale), Imp (music importance), Use (music usefulness), Like1 (interested in music), Like2 (likes music), Par (parent competence rating), Teach1 and Teach2 (teacher competence ratings): * p < .05; ** p < .01; ***p < .001; Numbers in italics represent estimated correlations.

Gender was found to be positively correlated with Competence beliefs and Interest, and the correlation between gender and Values was also included because it fell just short of a significant result (Critical Ratio = 1.93). These results indicated that females tended to believe themselves more competent at music than males and also expressed greater interest in the subject. In light of the higher competence beliefs and interest in music for females, the negative path coefficient between gender and Achievement was difficult to explain. This negative relationship was investigated further by examining means for the two teacher achievement ratings (Teach1 and Teach2) by gender. This indicated that males tended to be rated as more competent by their teachers than were females (Teach1, females $M = 6.70$, $SD = 1.61$, males $M = 6.96$, $SD = 1.93$; Teach2,
females $M = 6.87, SD = 1.58$, males $M = 7.23, SD = 1.87$). As with the reading Time 1 analysis, teacher ratings by gender were examined for each type of school (co-educational, single sex female schools and single sex male schools). The results are presented in Table 30.

Table 30. Means and Standard Deviations for Music Achievement by Gender and Type of School

<table>
<thead>
<tr>
<th>Type of School</th>
<th>Teach1</th>
<th>Teach2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Females</td>
<td>Males</td>
</tr>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>Co-educational</td>
<td>6.68</td>
<td>1.56</td>
</tr>
<tr>
<td>Females only</td>
<td>6.73</td>
<td>1.66</td>
</tr>
<tr>
<td>Males only</td>
<td>-----</td>
<td>-----</td>
</tr>
</tbody>
</table>

The results for co-educational schools indicated that females tended to be rated as more competent by their music teachers than were boys. Students in female only schools were rated at a similar average level to females in co-educational schools. These results were consistent with results from the first study and previous research (Wigfield et al., 1997). However, inconsistent with previous research, teachers rated boys in the male only schools (as in the reading Time 1 results) at least one scale-point higher on each scale than any of the comparison groups (males or females). It may be that the male participants attending male only schools were generally better at music than other participants. Another possibility is that the music teachers participating in the study from males only schools were tending to overrate the competenec of their students compared to teachers from co-educational and female only schools. As this study can not rule out the second possibility, all results for music relating to gender should be interpreted cautiously.

7.6.4. Structural Model for Flow Theory

The same flow grouping procedure was employed as had been used for the maths and reading analyses. The new variable created (Flow) had 22 children in the flow group (coded as '2') and 113 children in the non-flow group (coded as
'1'). Flow children therefore experienced music classes as above average in terms of both the challenge involved and their personal skills exhibited. Latent variables Happy and Clear were created and, following the procedure used in maths and reading, path coefficients estimated from these variables to their respective measured variables (MusHap and MusClear) based on an estimated reliability of .8 (Happy = 1.31, Clear = 1.13). Error variances were also estimated for the measured variables (MusHap = 1.72, MusClear = 1.28). A structural model for flow was then evaluated in which gender was included. Correlations were constructed between gender and both Happy and Clear, and a directional path added from gender to music Achievement.

The iterative procedure of the initial run indicated a negative error variance for Teach1 that was adjusted by constraining this variance to positive 0.17. Through sequential runs of the model, non-significant paths were removed. The first path removed was the path from Clear to Achievement (Path coefficient = 0.17, Critical Ratio = 1.53), followed by Flow to Achievement (Path coefficient = 0.15, Critical Ratio = 1.78). Non-significant estimated correlations were then removed from Clear to Flow (r = .01, Critical Ratio = 0.08), Clear to Gender (r = .04, Critical Ratio = 0.36), and Gender to Flow (r = .06, Critical Ratio = 0.66). The final flow model for children’s music achievement at Time 1 is presented in Figure 23.

The results generally indicated that the model was a good representation of the data, $\chi^2 (9) = 8.91, p = .45, \chi^2/df = 0.99$, GFI = .98, AGFI = .95, RMR = .12, RMSEA = .00, TLI = 1.00, and CFI = 1.00, and once again the RMR was the only statistic outside the acceptable range. The flow model accounted for 17 percent of the variance in children’s music achievement. Happy was the only significant positive predictor of children’s music achievement. As in the previous analysis, Gender was found to negatively predict children’s music Achievement and, as explained above, this result should be treated with caution.

Happy was found to have significant estimated positive correlations with Flow, Clear and gender. Taken together, the flow model for music suggests that children who tended to achieve at a higher level tended to report being happier and less confused during music lessons, and were more likely to report lessons as higher challenge and skill environments (flow) than were lower achieving students. As well, the results suggest that females were, on average, happier
during music lessons than males but that the male students tended to achieve at a higher level.

Figure 23. Final flow model, including gender, for music achievement - Time 1
MusHap (happiness during music classes), Flow (grouping variable as flow or non-flow), MusClear (confusion during music classes - reverse scored), Gender (1 = males; 2 = females), Teach1 and Teach2 (teacher competence ratings). * p < .05; ** p < .01; *** p < .001: Numbers in italics represent estimated correlations.

7.6.5. Composite Music Model - Time 1

The next analysis investigated relationships between the two theories through examination of a composite model. The final expectancy-value model (Figure 22) and flow model (Figure 23) were combined and correlational paths added joining latent variables from each theory. An initial run of the model identified a non-significant path from Happy to Achievement (Path coefficient = .11, Critical Ratio = 0.71), and this was removed for the final model. The results for the final composite model are presented in Figure 24.

The goodness-of-fit statistics provided support for the model, $\chi^2 (50) = 50.81$, $p = .44$, $\chi^2/df = 1.02$, GFI = .95, AGFI = .90, RMR = .15, RMSEA = .01, TLI = 1.00, and CFI = 1.00, suggesting that it was a good representation of the data. The RMR was the only non-supportive statistic and the model accounted for 25 percent of the variance in children’s music achievement. Children’s Competence beliefs had the largest positive path coefficient to Achievement followed by parents’ beliefs and, again, there was a significant negative relationship between
gender and Achievement. Although the data fitted the model well, the amount of additional variance explained by the composite model, one percent more than expectancy-value theory alone, was negligible and did not fully support the prediction that the composite model would explain more of the variance than either theoretical approach alone.

Figure 24. Composite model for music achievement - Time 1. Comp (music competence beliefs), SDQ-mu (SDQ-music scale), Imp (music importance), Use (music usefulness), Like1 (interested in music), Like2 (likes music), MusHap (happiness during music classes), Flow (grouping variable as flow − 2 and non-flow − 1), MusClear (confusion during music classes - reverse scored), Teach1 and Teach2 (teacher competence ratings): Numbers in italics represent estimated correlations: 
* p < .05; ** p < .01; *** p < .001
The two latent variables for flow theory (Happy and Clear) were significantly related to the three expectancy-value theory latent variables (Competence beliefs, Values and Interest), with Happy having stronger correlational relationships to all three expectancy-value variables than did Clear. There were some changes in the flow theory section of the composite model from the results obtained for flow theory alone (see Figure 23). The most prominent of these was the absence of a significant path between Happy and Achievement. This suggests that when the relationships between Happy and the expectancy-value variables were taken into account, children's level of happiness during music lessons was more strongly aligned with their competence beliefs, values and interest in music than with their music achievement.

Another change was the non-significant correlation between Happy and Flow in the composite model. This path had produced a significant estimated correlation ($r = .23$) in the flow theory model so the change was caused by the inclusion of the expectancy-value variables. This may also explain the non-significant path from Happy to Achievement. All of the gender correlations remained similar to those found in the single theory models, although the correlation between gender and Values only approached significance (Critical Ratio = 1.64).

7.7. Music Time 2

7.7.1. Data Preparation and Assumptions

Initial screening of the Time 2 music data for children identified five missing values for expectancy-value theory items and three missing flow responses. Examination of these missing values indicated that they were all responses from different child participants and they were replaced with item means. As previously mentioned, twenty-two parents did not respond to the Time 2 questionnaire and these values were replaced using the same procedure employed at Time 2 analyses for maths and reading. That is, parents' values from the Time 1 analysis were used at Time 2. From those parents who returned Time 2 questionnaires there were a further seven missing values for music questions. These were all replaced with item means. Tests for univariate and multivariate normality revealed no significant breaches of assumptions.
7.7.2. Expectancy-Value Theory Measurement Model

Following the same procedure used previously, Time 2 music models were analysed as confirmatory evaluations of those developed for music at Time 1. The first of these was a confirmatory evaluation of the Time 1 music measurement model for expectancy-value theory. This confirmatory model is presented as Figure 25.

![Diagram](image)

**Figure 25.** Confirmatory measurement model for expectancy-value theory for music - Time 2 (children's beliefs). Comp2 (music competence beliefs), SDQ-mu (SDQ-music scale), Imp2 (music importance), Use2 (music usefulness), Like3 (interested in music), Like4 (likes music): *****p < .001

The goodness-of-fit statistics supported this model as a good representation of the data, $\chi^2 (6) = 5.73$, $p = .45$, $\chi^2/df = 0.96$, GFI = .99, AGFI = .95, RMR = .14, RMSEA = .00, TLI = 1.00, and CFI = 1.00, thus providing confirmation of the Time 1 model. As with the Time 1 music model, the RMR was the only non-supportive goodness-of-fit statistic.

The structure of the Time 2 model was quite similar to that developed at Time 1. The three latent variables all had significant path coefficients to their two respective measured variables, and they were also significantly related to each other. The most notable change in the Time 2 music model was a reduction in the path coefficient for usefulness in the definition of the latent Values variable (by
.13). Also of the note was the stronger relationship between Competence beliefs and Values than between Competence beliefs and Interest.

7.7.4. Structural Model for Expectancy-Value Theory

The next confirmatory analysis was of the expectancy-value structural model for music achievement and was again based on the model developed at Time 1. This model is presented in Figure 26.

![Diagram of Expectancy-Value Model](image)

**Figure 26.** Final expectancy-value theory model (including parents’ beliefs) for music - Time 2. Comp2 (music competence beliefs), SDQ-mu (SDQ-music scale), Imp2 (music importance), Use2 (music usefulness), Like3 (interested in music), Like4 (likes music), Par2 (parent competence rating), Teach3 and Teach4 (teacher competence ratings): * p < .05; ** p < .01; *** p < .001. Italic represents estimated correlations.

The goodness-of-fit statistics provided overall support for the adequacy of the model, $\chi^2 (26) = 40.67$, $p = .03$, $\chi^2/df = 1.56$, GFI = .94, AGFI = .88, RMR = .15, RMSEA = .07, TLI = .96, and CFI = .98. While the chi-square probability, AGFI and RMR were outside of acceptable limits, the normed chi-square result suggests that, considering the small sample size, the remaining statistics may be more representative. The model predicted 33 percent of the variance in children’s Time 2 music achievement, 9 percent more than had been predicted by the Time 1 model (Figure 22). These results therefore supported the confirmatory prediction.

Children’s Competence beliefs and parents’ competence beliefs (Par2) were both significant predictors of music achievement, the path coefficient from
children's beliefs being larger than that from parents' beliefs. There was also a significant path between children's and parents' competence beliefs and the correlation between error terms for these variables was also significant. None of the paths involving gender were significant, including the path from gender to music Achievement, indicating that males and females did not differ significantly in their expectancy-value beliefs or music achievement. However, the correlation between gender and Competence beliefs was not far from a significant result (Critical ratio = 1.63).

7.7.5. Flow Theory Structural Model

The flow theory model for music developed at Time 1 was examined using the Time 2 data. Following the procedures employed previously for flow analysis, children were grouped as experiencing either flow or non-flow during music lessons, based on their responses to the items measuring perceptions of classroom challenge and skill. Twenty-eight participants were classified in the flow group (coded ‘2’), experiencing above average level of challenge and skill, and 107 in the non-flow group (coded ‘1’). Of those classified in the flow group at Time 2, 11 had been similarly classified at Time 1. The results are shown in Figure 27.

![Figure 27](image_url)

**Figure 27.** Final flow model, including gender, for music achievement - Time2 MusHap2 (happiness during music classes), Flow2 (grouping variable as flow or non-flow), MusClear2 (confusion during music classes - reverse scored), Gender (1 = males; 2 = females), Teach3 and Teach4 (teacher competence ratings): * p < .05; ** p < .01; *** p < .001: Numbers in italics represent estimated correlations.
The goodness-of-fit statistics provided support for the adequacy of the model, \( \chi^2 (8) = 16.02, p = .04, \chi^2/df = 2.00, \text{GFI} = .96, \text{AGFI} = .90, \text{RMR} = .15, \text{RMSEA} = .09, \text{TLI} = .95, \text{and CFI} = .97 \), and supported the prediction concerning the general stability of the model over time. The chi-square probability and RMSEA were just outside of the preferred limits, but were acceptable in light of the small number of participants. In line with previous analyses only the RMR was well above the acceptable level. The model accounted for 32 percent of the variance in children’s music achievement, substantially more than the 17 percent predicted by the same flow model at Time 1 (Figure 23), and similar to the 32 percent predicted in the final Time 2 expectancy-value theory structural model (Figure 26). This result did not support the prediction that the composite models would provide greater predictive power of children’s achievement than either theoretical approach.

The Time 2 model was similar to the Time 1 model, with Happy being the only predictor of achievement. The paths between gender and both music achievement and Happy were not significant. These non-significant gender paths suggest that females and males did not differ substantially in their level of happiness reported during music lessons or their achievement at Time 2. However, even noting these differences to the Time 1 model, the Time 2 model, without modification of the Time 1 paths provided an adequate confirmatory analysis.

7.7.6. Composite Music Model – Time 2

The composite model developed at Time 1 was replicated with Time 2 data. The results are presented in Figure 28.

The goodness-of-fit statistics lent some support to the adequacy of the model, \( \chi^2 (50) = 88.58, p < .01, \chi^2/df = 1.77, \text{GFI} = .91, \text{AGFI} = .84, \text{RMR} = .21, \text{RMSEA} = .08, \text{TLI} = .93, \text{and CFI} = .95 \). Four of the goodness-of-fit statistics were supportive. However, the chi-square probability, AGFI, and RMR were outside of the preferred limits. While the support was not unanimous, the normed chi-square result in particular suggests that, bearing in mind the number of variables in the model and the small sample size, the model was an adequate description of the data and therefore supported the confirmatory prediction. The model predicted 34 percent of the variance in children’s music achievement at
Time 2, more than the 25 percent predicted by the Time 1 composite model and very similar to the 33 percent predicted by the expectancy-value theory model, and the 32 percent predicted by flow theory at Time 2. This result did not support the greater predictive power hypothesised for the composite models.

Figure 28. Composite model for music achievement - Time2. Comp2 (music competence beliefs), SDQ-mu (SDQ-music scale), Imp2 (music importance), Use2 (music usefulness), Like3 (interested in music), Like4 (likes music), MusHap2 (happiness during music classes), Flow2 (grouping variable as flow = 2 and non-flow = 1), MusClear2 (confusion during music classes - reverse scored), Teach3 and Teach4 (teacher competence ratings): Numbers in italics represent estimated correlations: * p < .05; ** p < .01; *** p < .001
The significant predictors of children's music Achievement were again children's and parents' competence beliefs. Gender was not a significant predictor of achievement. The relationship between latent variables representing each of the theories followed a similar pattern to that attained at Time 1. That is, Happy and Clear were significantly related to each of the three expectancy-value theory constructs. As with the Time 1 composite model, Happy had larger estimated correlations with each of the expectancy-value theory latent variables than did Clear. Also, similar to the Time 1 composite model, the estimated correlation between Flow2 and Happy was considerably lower than it had been in the confirmatory flow model for Time 2 music (Figure 27, estimated \( r = .38 \)), suggesting that the latent Happy variable was partly accounted for by the expectancy-value theory constructs.

There were several paths that had been significant in the Time 1 composite model that were not significant at Time 2. Most notably all of the paths to and from gender were in this category, the strongest estimated correlation being between gender and Competence beliefs (Critical ratio = 1.69). These results suggest that female and male participants did not differ significantly in their perceptions of their own music ability, values and interest in the subject area, their emotional experience during classes, or their music achievement. This was a major area of difference from the Time 1 composite model (Figure 34), where females thought themselves more competent, expressed greater interest and were generally happier than males, although males tended to achieve at a higher level.
8. Study 2 Discussion

The discussion will commence with an overview of the major findings from Study 2. This will be followed by a more in-depth discussion of the findings for expectancy-value theory and flow theory individually, and will then discuss the composite-theory findings.

8.1. Overview of Study 2

The two theories of motivation being investigated in Study 2 (expectancy-value theory and flow theory) were both supported in their independent prediction of children's achievement in maths, reading and instrumental music. Models developed for the two theoretical orientations at Time 1 were generally confirmed with the Time 2 data collected approximately four months later. The one exception was the flow theory model for reading, where limited support was obtained for the confirmatory model and two modifications were required to produce a model of good fit.

Of the two theoretical orientations, expectancy-value theory generally accounted for more of the variance in children's achievement than did flow theory. This was particularly the case for maths and reading, where expectancy-value theory models at both time periods accounted for at least twice as much of the variance in children's achievement than was accounted for by the respective flow theory model. Thus, for maths and reading, children's beliefs about their competence, their subject-specific self-concept and their subjective task values for those subjects, as well as parents' beliefs about children's competence, were better predictors of children's school achievement than were children's perceptions of the challenge and skills involved in classroom experience and recollections of their emotional reactions to that experience. For music the role of flow theory factors were more evident. While expectancy-value theory did account for more of the variance in children's music achievement than flow theory, at both times, the differences were minimal.

It had been predicted that integrating models from both theories into a composite model of achievement motivation for each subject area would provide a better prediction of children's achievement than models from either theory alone. While this prediction was supported for maths at both times, the composite models for reading and music provided similar predictions to the relevant
expectancy-value theory model. Including flow theory with expectancy-value
typefor reading and music therefore did not improve the prediction of
children's achievement in these subject areas.

Expectancy-value theory findings were quite robust across each of the subject
areas suggesting a stable pattern of interrelationships between expectancy-value
theory factors and achievement. The measurement models for children's
expectancy-value theory beliefs for each subject area identified a competence
beliefs factor and two subjective task values factors: values and interest. The
values factor consisted of importance and usefulness. This two-factor solution for
children's subjective task values provided some support for the two-factor
solution reported previously (Eccles et al., 1989; Wigfield et al., 1997), although
there was an extra path required to define the values factor in the maths and
reading models. The competence beliefs factor was adequately measured by
children's subject-specific self-concept and their competence beliefs in each
subject.

For all of the expectancy-value theory structural models, children's
competence beliefs were strongly related to parents' beliefs about the competence
of child participants. Children's and parents' competence beliefs were also the
only significant predictors of children's maths, reading and music achievement
approximately two months later. Children's level of interest in the subject area
and values associated with achievement in the area were related to each other and
to children's own competence beliefs. However, these subjective task values
were not significant predictors of later achievement. While modeling of this sort
has not been previously reported in the literature, these results were broadly
supportive of previous findings (Eccles et al., 1989; Wigfield et al., 1991;
Wigfield et al., 1997).

The expectancy-value theory effects for gender were generally less robust. As
predicted, there were no effects for gender in the maths domain. However, for
reading and music, gender effects were found but not always in the predicted
direction. Females tended to believe themselves more competent and had higher
subjective task values for reading and instrumental music than did males, the
same relationship as found by Wigfield et al. (1997). However, there were several
negative relationships between gender and achievement suggesting that males
tended to achieve at a higher level in these subjects than did females. There was
some doubt about the reliability of these negative relationships based on possible inconsistent teacher ratings from teachers at male-only schools. Taken together however, the expectancy-value theory components remained relatively constant across subject areas and time periods.

The robustness of the expectancy-value theory models was not present to the same degree for flow theory. The structural equation models for flow theory in each subject area found that children who were classified as experiencing flow (flow group) generally reported more positive emotional reactions to classes than did other children. It was also found that children who reported a more positive emotional experience during lessons tended to achieve at a higher level than children with less positive emotional recollections. These findings fully supported the relationships proposed by Csikszentmihalyi et al. (1993), and extended the findings to a normal Australian fifth grade sample. However, there were major differences in the type of emotional response (happiness or confusion) that was associated with achievement depending on the subject area and time of data collection. For some models, higher achievement was associated with both a happier classroom experience and lower levels of confusion, while for others it was only associated with either greater happiness or lower confusion.

The relationships between gender and achievement in the flow models were generally not consistent, with the exception of maths where there were no gender differences. The Time 1 models for reading and instrumental music found that males tended to achieve at a higher level than females. However, these results were not replicated at Time 2 and, as mentioned, may reflect inconsistency in teacher achievement ratings across school types. Females tended to report reading and music lessons as happier experiences than did males, although both genders reported similar levels of confusion during lessons in each subject.

The composite models provided major similarities between subject areas and time periods with some small differences, especially in relation to the flow theory components. The three expectancy-value theory factors (competence beliefs, values and interest) were always related to the two emotional components of flow theory, happiness and confusion during lessons. In other words, children with higher competence beliefs and subjective task values (values and interest) also tended to report feeling happier and less confused during lessons. However, significant prediction of children’s achievement in all of the composite models
was limited to the expectancy-value theory factors of children’s competence beliefs and parents’ competence beliefs. Flow theory did not provide any significant contribution to the prediction. The prediction that the composite models would account for more of the variance in children’s achievement than the relative single theory models was only supported for children’s maths achievement. For reading and music, the composite model at both times accounted for a similar amount of the variance in children’s achievement as had been predicted by expectancy-value theory alone. The expectancy-value theory findings will now be discussed in more detail.

8.2. Expectancy-value Theory

Expectancy-value theory was well supported by the structural equation models evaluated during the study. The procedure of developing exploratory models using Time 1 data and then confirming them with the Time 2 data provided consistent results. The modeling also provided a more detailed description of the relationships between expectancy-value theory components than provided by the multivariate analyses of variance employed by Wigfield et al. (1997). Different measurement models of children’s beliefs were produced for each of the subject areas indicating distinct relationships between factors depending on the domain.

Before going on to further discussion of the expectancy-value theory findings, one area of possible confusion requires clarification. There were two model components relating to children’s competence beliefs for each subject area: children’s competence beliefs as measured by the Wigfield et al. (1997) competence beliefs scale, and the competence beliefs factor (based on the Wigfield et al. (1997) competence beliefs scale and children’s subject-specific self-concept). In order to avoid confusion, the competence beliefs factor will be referred to as children’s competence beliefs. The Wigfield et al. (1997) Competence Beliefs Scale will be referred to as WCBS.

8.2.1. Competence Beliefs and Self-Concept

The investigation of expectancy-value theory explored the possibility of including children’s self-concept in each school subject as a second measure of their competence beliefs in that subject area. The reason for this investigation was that Marsh (1990) has reported significant relationships between children’s
subject-specific self-concept (SDQ-I) and their achievement in maths and reading respectively, as measured by both teacher ratings and objective tests. A similar pattern of results was reported in Study 1 with a sample of grade four children. There was also some support for similar relationships being evident for the music self-concept scale.

It was found that including the self-concept scales as second measures of children's competence beliefs in the models was successful for each of the subject areas and at both Time periods. That is, children who believed themselves more competent in a subject area also tended to have a higher self-concept in that subject, the two items successfully combining into a single competence beliefs factor with good statistical support.

The concurrence between children's specific self-concept and their WCBS in maths, reading and music raises some interesting theoretical possibilities. The modeling undertaken in the current study suggests that children's subject-specific self-concept and WCBS for that subject may be part of the same construct. If so, a common term for the construct rather than the present two, would be more parsimonious. Alternatively, children's subject-specific self-concept and competence beliefs could become subsumed under the higher order construct of children's overall self-concept. In this way, as has been argued by Marsh (1990), the composition of overall self-concept is assumed to be dependent on the constituent lower order constructs and the relative weighting given to these.

However, there is no straightforward way of defining children's overall self-concept in terms of which children's activities and attributes are important lower order constructs. A decision made to include children's maths, reading and physical abilities as lower order constructs, as in the SDQ-I (Marsh, 1990), excludes measuring the self-concepts of children in terms of other activities, such as music or art, which are a more or less important part of their life and self-identity (see, Bloom, 1985). For instance, in the current study nearly all of the child participants had learnt to play a musical instrument. This contrasts with the Wigfield et al. (1997) study, in which few children had ever learnt an instrument. It would seem appropriate to assume that the way these two groups of children see themselves, their self-concept, could be different based, in part, on their music self-concept. But this difference may be not reflected in their self-concept scores as measured by implements such as the SDQ. The issue this
highlights is that the activities children engage in vary individually, culturally and between families and schools. An activity, like instrumental music, may contribute to one child's overall self-concept if music is an important part of their weekly activity, but not be related to another child's self-concept if music is not a part of their experience. The difficulty in taking this lower-order construct approach to self-concept is the variety of activities in which children engage.

Perhaps an aspect of children's beliefs, such as the subjective task values construct from expectancy-value theory, could be used to better define children's self-concept. In a two-stage process, children's values could be used first to select appropriate lower order constructs for inclusion in their self-concept measure. At a later date, the self-concept scale could be administered and the sub-scales weighted according to children's initial responses to the values associated with each activity. For instance, a child who has a low valuation of maths would either not have any maths competence questions, or would have a reduced weight associated with the maths self-concept scale in the calculation of their overall self-concept. While there are many practical difficulties to this approach, it could provide a more accurate representation of children's overall self-concept relative to other children.

8.2.2. Subjective Task Values

In support of the findings of Eccles et al. (1989) and Wigfield et al. (1991; 1997), a two-factor solution was found for subjective task values. Children's perceptions of the importance and usefulness of each subject area did factor together into a single factor (labeled Values throughout the study), interest being a separate but related factor. These results supported previous findings (Eccles et al., 1989; Wigfield et al., 1991; Wigfield et al., 1997), but there was also a more complex relationship between children's expectancy-value beliefs identified for children's maths and reading beliefs at Time 1. While children's Time 1 interest in maths and reading remained a separate factor, there was a crossover relationship found in which the values factor was defined not just by the importance and usefulness scales, but also with a small contribution from the WCBS. Including this extra path in the Time 1 maths model tended to increase the weighting of the importance scale on the values factor and decrease the factor weighting for the usefulness scale. The implication is that the two-factor solution
for children's subjective task values, in which the importance and usefulness values have not always been found to factor together (Wigfield et al., 1997), may be more stable with the inclusion of a measure of their competence beliefs such as the WCBS.

While it is not possible to say how stable this measurement model may be across children's ages for maths and reading, there was some support for stability in the case of maths from the Time 2 confirmatory measurement model. However only limited support was found in the Time 2 reading model, for which just two of the eight goodness-of-fit statistics were acceptable. Children's importance-usefulness values may be more closely related to their sense of competence in maths than in the other subject areas. In contrast, the Time 1 measurement model for instrumental music followed the same division generally reported in previous research (Eccles et al., 1989; Wigfield et al., 1991; 1997). There was a clear two-factor solution for children's subjective task values of values (importance-usefulness) and interest, which was confirmed with the Time 2 data. These results suggest that grade five children's values for maths and music, while being defined differently, remain stable throughout the year. This contrasts with values for reading, which may be in a process of change during grade five.

What is unclear, however, is why there were these subject area differences. It has been proposed that the generally decreasing trend in children's expectancy-value theory beliefs during primary school represents a gradually more realistic understanding by children of their abilities with age (Wigfield et al., 1997). Perhaps the lower competence beliefs and subjective task values for music than for maths, reading and sport found by Wigfield et al. (1997) and in Study 1, indicate that children's music beliefs are relatively mature by grade five. Grade five children may have developed a firm view of their relative musical competence and have decided their level of value and interest. Children's reading beliefs could be reaching a similar level of maturity during grade five. These developmental differences could be tested by showing that children's importance-usefulness values for music remain stable from grade five onwards and that the same relationship gradually occurs with other subject areas (i.e., maths and reading).

An alternative explanation is that children's expectancy-value theory beliefs are just different in different subject areas because of the influence of teachers.
For instance, primary school-age children often have the same teacher for all of their academic subjects (although this was not always the case for participants in the current study), but a different teacher for music. Depending on the classroom teachers' attitude, children may be getting different value messages for different subjects. Teachers may generally stress the importance and usefulness of reading outside of the classroom more than they do for maths. The importance and usefulness of music, on the other hand, may be stressed very little in the classroom by children's classroom teachers. Children would therefore not get the same consistent feedback and attention for music as they would for other subject areas taught specifically by the classroom teacher. Because the classroom teacher is probably the main significant adult in children's school experience, any subject area differences in classroom teachers' values and classroom behaviour could have an impact on children's values.

8.2.3 Expectancy-value Theory and Achievement

The expectancy-value theory measurement models were used as the basis for Time1 structural models predicting children's school achievement in each subject area. Effects for gender and parents' competence beliefs were included in these models and again the Time 2 data were used to confirm the models developed at Time 1. The Time 1 structural models, while having some differences between subject areas, were all successful in predicting children's achievement. Further to this, the Time 2 confirmatory models were generally supportive of the models developed at Time 1.

There were several findings common to all of the expectancy-value theory models. The first common finding was that, of the range of children's expectancy-value theory-related beliefs, children's beliefs about their competence in each of the subject areas were predictive of their achievement. In contrast, children's values and interest were not predictive of their performance in any of the subject areas. Thus the implication is that grade five children's subjective task values, while having strong relationships with their competence beliefs, did not add any unique component to the prediction of their achievement in maths, reading and music. Further research is required to determine if this is a consistent pattern of relationships for other subject areas and at other ages.
The second common finding to all of the models were the significant relationships between children’s competence beliefs and parents’ competence beliefs in each subject area. Further, the findings indicated that children’s competence beliefs tended to be more strongly related to parents’ competence beliefs than teachers’ achievement ratings. These differences supported previous findings with primary school aged children (Marsh & Craven, 1991; Wigfield et al., 1997). This suggests that either grade five children are more inclined to believe what parents’ think of their capabilities than what teachers believe, or that parents’ know more about children’s competence than do teachers. While the second possibility seems unlikely, owing to the opportunities teachers’ have to compare one child’s performance with that of many other children, it can be argued that the social impact of parents’ competence beliefs appears to be an important element in understanding children’s their own competence beliefs.

The third finding common to all of the subject areas was the significant relationships between parents’ competence beliefs and children’s achievement. Together with the earlier finding, that children’s competence beliefs were related to achievement, this indicates that children’s and parents’ competence beliefs both provided some unique contribution to the prediction of children’s achievement. However, there were subject area differences. These differences suggested that, for maths, parents’ competence beliefs tended to be more strongly related to children’s achievement than children’s own competence beliefs, but that the reverse applied for reading and music.

If these differences are found to be robust it could indicate inherent subject area differences affecting individuals’ perceptions, and provide an important direction for future research. One could argue that maths is generally a more well-defined subject than reading and music during primary school. Unlike reading and music, answers to classroom maths problems are usually either correct or incorrect. In reading and music classes, the immediate feedback children receive from teachers may reflect children’s competence to perform accurately as well as their creativity and originality. It could be that parents focus their competence beliefs more on children’s accuracy (i.e., correct maths problems, correctly spelt words and correct musical notes). This proposed subject area difference between children’s classroom experience and parents’ experience
at home could explain why children’s competence ratings for reading and music were closer than parents to the teacher ratings for these subjects.

Alternatively, it could be that parents’ have more direct experience with children in maths than in reading and music. Perhaps parents have more involvement with their children’s maths homework, enabling them to have a more accurate estimate of their child’s ability in this subject. There could be also be more regular testing in maths than the other subject areas, with parents’ seeing regular evidence, in terms of test scores, of the level at which their child is performing. These alternatives would need to be evaluated in future research.

8.2.4. Gender Differences in Children’s Competence Beliefs and Subjective Task Values

Gender differences in the findings of the structural models for expectancy-value theory fell broadly into two main areas: the constellation of children’s expectancy-value theory-related beliefs and the relationship of these beliefs to achievement. Generally, the findings for children’s expectancy-value theory-related beliefs provided some support of gender differences found in previous research (Eccles et al., 1989; Wigfield et al., 1991; 1997). In contrast, the relationship of these beliefs to achievement did not support previous findings.

For the constellation of children’s expectancy-value theory beliefs at Time 1, females and males had similar beliefs for maths but not for reading and instrumental music. The current findings provided some support for the gender differences found for grade four children in Study 1, but did not fully support the gender differences found by Wigfield et al. (1997). Considering maths first, Wigfield et al.’s (1997) finding that females tended to have lower competence beliefs and values associated with maths than males was not supported in the current study. As in Study 1, the current study showed that females and males had similar competence beliefs, values and interest in maths.

It could be argued that the absence of gender effects for children’s maths competence beliefs reflects the trend for children to have similar self-concepts for maths in primary school (Meece et al., 1982). However, the lack of gender differences in values is more difficult to interpret. It could be argued that the lack of differences previously found by Wigfield et al. (1997) represents a cultural difference between American and Australian primary school students. However,
it could equally be argued that the similarities between genders was the result of
the selective population of private school students used in the current study. For
these arguments to be tested it would require further Australian studies comparing
expectancy-value theory beliefs of private and public school students.

Unlike maths, the Time 1 structural models for reading and music did find
significant gender effects in the constellation of children's expectancy-value
theory-related beliefs. In support of Study 1 and the findings of Wigfield et al.
(1997), females tended to have significantly higher competence beliefs in both
reading and instrumental music. Females also reported more interest in these
subjects than males. However, unlike previous research (Wigfield et al., 1997;
Study 1), females did not significantly differ from males in their values for
reading and music. In the current study the relationship between gender and
values was, however, close to a significant level and the findings could have been
supportive with a larger sample. However, it could also indicate general
instability in children's beliefs.

Support for the second possibility came from the Time 2 findings. While the
Time 2 confirmatory models were supported for reading and music, the results
also cast some doubt on the stability of these findings. The Time 2 findings
suggested that while the models were acceptable, females did not have
significantly higher competence beliefs or interest in reading or music than males.
Particularly noteworthy was the Time 2 finding that females did not believe
themselves to be more competent at reading than males. This finding is contrary
to much research over the last twenty years showing that females in middle
primary school tend to believe that they are more competent at reading than males
(Eccles et al., 1989; Eccles et al., 1993; Harter, 1982; Marsh et al., 1984, 1991;
participated at both data collection points, the non-permanence of significant
gender effects suggests that these beliefs may not be stable for children during
grade five. Whether this result was specific to the sample of grade five children,
or is more generalisable, could be investigated in future studies.

8.2.5. Gender Differences in Achievement

The relationships between gender and achievement in the three subject areas
were generally not supportive of previous research, with the exception of maths
where only limited support was obtained. There were no significant differences between genders in maths achievement indicating that females and males tended to perform at similar levels. This did not support previous research showing that Australian female students in grade five tended to achieve at a higher level in maths than male students as measured by objective tests and teacher ratings (Marsh et al., 1985). However, the results were consistent with the findings for grade four students in Study 1. This consistency within the current studies suggests that there may be gender differences in maths achievement between children in Australian private schools (studied in this thesis) and Australian public schools (studied in Marsh et al., 1985). Alternatively, the results may reflect a more general change over time in the 15 years since the Marsh et al. (1985) study.

For reading and music the relationships between gender and achievement at Time 1 were not in the predicted direction. For both subject areas males tended to achieve at a significantly higher level than females. This result was opposite to the results of the first study and did not support previous research (see, Eccles et al., 1989; Wigfield et al., 1991; Wigfield et al., 1997). Because a confounding effect was suspected, teacher achievement ratings were investigated further. While it was not possible to say definitively that the results were compromised, examination of teacher ratings indicated that for reading and music, males at single gender schools tended to be rated as more competent than children attending coeducational and female only schools. This result has at least two interpretations. Either the sample of children from male only schools were, on average, substantially better at reading and music than the child participants from the other schools, or the teacher achievement ratings from male only schools were not commensurate with the teacher ratings from other schools. This aspect could be investigated in future research. While it is beyond the scope of the present study to investigate these interpretations, based on the weight of previous research (Eccles, 1984; Eccles et al., 1989; Wigfield et al., 1991; Wigfield et al., 1997; Marsh, 1989; Marsh, 1990), the later interpretation appears more likely.

As previously mentioned, the Time 2 expectancy-value theory models for reading and music successfully confirmed the models developed at Time 1. However, as with the relationships between children's expectancy-value theory factors and gender, the relationships between gender and achievement that had favoured males for reading and music at Time 1 were no longer significant at
Time 2. This again indicated possible instability in gender differences as a factor predicting children's achievement in reading and music.

The reason for the change in the significance of gender to reading and music achievement between Time 1 and 2 can only be speculated on because this type of effect has not previously been reported. The implication was that at Time 2, females and males did not differ significantly in their reading and music achievement. The lack of relationship between children's gender and their achievement in reading and music was perhaps easiest to explain based on the Time 1 results previously discussed. Whereas, at Time 1, teachers at male only schools gave their students comparatively higher achievement ratings than were given to other students, this strength of this difference could have diminished by the Time 2 data collection period. Alternatively, teachers' greater knowledge of children's individual competence over the five month period might have led to ratings being more globally accurate at Time 2.

8.3. Flow Theory

The Study 2 findings for flow theory indicated a generally coherent pattern of relationships in each subject area leading from flow group (challenge/skills perceptions), to emotional reaction to lessons, and from there to achievement. However, there were differences in which emotional experience of lessons (happiness or confusion) was related to flow group, varying both between subject areas and time of measurement. These findings extended on previous findings (Csikszentmihalyi & Larson, 1987; Csikszentmihalyi, et al., 1993) by predicting school achievement in maths, reading and music for an average sample of preadolescent children.

8.3.1. Relationships Between Flow Group and Emotional Experience of Lessons

Children in the flow group had a more positive emotional reaction to classes than non-flow children, although the nature of the emotional experience varied between subject areas and time period. At Time 1, children in the flow group for reading reported feeling both happier and less confused during classes than non-flow group children, while flow group children for maths and music just reported feeling happier. The Time 2 confirmatory analyses showed that these
relationships were stable for maths and music but not for reading. At Time 2, children in the flow group reported similar levels of confusion to non-flow group children but more happiness during lessons.

These findings indicate that grade five children who perceive their classroom experience as relatively more challenging than do peers, and also consider their skill levels to be relatively higher, tend to report a more positive affective state during lessons. These results extend on the findings of Csikszentmihalyi et al. (1993), and suggest that the relationship between flow (challenge and skill) and affective state, found for talented adolescents when engaged in their area of talent, also has utility in describing classroom activity for an average sample of preadolescent children.

§3.2 Relationships Between Flow Theory and Achievement

The predicted relationships between flow theory and achievement were successfully described by relationships in the data. For each subject area and at both Times there was a significant prediction of children's achievement from their emotional reaction to average classes, although there were differences between subject areas in which emotional scale(s) was related to achievement. Children who reported feeling happier and less confused during average maths classes also tended to achieve at a higher level than other children at both time periods. For music, children who reported feeling happier during lessons tended to achieve at a higher level than other children. However, children's reading achievement was predicted by their level of confusion at Time 1, and by their level of Happiness at Time 2, lower confusion and higher happiness respectively being associated with higher achievement.

Interestingly, these findings support the differentiation between happiness and confusion, one a positive affective state and the other negative, with only the prediction of maths achievement having a significant contribution from both states. This suggests that during lessons in the different subjects, children's emotional reactions may be associated differently with their achievement. Perhaps the well-defined nature of maths encourages feelings of confusion for children having regular difficulty with maths problems, and happiness for children doing comparatively well. Lessons in instrumental music, which are normally given individually or in small groups, may not differ in the level of confusion for
children of differing standards because the teacher can design lessons to suit the standard of students. Children doing well in music would probably have a faster turnover of repertoire than less well-performed students, with the result that they generally feel happier and less bored during lessons.

In contrast to maths and music, the differences in the Time 1 and Time 2 reading findings are more problematic. The difficulty is explaining why the Time 1 prediction of children’s achievement from their level of confusion changed, at Time 2, to a prediction based on their level of happiness. It may be that grade five is a time of change in children’s understanding of their reading competence or of change in the difficulty of the material being undertaken in classes. At the start of grade five, most children may believe that they already know how to read so that, regardless of their level of achievement, all children are similarly happy. However, children performing comparatively well at this stage may not be sufficiently taxed during lessons to suffer any significant levels of confusion, with children doing less well having occasional confused moments. By the end of the year, material covered in reading classes may be more difficult for all children, thereby increasing the happiness experienced by children meeting the increased challenges. These proposals would need testing to determine their feasibility.

Overall, these results supported the chain of flow theory constructs proposed by Csikszentmihalyi et al. (1993), leading from children’s challenge/skill perceptions of lessons to their emotional reaction to those lessons and, finally to achievement. It was of note that at no stage was there a direct relationship between flow group and achievement. This suggests that children’s emotional reactions to classes serve as a mediator between their inclusion or exclusion from the flow group, and their school achievement. When compared to the expectancy-value theory structural models, flow theory accounted for less of the variability in children’s achievement, suggesting that it was generally a less powerful theoretical predictor of children’s achievement.

8.3.3. Gender Differences in Flow Theory

As predicted, there were no significant gender differences in the flow theory structural models for maths at Time 1 or Time 2. Females and males reported similar emotional experiences during lessons and did not differ in their maths
achievement. In contrast, there were some gender differences in the flow theory models for reading and music, not always in the predicted direction. At Time 1, females reported feeling generally more happy and alert than males during lessons in reading and music. Both genders reported similar levels of confusion for each subject area. These relationships were confirmed at Time 2 for reading but not for music. The relationship between gender and happiness during music lessons was not significant at Time 2, but was successfully included in the model because it was near a significant level.

The reason for females and males having similar perception of confusion as each other in reading and music lessons while, at the same time, females perceived these same classes as generally a happier experience, is perhaps related to subject area differences previously discussed. For reading, the possibility that grade five children may consider that they can already read and therefore do not usually feel confused no matter what their achievement level, resulting in similar confusion for females and males. For music, the individual-small group nature of lessons in instrumental music may provide the opportunity for music teachers to individually tailor their lessons and therefore reduce variety in children’s level of confusion. Females’ greater happiness in these two subjects fits with gender stereotypical findings found in expectancy-value theory research (Eccles et al., 1989; Wigfield et al., 1991; Wigfield et al., 1997).

The relationships between gender and achievement in the flow theory models for maths and music followed the same pattern already discussed for expectancy-value theory. There were no gender differences in maths achievement at either Time. For music, males achieved at a higher level Time 1, and no gender differences were evident at Time 2. The findings of most interest were for reading. Unlike results from the Time 1 structural model for expectancy-value theory, there was not a significant relationship between gender and reading achievement in the flow theory model at Time 1. Because the same participants and reading achievement measures were used in the expectancy-value and flow theory models, this contrast highlights one of the vagaries of structural equation modeling. In order to best fit the data, a factor can be differently balanced between its measured variables depending on which other variables are in the model. In this case, it seems likely that the two teacher achievement scales that made up the achievement factor had different weightings on the Time 1 flow
theory model than in the Time 1 expectancy-value theory structural model. This would explain why gender was related to reading achievement in one and not the other.

8.4. Composite Models

The composite models created by combining the structural models developed from expectancy-value theory and flow theory were successful in predicting children's achievement each subject area. However, maths was the only subject area in which the prediction, that the composite models would explain more of the variance in children's achievement than either theory alone, was supported. For reading and music, the composite model was about as successful as expectancy-value theory in the prediction of children's achievement. The Time 1 composite models for maths and music were successfully confirmed with Time 2 data, indicating relative stability in these models. The reading model was less successful, largely because of the previously discussed differences in the flow theory components at Time 2 compared to Time 1. The findings shed light on the relationships between constructs from each theory and in the explanation of children's achievement motivation.

8.4.1. Relationships Between the Expectancy-value Theory and Flow Theory Constructs

While there were many similarities in the composite models for each of the subject areas, there were also some important differences. This was particularly the case for the comparison of the maths composite models with those for reading and music. In the models for each subject area the findings indicated significant relationships between expectancy-value theory and flow theory constructs. Children who reported lessons in a subject as a happier experience also tended to believe that they were more competent, and had higher values and interest in the subject area. This was the same at both Time periods and indicates that these may be stable relationships. Within these cross-theoretical relationships, it was also the common finding that children's level of happiness during lessons tended to be most strongly related to their competence beliefs and interest in the subject area, a weaker relationship being evident with values
While there were no causal relationships examined in the study, the weaker relationships evident in each subject area between children’s happiness and their values suggests that this relationship is the least likely to be causal. It appears unlikely that changes in a child’s level of happiness during lessons will result in similar changes in their values, or the reverse of this. The stronger relationships between children’s happiness during lessons, and their competence beliefs and interest, suggests that these relationships would be of more immediate interest in future investigations of causal relationships.

The findings also suggest that while children’s level of confusion during lessons was related to each of their expectancy-value theory beliefs, with the exception of their importance-usefulness values for maths, all of the relationships were generally weaker than had been the case for their level of happiness during lessons. Given the subject area differences found in children’s level of lessons confusion already discussed for the flow theory model, these findings suggest that the emotional experience of confusion during lessons may be, compared to their level of happiness, relatively independent from specific beliefs about their maths, reading and music competence and domain valuations. This further suggests that confusion during lessons would be unlikely to have a causal effect on children’s subject-specific beliefs and values.

Children’s membership in the flow group was not found to be related to their expectancy-value theory beliefs, again with the exception of maths. At Time 1, maths flow group children were found to have significantly higher beliefs about their competence in maths than non-flow children and, while the path was successfully included in the maths composite model at Time 2, the relationship was no longer significant. This suggests that children’s challenge/skill perceptions of lessons may have a more important connection with their competence beliefs in maths than in reading and music. However, the non-significance of this relationship at Time 2 suggests that it might not be a stable relationship. The Time 1 relationship was not strong and could again be related to the comparatively structured nature of maths lessons. Future research is need to confirm this relationship and investigate its stability.

Surprisingly, many of the relationships between flow group and emotions that had been significant in the flow theory models, were no longer significant in the composite models. This again highlights changes in the measurement of
constructs in structural equation modeling caused by the inclusion of different factors. Overall, the composite model findings for flow group suggest that flow, as a construct (challenge/skill), does not have strong explanatory power for children’s achievement. Its strength, as proposed by Csikszentmihalyi et al. (1993), lies in the ability of challenge/skill perceptions to provide a theoretical link to children’s emotional experience during lessons.

8.4.2. Relationships in the Composite Models to Children’s Achievement

The prediction of children’s achievement in the composite models for each subject area were from similar constructs, with the exceptions of gender and maths. The gender differences for reading and music achievement have been previously discussed, and the maths composite models had one additional path to achievement at both Times. The two common predictors of children’s achievement in each subject area were the expectancy-value theory constructs of children’s own competence beliefs and parents’ competence beliefs about their child. The additional predictive relationship in the maths models was from the flow theory measure of children’s happiness during lessons. However, the findings indicated that children’s level of happiness added to the prediction of achievement in the composite maths models through non-linear relationships. This was different from the same relationship in the flow theory models for maths, where increased happiness during lessons was associated with higher achievement.

Children’s own beliefs about their competence in each subject area provided the strongest prediction of their achievement in the composite models. This finding indicates that the range of children’s other beliefs, perceptions and emotions that were tested tended to be more strongly related to each other, and to children’s competence beliefs, than to children’s achievement. It could be argued from these findings that the other factors (values, interest, emotions, and flow group) may contribute to children’s competence beliefs. But the relationships may also work in the other direction (from competence beliefs) as well. Regardless, the findings suggest that any intervention strategies designed on expectancy-value and flow theory principles that aimed at improving children’s achievement would best be directed towards factors that would increase children’s competence beliefs.
Parents' beliefs about children's competence had weaker relationships with children's achievement in each subject area, but still indicated that parents' beliefs added something unique to the prediction of children's achievement. This result was surprising for reading and music, considering that the expectancy-value theory models had indicated that parents' beliefs about children's competence were more strongly related to children's achievement than were children's competence beliefs. The change in the relative predictive power of children's and parents' competence beliefs suggests that other relationships in the composite models, particularly those with children's happiness and confusion during lessons, helped to increase the predictive strength of the children's competence beliefs construct.

The extra path in the maths composite models predicting children's achievement, from children's level of happiness during lessons, supports previous differences found in children's beliefs and experience of maths lessons compared to the other subject areas. However, interpretation of this path is problematic. The negative coefficient found for this relationship suggests that the predictive relationship, which had been a positive linear relationship in the flow theory models for maths, was operating differently in the composite maths models. The Time 2 confirmation also suggests that this may be a stable relationship between children's happiness during maths lesson and their achievement.

While further research is needed to fully examine what is happening in the composite theory relationships for maths, one such possibility will be discussed. It could be that the strong relationships between children's level of happiness during maths lessons and both their competence beliefs and interest in maths successfully describes the relationship for most children. Most children who report a happier emotional experience also believing themselves to be more competent and having greater interest in maths. However, this may not accurately represent the situation for a smaller percentage of children. Some of whom might be achieving at a high level but reporting low levels of happiness during lessons, perhaps due to boredom, and others may not be achieving at a high level but are happy during maths lessons. Why this second experience would be the case is puzzling, but could be because of greater teacher encouragement, or receiving more individually tailored maths problems to match individual skill levels.
Bearing these possibilities in mind, the findings for the composite maths models may indicate that most children's level of happiness during lessons may be more directly related to their expectancy-value theory beliefs than their achievement. However, once these relationships are taken into account, the significant prediction of maths achievement from children's happiness during lessons could represent the extra prediction for the minority of children for whom there is an inverse relationship between happiness and achievement.
9. General Discussion

Children's achievement motivation is a key research area for educational psychologists, particularly how children's beliefs, perceptions and emotions are related to school achievement. Because education tends to be highly valued by much of western society, both financially and as a positive individual attribute, the examination of children's education-related internal life provides perspectives from which to design learning environments to maximise educational outcomes. While there have been many aspects of children's achievement motivation investigated, most of the research has been based upon individual theoretical perspectives. In the current thesis, three such perspectives were investigated and the findings not only expand on previous research but also provide an indication of the relationships between theoretical perspectives for a sample of Australian children in grades four and five.

The three achievement motivation perspectives, expectancy-value theory (including self-concept), implicit theories of intelligence, and flow theory received varying support from the findings of the two studies. Expectancy-value theory was consistently, across subject areas and studies, the most widely supported orientation. The support was both for the structure of participants' expectancy-value theory beliefs and the ability of the constructs to account for children's achievement. In contrast, grade four children's general and subject-specific implicit theories of intelligence were found to be related, but only children's sports theory of achievement was associated with their actual achievement. Because of this, children's implicit theories of intelligence were not included in the Study 2 analyses. Flow theory received some support in both studies, although there were inconsistencies in the findings across time and subject areas.

The integrated analyses for the four subject areas indicated that there were relationships between constructs from expectancy-value and flow theories. However, expectancy-value theory beliefs tended to be more explanatory of children's achievement than children's flow theory beliefs. Each of the theories will be discussed separately before the discussion of the composite framework.
9.1. Expectancy-value Theory

There were several areas of difference in the treatment of expectancy-value theory constructs in the current thesis from previous research (Eccles et al., 1989; Wigfield et al., 1991; Wigfield et al., 1997). These differences included investigating the relationship between children's competence beliefs and their subject-specific self-concept, employing teacher competence ratings as a measure of children's achievement, and analysing the relationships between expectancy-value theory constructs through structural equation modeling. Each of these differences are critical for interpretation of the findings.

9.1.1. Children's Self-concept and Competence Beliefs

In Study 1, the examination of the relationships between children's competence beliefs and subject-specific self-concept in each subject area suggested that there were many similarities in the constructs. These similarities were confirmed during Study 2, with the two constructs forming a single factor for each subject area in the structural equation models. There are several implications arising from the concurrence between these two constructs. At a theoretical level, the successful factoring together of children's competence beliefs and self-concept into a single construct raises several issues. The use of the terms "competence beliefs" and "self-concept" in a domain implies that the constructs are different. If the constructs do factor together, then readers of the achievement motivation/self-concept literature may be misled or confused about the construct distinction. While further examination of this issue appears warranted, future research could either point out the similarity between children's competence beliefs and self-concept in a subject area, or adopt a single term to apply to children's beliefs about how well they are doing in a subject area.

The related second theoretical issue applies to self-concept research. While there is much support for the existence of multiple dimensions of self-concept relative to various personal attributes and domains of experience, there is also a possible ambiguity in the description and measurement of children's overall self-concept through scales such as the SDQ-I (Marsh, 1990). This comes about from the proposed multidimensional nature of self-concept, the use of sub-scales to measure those different dimensions, and the additive procedure of measuring overall self-concept across dimensions (Marsh, 1989, 1990, 1993; Marsh &
Craven, 1991; Marsh et al., 1983; Marsh et al., 1984; Marsh et al., 1991). For instance, a child with a high self-concept in science or music may have a comparatively low score for overall self-concept as measured by the SDQ-I, perhaps resulting mainly from low scores for the maths and physical abilities subscales. However, using the subjective task values aspect of expectancy-value theory for the example, this child may actually feel quite good about themselves, the low scores for the maths and physical abilities scales reflecting the lack of importance of these areas in the child’s life. Thus, the additive nature of the SDQ-I sub-scales might not always provide a meaningful measure of children’s overall self-concept.

Another possible inconsistency in the measurement of children’s overall self-concept is due to different school experiences. Children not only differ individually in their valuation of a domain, but schools also differ in the classes offered to students. For instance, whereas very few participants in the Wigfield et al. (1997) study had had any involvement with instrumental music, virtually the entire sample in the current thesis had learnt, or were learning, a musical instrument. While the current findings reflected those of the Wigfield et al. (1997) study, participants’ having similarly lower competence beliefs and subjective task values for instrumental music than for the other subject areas, there could be important differences of the effect of this on children’s overall self-concept. While children’s music self-concept may not be important in the measurement of overall self-concept for children with no experience of instrumental music, this might not be the case for all children. Children’s music self-concept in a school environment that fosters musical activities may have an effect on how they see themselves overall, even if their music self-concept scores are similar to children with limited musical experience.

At a practical level, using children’s self-concept as a second measure of competence beliefs could supply greater measurement accuracy. Further, using self-concept scales from measures such as the SDQ-I (Marsh, 1990), which have undergone extensive research and development, provides an opportunity to compare results from sample populations with norms established with thousands of participants and over many studies. Conclusions drawn from future studies, especially those with small sample sizes, could be stronger if this comparison was available.
9.1.2 Relationships Between Expectancy-value Theory Constructs

With the exception of the relationship between children’s music achievement and their competence beliefs in Study 1, most of the other relationships between expectancy-value theory constructs were as predicted from previous research (Eccles et al., 1989; Wigfield et al., 1991; Wigfield et al., 1997). Children achieving at a higher level in a subject area tended to believe that they were more competent and also valued that subject more highly than lower achieving children. Consistent with some previous research employing factor analytic techniques (Eccles et al., 1989; Wigfield et al., 1991; 1997), three children’s beliefs factors were identified in Study 2: competence beliefs, importance-usefulness values (called “values” in Study 2) and interest. However, there were two important differences from previous studies.

First, findings in Study 1 suggested that there were strong relationships between children’s WCBS and their subject-specific self-concept in each subject area. The findings from Study 2 indicated that the competence beliefs factor in each subject area was successfully defined, not just by children’s WCBS, but also by their self-concept in each subject area.

The second difference found was a variation between subject areas in the definition of the children’s values factor. Unlike previous studies, where children’s perceptions of the importance and usefulness of a subject area have been reported as a single values factor (Eccles et al., 1989; Wigfield et al., 1997), it was found in Study 2 that the children’s values factor for maths and reading included a third measure, children’s WCBS. While it is difficult theoretically to contemplate children’s beliefs about their competence in maths and reading as a value, the factor loadings suggested that children’s WCBS were less important than the importance and usefulness measures in defining this values factor. It can be interpreted from this that the inclusion of children’s WCBS in the values factor helped to better define the relationship between children’s importance and usefulness values for maths and reading. This may also help to explain the previously reported occasional failure of children’s importance and usefulness beliefs to factor together (Wigfield et al., 1997).

The children’s music values factor, in contrast, was consistent with the values factor reported for all subject areas in previous research (Eccles et al., 1989;
Wigfield et al., 1991; 1997). That is, children's music values reflected their perceptions of the importance and usefulness of music. Of interest in the modeling of children's values is whether the different model for music, compared to maths and reading, represents a basic difference in most children's beliefs about subject areas or is unique to the current sample. It could be argued that because previous research (Wigfield et al., 1997), including Study 1, has found that children have lower competence beliefs and subjective task values for music than for maths or reading, their pattern of expectancy-value theory-related beliefs is inherently different for music. It could also be that the relationships between children's expectancy-value theory beliefs are not only different between subject areas, but also change over time. The pattern of results suggests that the relationships between expectancy-value theory constructs are influenced by the subject, and that children's perceptions of competence, importance, usefulness and interest are sensitive to subject area.

9.1.3. Teacher Achievemen t Ratings

Although teacher achievement ratings were used as the measure of children's achievement for each theoretical approach, and in both studies, they will be discussed under expectancy-value theory because the two items used for the measure have been used in previous expectancy-value theory research (Eccles et al., 1989; Wigfield et al., 1991; 1997). This measure has not previously been used as a dependent measure. Rather, it has been used to evaluate whether children's beliefs about their competence are closer to parents' or teachers' beliefs. The use of this scale as a dependent measure of children's achievement in both current studies was well supported, except for the investigation of instrumental music in Study 1. The later finding was probably due to lack of reliability in the small number of teacher achievement ratings available.

For all other expectancy-value theory analyses, teacher achievement ratings were not only associated with children and parents' competence beliefs, but also with children's subjective task values and self-concept in each subject. Further support for the adequacy of the teacher achievement rating was also found outside of expectancy-value theory analyses. As predicted in Study 1, children's general school self-concept was found to be associated with the teacher achievement ratings, but not as strongly as were children's subject-specific self-concept in each
subject area. There was further support from relationships between teacher achievement ratings and constructs from the other two theories (ITI and flow theory).

While the use of the teacher competence ratings as a measure of children's achievement was supported, there were unexpected gender differences in achievement in Study 2 for reading and music in the Time 1 analyses which might be due to the achievement measures used. In support of previous research (Eccles et al., 1989; Wigfield et al., 1991; Wigfield et al., 1997), females believed themselves more competent at these subjects than males but, unexpectedly, males were rated as achieving at a higher level than females. Further investigation of the teacher ratings found that if males-only school were excluded, the expected trend was present. That is, there was a trend for females to be rated as achieving at a higher level in reading and music than males.

While possible explanations for teachers at male-only schools giving higher achievement ratings for their students in reading and music than teachers at other schools have already been discussed, there are implications for past and future studies. If this is a reliable difference, other studies of children's achievement which use teacher achievement ratings should make a careful analysis of differences across single-sex and coeducational schools. Past research involving teacher achievement ratings from single-sex and coeducational schools may also need to be interpreted cautiously unless it can be shown that the teacher achievement ratings were consistent between school types.

9.2. Implicit Theories of Intelligence

Previous research on children's implicit theories of intelligence has only investigated children's general understanding of what it means to be intelligent or smart (Cain & Dweck, 1995; Dweck & Leggett. 1988; Henderson & Dweck, 1990). Study 1 investigated this as well as what children thought it meant to be intelligent or achieve in specific subject areas. There was some evidence to suggest that there may be some important differences between children's general theory of intelligence and their subject specific achievement beliefs. While both were generally not found to be related to children's achievement in maths, reading and music, for sport it was found that children with a more incremental sports achievement theory tended to achieve at a higher level than those with entity
beliefs. While this finding could have resulted from the small sample size in the analysis, there is also the possibility that this difference might be reliable. Given that the two forms of ITI beliefs (general and subject-specific) were found to be only moderately related to each other, this points to an interesting possibility.

While children have a general implicit theory of intelligence that is not associated with their maths, reading, music or sport achievement in grade four, it could be proposed that their related subject-specific achievement beliefs may be sufficiently different in some subject areas to be a contributing factor to children's achievement motivation. Confirmation of the sport findings is required before firm conclusions can be drawn, and there is also a need for further investigation of age and subject area differences. However, from the current investigation the possibility exists that a child achieving well in a subject could have an entity view of general intelligence but believe that their high achievement in that subject is the result of hard work. Subject-specific achievement beliefs would therefore be more predictive of high achievement in that subject than their general implicit theory of intelligence. These possibilities could be usefully researched to increase understanding of the relative influence of general versus subject-specific views of intelligence on children's achievement.

9.3. Flow Theory

Flow theory was supported in both studies, with the support generally stronger for the grade five children in Study 2 than for the grade four children in Study 1. This may reflect an age difference in the relationship between children's flow experience and achievement. It was found in Study 1 that children who had a more positive emotional experience of lessons (greater happiness and less confusion) achieved at a higher level in maths, reading and sport. The other major finding in Study 1 was that children who perceived classes in maths and sport to be more challenging than normal but matched by higher personal skills than normal (flow group), were also achieving at a higher level.

These findings were confirmed in Study 2, where further relationships were successfully modeled in each subject area consistent with Csikszentmihalyi et al. (1993). That is, children in the flow group tended to have a more positive emotional reaction to classes than non-flow children, and children with a more positive emotional reaction to classes tended to achieve at a higher level. It was
of note that there was not a direct link between flow group and achievement in any of the subject areas in either Time 1 or Time 2 analyses. These findings extend previous flow theory research (Csikszentmihalyi et al., 1993), by showing that flow theory has utility as an explanatory model of normal preadolescent children's school achievement in maths, reading, music and sport.

It is also an important distinction in the current research that data was collected in a different manner than used in much previous flow theory research (Csikszentmihalyi et al., 1993; Csikszentmihalyi & Larson, 1987; Turner et al., 1998). Rather than gauging participants' immediate reaction to involvement in classes through the use of things such as electronic beepers and classroom observations, the current study used questionnaires completed at the same time for all subject areas. As well, children were asked about their perceptions of average classes in each subject area rather than their experience of a particular lesson. The pragmatic data collection method appears to provide acceptable flow theory differentiation among children's achievement, especially for children in grade five.

The only unsuccessful aspect of flow theory investigated was in Study 1, where it was found that children's perceptions of their relationship with parents were not related to their achievement in any of the subject areas, or to the other flow measures. This finding was inconsistent with Csikszentmihalyi et al. (1993). However, given the more sensitive measures used by Csikszentmihalyi et al., (1993), and the different aged samples and level of achievement, it is unclear whether the difference was due to sample or measurement differences. If it was sample differences then it could be either that younger children's school achievement is less influenced by their perceptions of their relationship with parents, or the differentiation will only apply between those children achieving at a high level.

9.4. Composite Models

The composite model analyses in both studies identified significant relationships between expectancy-value theory and flow theory constructs. The only significant cross-theoretical relationship for ITI theory occurred in Study 1, where children with more incremental beliefs about sport achievement (ITI-sport) also tended to have higher competence beliefs (expectancy-value theory) and a
more positive emotional reaction to classes (flow theory). This later finding could again reflect the small sample size available for the sport analysis.

The composite analyses for maths were consistently more predictive of children's achievement than either expectancy-value theory or flow theory. This suggests that children's evaluation of their performance may be more accurate in maths than in reading and music. It may be that the continual correct/incorrect feedback that children receive in maths lessons could increase their ability to accurately evaluate their performance against classmates, thereby providing an explanation for the higher prediction of achievement for maths.

For the other subject areas, except music in Study 1, the composite analyses accounted for similar amounts of the variance in children's achievement as were accounted for by expectancy-value theory alone. These findings suggest that expectancy-value theory may provide as good an explanation of children's achievement in reading, music and sport as it does in combination with flow theory and ITI. However, this interpretation hides one of the most important factors to better understand children's achievement motivation. There are a whole series of elements working together when a child either elects to concentrate on achieving in a subject or to keep their involvement to a minimum. For instance, in both Studies a strong relationship was found between children's perceptions of their happiness during average lessons and their beliefs about their competence and their interest in the subject. This provides a different understanding of achievement motivation than would be the case by just knowing that children's level of happiness during lessons is associated with their achievement.

9.5. Practical Implications

For parents and teachers of children in grade four and five the major implication is that because children's achievement in each subject area was most closely associated with their competence beliefs, any increase in children's competence beliefs may be beneficial to their achievement. Although no causal directions have been established in past research or the present study, the current findings confirm that children who believe they are good at a particular subject will also tend to achieve at a higher level in that subject. For maths, the Study 2 findings suggest that grade five teachers could also be aware that improving children's affective state during maths classes may also be related to increased
achievement. However, attempting to increase children’s competence beliefs and improve their emotional state may require attention in many different areas.

For a start, children’s competence beliefs in all of the subject areas (except music in Study 1) were not only predictive of their achievement, but were also related to their subjective task values and emotional perceptions of lessons. For the grade five children in Study 2, this was particularly strong for the relationship between competence beliefs and interest across all of the subject areas. The other consistently strong relationship was between children’s competence beliefs and their level of happiness during lessons. Not surprisingly, these findings suggest that if teachers want to increase children’s competence beliefs, they may be assisted by providing children with engaging activities that will increase their interest and to be sensitive to individual children’s level of positive emotion, particularly those with low positive affect.

But the models also suggests that providing a positive emotional experience for all students in a class may be problematic. This is because grade five children’s emotional experience of lessons were found to be associated with their perceptions of the challenge involved in lessons and of their personal skills exhibited. Children who believed that lesson challenge and skills in a subject area were both relatively high tended to have a better emotional experience. This interpretation is limited by the findings in Study 1, which suggest that most children may view the relationship between challenge and skills as inverse: lessons higher in challenge corresponding to a lower sense of personal skills, and vice-versa. Therefore, it appears possible that increasing the challenge of lessons may result in children viewing their skill level as lower than would otherwise be the case. This is pattern of relationships is particularly problematic bearing in mind the Study 1 findings that children’s achievement in maths, reading and sport was more strongly associated with their perceptions of personal skills during lessons than with their perceptions of the challenge of lessons. Getting an effective balance is likely to be a challenge, but the understanding that such a relationship exists could better inform teachers.

Although the relationship to children’s competence beliefs of their importance-usefulness values were not as strong in each subject area as their interest and happiness during lessons, most importance-usefulness values relationships were still of moderate strength. Thus, another strategy for parents and teachers
interested in maximising children's achievement through increasing children's competence beliefs could be to affirm the values associated with a subject area. One way to do this would be to regularly inform children of the importance and usefulness of a subject area outside of the classroom. This would require emphasis not just on the importance of a subject for good school reports, but the wider importance and usefulness of the subject in everyday life. For example, music teachers could refer to the strong relationship between music and emotion in genres as diverse as films, concerts, sporting chants and favourite popular music. Also, the creative uniqueness inherent in every live musical performance and the pervasive presence of music in everyday locations such as shopping centres, elevators and motor vehicles.

One further practical implication arises from the social impact of parents' perceptions. While it was shown in Study 1 that parents' subjective task values were not related to children's achievement or values, the strong connection between parents' competence beliefs and those of their children provides the possibility of some influence for parents. If parents were made aware of the possibility that underestimating their child's competence may decrease the child's own competence beliefs in a subject area, some parents' may be encouraged to affirm their child's competence more highly.

All of the practical implications above rely on an assumption that has yet to be tested. That is, children's competence beliefs (and perhaps happiness during maths lessons) are changeable from within the constellation of their other expectancy-value and flow theory-related beliefs. It is, however, possible that children's competence beliefs will only change with improved achievement. Bearing this in mind, it is arguable that if attention to the areas listed above produces even a small improvement in the achievement of some children in a certain subject, the effort is worthwhile.

9.6. Limitations

Apart from the sample limitations already mentioned, and the use of teacher ratings for children's achievement measurement, there are several issues that limit clearer interpretation of the findings. The first of these was lack of a measure of children's prior achievement in the analyses. Because prior achievement is a known to be a good predictor of future performance, inclusion of this measure
would probably have explained more of the variance in children's achievement. It would have been of interest to discover if, and by how much, the achievement motivation models improved the prediction of children's achievement over what would have been predicted by past achievement alone. However, given that the main interest was in the pattern of relationships between children's beliefs, values and classroom emotions, this limitation was of limited impact.

Another limitation is related to the first and deals with the direction of causation. The structural models in Study 2 all infer that children's beliefs, values and classroom experience predict children's school achievement and in a sense imply a causal relationship. Such a causal relationship can not be assumed because there may be other superior causal factors not included in the current study (e.g. past achievement). There were also no causal relationship proposed between theoretical constructs, with the exception of the relationship from children's perceptions of classroom challenge and skills to their emotional reaction to that experience. For instance, it is not known whether children's interest in maths causes variation in their emotional experience of maths lessons and/or their competence beliefs about maths. Without research designed to test causal relationships, some of the practical implications from the findings are problematic and the theoretical strength is diminished.

There is also a limitation of the generalisability of the findings due to the sample chosen. All of the child participants were from private schools in which enrollment depends on substantial parent payments or scholarship. Children were therefore generally limited to middle to upper socio-economic backgrounds. This sample was chosen to enable an evaluation of music beliefs of children likely to be involved in instrumental music, and to compare findings with those from previous research using children with limited musical experience (Wigfield et al., 1997). It also stems from the researcher's interest to follow up a previous honours study investigating the development of musical expertise. However, because the sample population was limited in this way, there is doubt about how well the current findings will generalise to other populations of children.

The final limitation of Study 1 was that it was not possible to look across subject areas. There are two aspects to this limitation. First, it was not possible to examine the relationships between children's responses across subject areas to determine the degree to which children have similar or dissimilar beliefs and
experiences of the subjects. For instance, do those children with above average competence beliefs in maths tend to hold similar beliefs for reading and sport. It was also not possible to investigate possible compensation effects. For example, do children with poor academic achievement in reading and music tend to compensate by giving an inflated competence rating for their achievement in music or sport. The second aspect of this limitation is the inability to provide a general model of children's school achievement motivation. One of the strengths of the current research was the subject-specific nature of the investigation but there is little that can be taken to apply to other subject areas or children's general school achievement.

9.7. Future Research Directions

While many directions for future research have been mentioned during the earlier sections of this thesis, this section will conclude with a discussion of several of the major possibilities, first within each theory and then in composite research. At the broadest level, for each of the theories investigated in the current thesis, and the composite analyses, confirmatory research with other samples is needed to confirm the findings.

Because expectancy-value theory was found to be the achievement motivation perspective most predictive of children's achievement, future research investigating children's beliefs in other subject areas would provide an indication of the educational generalisability of expectancy-value theory findings. The role of children's emotional response to lessons should also be included in these studies, given the results for flow theory. This information would be of benefit to educators in other subject areas. The significant gender differences found for expectancy-value theory and flow theory also suggest that future investigations, particularly structural equation modeling analyses, may provide more explanatory results by investigating children's beliefs for each gender. It could be that, investigated separately, females and males' beliefs would have structural differences. The present investigation demonstrates that further understanding is likely to be based on comparisons of beliefs and values across different subject areas.

There are two aspects, in particular, of expectancy-value theory that would benefit from further research. The first of these involves differences in the structure of children's importance and usefulness values reported previously
(Wigfield et al., 1997), and found in the current studies. While Wigfield et al. (1997) reported that children's importance-usefulness values did not always factor together into a single construct, the current findings suggested that the definition of values may include children's competence beliefs in some subject areas. That is, children's maths and reading values may best be defined as a combined measure of children's importance, usefulness and competence beliefs, while music values may follow the previous combination of children's importance and usefulness beliefs. While this requires more investigation, further structural equation modeling, both across age and subject area, would enable better definition of the relationships between children's expectancy-value theory-related beliefs.

The second aspect of expectancy-value theory research suggested by the current findings involves the possibility of incorporating specific children's self-concept scales into the theory. The current research found that children's competence beliefs and specific aspects of their self-concept were strongly related. Therefore, the use of self-concept measures (such as the SDQ) would provide a means to evaluate and compare sample populations with norms established through extensive testing. Further evaluations are also required of the relationships between children's competence beliefs and related self-concept. If both aspects are found consistently to be equivalent measures of the same construct, this should be reflected in the use of a single construct name.

Children's implicit theories of intelligence (achievement beliefs) were the least supported achievement motivation perspective in Study 1, with the exception of sport, where children's sport theory of achievement was associated with their sport achievement. However, while it was found that grade four children's achievement beliefs were not generally associated with their school achievement, this has yet to be investigated with older participants. Another area of ITI research was suggested by the findings that implied that children's subject-specific achievement beliefs, while being related to their general achievement beliefs, may also be sufficiently different to warrant further investigation across age groups and subject areas. Because the current study was the first investigation into this relationship, further research appears warranted. For instance, following the methodology of Cain and Dweck (1995), children's general and subject-specific achievement beliefs could be evaluated and then compared with their
motivational style (i.e., helplessness) after manipulated failure experiences on real-world tasks (e.g. maths problems).

There were also several research directions suggested by the flow theory findings. For a start, the support for the flow model developed in Study 2, provides an initial model of preadolescent children’s achievement motivation that has yet to be evaluated across other age groups and subject areas. Second, while children’s emotional experience of lessons were found to be related to their classroom challenge/skills perceptions and their achievement in maths, reading and music, the predictor varied between the two emotion measures used. That is, sometimes it was children’s level of happiness, sometimes their level of confusion, and sometimes both. Further research could evaluate the other emotional dimensions originally investigated by Csikszentmihalyi et al. (1993), and found to differentiate the achievement of talented adolescents. Evaluating and combining more emotional indicators may improve the stability of the emotional predictors of achievement in the flow models.

A third research possibility stems from the Study 1 finding that children’s parent relationship self-concept was not related to either their achievement or the other flow theory constructs. Children’s parent relationship self-concept in Study 1 was similar to the family integration aspect of the original flow theory proposal of ‘family type’ (Csikszentmihalyi et al., 1993). However, because this lacked the other contributing factor to ‘family type’, family differentiation, there were no ground for concluding that family type was not related to the other flow constructs. Future research could include both aspects of the original ‘family type’ proposal to more fully evaluate the relationship of preadolescent children’s family perceptions to their achievement.

The title of this thesis suggests that the current work represents a step towards integrating different theories of achievement motivation. Indeed, it is a first step in this direction and, therefore, invites many integrative research possibilities. Among these is the incorporation of other achievement motivation perspectives within similar integrative frameworks. At a more immediate level, of the three approaches investigated during the current study, only expectancy-value theory and flow theory supported an integrative approach to children’s achievement motivation in grades four and five. Further investigation is needed to determine
whether the integrative relationships between these theories remains similar during earlier and later school years, and for other subject areas.

An exciting area of possibilities is the investigation of relationship within and between theories to examine the effectiveness of intervention strategies. For instance, how would an intervention designed specifically to increase children’s subjective task values affect children’s achievement, competence beliefs, challenge/skill perceptions and emotional experience of lessons? Also, how would the effects compare to another intervention designed specifically to improve children’s emotional experience of lessons? Would the effects for both interventions be similar at different ages and in different subject areas? These yet to be answered questions are of fundamental importance to the maximisation of children’s educational potential.
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Appendix A: Children's Achievement Motivation Questionnaire

Name: ............................................. Age: ........ Circle one: Boy / Girl

School: ................................................ Class: .............

Teacher: ................................................

In the questions that follow, I am interested in finding out what you think. This is not a test and there are no right or wrong answers. Be sure that your answers show how you feel. PLEASE do not talk about your answers with anyone else or copy what other people write.

When I ask you to begin, I want you to read each sentence quickly to yourself as I read aloud. To answer, circle one number in each row between 0 and 10. Do not take too long answering each question as your first choice is probably the best.

Before we start, let’s look at three examples below. A student called Hilda has already answered two of these sentences to show you how to do it. In the third example you must choose your own answer and put in your own circle.

EXAMPLES
A How good are you at computer games?

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<td>Not very good</td>
<td>(average)</td>
<td>Very good</td>
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Hilda circled number 8. This means that she thinks that she is quite good at computer games but not the very best. If she thought that she was the best she would have circled number 10 "Very good".

Some questions ask you to agree or disagree with a statement, like example B.

B In general, I find working on science projects very interesting.

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<tr>
<td>Strongly disagree</td>
<td>(neither)</td>
<td>Strongly agree</td>
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Hilda circled 0. This means that she really does not find science projects interesting. If she thought that science projects were sometimes boring and sometimes interesting, she would have circled number 4, 5 or 6, to show her interest in science projects was about average. Now its your turn.

C For me, being good at drawing is........

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<td>Not at all important</td>
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If you want to change an answer you have marked, you should cross out your circle and put a new circle on the number of your choice. If there is a question that you do not understand, please leave that one and I will give you some time at the end to finish.

If any of you feel uncomfortable about any of my questions, you can simply not answer those questions.

I will be the only person to see your answers, not your parents or teachers, so answer as honestly as you can.

Are there any questions?

Let’s turn the page and begin! Remember, I am interested in what YOU think!
The first three questions ask about your general view of smartness. Smartness has to do with schoolwork. We sometimes call children who do very well on their schoolwork "smart". I want to see how much you agree or disagree with the following statements about smartness.

1. You're a certain amount **smart** and you can't really do much to change it.

   
<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
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</thead>
<tbody>
<tr>
<td>Strongly disagree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Strongly agree</td>
</tr>
</tbody>
</table>

2. How **smart** you are is something about you that you can't change very much.

   
<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
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<th>3</th>
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<tbody>
<tr>
<td>Strongly disagree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Strongly agree</td>
</tr>
</tbody>
</table>

3. You can learn new things, but you can't change how **smart** you really are.

   
<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
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<tbody>
<tr>
<td>Strongly disagree</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Strongly agree</td>
</tr>
</tbody>
</table>
Maths Questions

1 How good in maths are you?

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
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<th>4</th>
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<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>very good</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2 If you were to list all the students in your class from the worst to the best in maths, where would you put yourself?

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
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<th>4</th>
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<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>One of</td>
<td>one of</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>the worst</td>
<td>the best</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

3 Some kids are better in one subject than in another. For example, you might be better in maths than English. Compared to most of your other school subjects, how good are you in maths?

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
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<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>A lot worse</td>
<td>a lot better</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>in maths than</td>
<td>in maths than</td>
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<td></td>
</tr>
<tr>
<td>in other subjects</td>
<td>in other subjects</td>
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<td></td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

4 How well do you expect to do in maths this semester?

<table>
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<tr>
<th>0</th>
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<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>very well</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

5 How good would you be at learning something new in maths?

<table>
<thead>
<tr>
<th>0</th>
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<th>4</th>
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<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>very good</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6 Some things that you learn in school help you do things better outside of class, that is, they are useful. For example, learning about plants might help you grow a garden. In general, how useful is what you learn in maths?

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
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<th>4</th>
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<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>very useful</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7  Compared to most of your other activities, how **useful** is what you learn in maths?
   
   0  1  2  3  4  5  6  7  8  9  10
   Not at all                          Very

8  For me, being good in maths is .....  
   
   0  1  2  3  4  5  6  7  8  9  10
   Not at all                         Very
   **important**                      **important**

9  Compared to most of your other activities, how **important** is it for you to be good at maths?
   
   0  1  2  3  4  5  6  7  8  9  10
   Not at all                          Very

10 In general, I find working on maths assignments ....
   
   0  1  2  3  4  5  6  7  8  9  10
   **Very**                            **Very**
   **boring**                          **interesting**

11 How much do you like doing maths?
   
   0  1  2  3  4  5  6  7  8  9  10
   Not at all                          Very much

12 You have a certain amount of maths ability and you really can't do much to change it.
   
   0  1  2  3  4  5  6  7  8  9  10
   **Strongly**                        **Strongly**
   **Disagree**                        **Agree**

13 Your maths ability is something about you that you can't change very much.
   
   0  1  2  3  4  5  6  7  8  9  10
   **Strongly**                        **Strongly**
   **Disagree**                        **Agree**

14 You can learn new things, but you can't really change your basic maths ability.
   
   0  1  2  3  4  5  6  7  8  9  10
   **Strongly**                        **Strongly**
   **Disagree**                        **Agree**
Reading Questions

1 How good in reading are you?

0 1 2 3 4 5 6 7 8 9 10
Not at all Very good
good

2 If you were to list all the students in your class from the worst to the best in reading, where would you put yourself?

0 1 2 3 4 5 6 7 8 9 10
One of One of
the worst the best

3 Some kids are better in one subject than in another. For example, you might be better in reading than music. Compared to most of your other school subjects, how good are you in reading?

0 1 2 3 4 5 6 7 8 9 10
A lot worse A lot better
in reading than in reading than
in other subjects in other subjects

4 How well do you expect to do in reading this semester?

0 1 2 3 4 5 6 7 8 9 10
Not at all Very well
well

5 How good would you be at learning something new in reading?

0 1 2 3 4 5 6 7 8 9 10
Not at all Very good
good

6 Some things that you learn in school help you do things better outside of class, that is, they are useful. For example, learning about plants might help you grow a garden. In general, how useful is what you learn in reading?

0 1 2 3 4 5 6 7 8 9 10
Not at all Very

7 Compared to most of your other activities, how useful is what you learn in reading?

0 1 2 3 4 5 6 7 8 9 10
Not at all Very
8 For me, being good in reading is ….


0 1 2 3 4 5 6 7 8 9 10
Not at all
important

Very
important

9 Compared to most of your other activities, how important is it for you to be good at reading?


0 1 2 3 4 5 6 7 8 9 10
Not at all
Very

boring

interesting

10 In general, I find working on reading assignments ….


0 1 2 3 4 5 6 7 8 9 10
Very
boring

Very
interesting

11 How much do you like doing reading?


0 1 2 3 4 5 6 7 8 9 10
Not at all
Very much

12 You have a certain amount of reading ability and you really can't do much to change it.


0 1 2 3 4 5 6 7 8 9 10
Strongly
Disagree

Strongly
Agree

13 Your reading ability is something about you that you can't change very much.


0 1 2 3 4 5 6 7 8 9 10
Strongly
Disagree

Strongly
Agree

14 You can learn new things, but you can't really change your basic reading ability.


0 1 2 3 4 5 6 7 8 9 10
Strongly
Disagree

Strongly
Agree
Music Questions

1 How good are you at music?

0 1 2 3 4 5 6 7 8 9 10
Not at all good Very good

The next series of questions ask for your beliefs about playing a musical instrument.
Some of you are already learning instruments or have learnt musical instruments in the past.
If you are not currently learning a musical instrument, I want you to imagine what it would be like
when you answer the next series of questions.

2 If you were to list all the students in your class from the worst to the best at playing
a musical instrument, where would you put yourself?

0 1 2 3 4 5 6 7 8 9 10
One of the worst One of the best

3 Compared to most of your other school activities how good are you, or would you be,
at playing a musical instrument?

0 1 2 3 4 5 6 7 8 9 10
A lot worse A lot better

4 How good are you, or would you be, at learning something new on your musical instrument?

0 1 2 3 4 5 6 7 8 9 10
Not at all good Very good

5 Compared to most of your other activities, how useful is what you learn in music?

0 1 2 3 4 5 6 7 8 9 10
Not at all Very

6 Some things you learn in school are useful and help you do things better outside of class.
In general, how useful is what you learn in instrumental music?

0 1 2 3 4 5 6 7 8 9 10
Not at all Very

7 For me, being good at playing a musical instrument is ....

0 1 2 3 4 5 6 7 8 9 10
Not at all Very
important important
8. How important is it for you to be good at playing a musical instrument?

   0 1 2 3 4 5 6 7 8 9 10
   Not at all Very

9. In general, I find working on music assignments .....

   0 1 2 3 4 5 6 7 8 9 10
   Very boring interesting

10. How much do you like playing a musical instrument?

    0 1 2 3 4 5 6 7 8 9 10
    Not at all Very much

11. You have a certain amount of music ability and you really can't do much to change it.

    0 1 2 3 4 5 6 7 8 9 10
    Strongly Disagree Strongly Agree

12. Your music ability is something about you that you can't change very much.

    0 1 2 3 4 5 6 7 8 9 10
    Strongly Disagree Strongly Agree

13. You can learn new things, but you can't really change your basic music ability.

    0 1 2 3 4 5 6 7 8 9 10
    Strongly Disagree Strongly Agree
Sports Questions

1. How good at sport are you?

   0 1 2 3 4 5 6 7 8 9 10
   Not at all good Very good

2. If you were to list all the students in your class from the worst to the best in sport, where would you put yourself?

   0 1 2 3 4 5 6 7 8 9 10
   One of the worst One of the best

3. Some kids are better in one subject than in another. For example, you might be better in sport than English. Compared to most of your other school subjects, how good are you in sport?

   0 1 2 3 4 5 6 7 8 9 10
   A lot worse in sport than A lot better in sport than in other subjects in other subjects

4. How well do you expect to do in sport this semester?

   0 1 2 3 4 5 6 7 8 9 10
   Not at all well Very well

5. How good would you be at learning something new in sport?

   0 1 2 3 4 5 6 7 8 9 10
   Not at all good Very good

6. Some things that you learn in school help you do things better outside of class, that is, they are useful. For example, learning about plants might help you grow a garden. In general, how useful is what you learn in sport?

   0 1 2 3 4 5 6 7 8 9 10
   Not at all useful Very useful

7. Compared to most of your other activities, how useful is what you learn in sport?

   0 1 2 3 4 5 6 7 8 9 10
   Not at all useful Very useful
8 For me, being good in sport is ....

0 1 2 3 4 5 6 7 8 9 10
Not at all               Very
important               important

9 Compared to most of your other activities, how important is it for you to be good at sport?

0 1 2 3 4 5 6 7 8 9 10
Not at all               Very

10 In general, I find working on sport assignments ....

0 1 2 3 4 5 6 7 8 9 10
Very                     Very
boring                   interesting

11 How much do you like doing sport?

0 1 2 3 4 5 6 7 8 9 10
Not at all               Very much

12 You have a certain amount of sports ability and you really can’t do much to change it.

0 1 2 3 4 5 6 7 8 9 10
Strongly                 Strongly
Disagree                 Agree

13 Your sports ability is something about you that you can’t change very much.

0 1 2 3 4 5 6 7 8 9 10
Strongly                 Strongly
Disagree                 Agree

14 You can learn new things, but you can’t really change your basic sports ability.

0 1 2 3 4 5 6 7 8 9 10
Strongly                 Strongly
Disagree                 Agree
**General Questions**

For these questions I want you to describe how you usually feel during lessons in maths, reading, music and sport. If you are learning a musical instrument describe how you feel during these lessons.

1. I generally feel happy and alert during maths lessons.  
   - 0: Strongly disagree  
   - 1: Strongly agree

2. I generally feel confused during maths classes.  
   - 0: Strongly disagree  
   - 1: Strongly agree

3. How challenging do you usually find maths classes?  
   - 1: Low challenge  
   - 2: High challenge

4. How are your maths skills during lessons?  
   - 1: Low skills  
   - 2: High skills

5. I usually feel happy and alert during reading classes.  
   - 0: Strongly disagree  
   - 1: Strongly agree

6. I generally feel confused during reading classes.  
   - 0: Strongly disagree  
   - 1: Strongly agree

7. How challenging do you usually find reading classes?  
   - 1: Low challenge  
   - 2: High challenge

8. How are your reading skills during lessons.  
   - 1: Low skills  
   - 2: High skills

9. I normally feel happy and alert during music lessons.  
   - 0: Strongly disagree  
   - 1: Strongly agree

10. I generally feel confused during music classes.  
    - 0: Strongly disagree  
    - 1: Strongly agree
11 How challenging do you usually find music classes.

<table>
<thead>
<tr>
<th></th>
<th>disagree</th>
<th>agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>1 2 3 4 5 6 7 8</td>
<td>9 10</td>
</tr>
<tr>
<td>challenge</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12 How are your music skills during lessons.

<table>
<thead>
<tr>
<th></th>
<th>disagree</th>
<th>agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>1 2 3 4 5 6 7 8</td>
<td>9 10</td>
</tr>
<tr>
<td>skills</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

13 I usually feel happy and alert during sports classes.

<table>
<thead>
<tr>
<th></th>
<th>disagree</th>
<th>agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly</td>
<td>0 1 2 3 4 5 6 7 8</td>
<td>9 10</td>
</tr>
<tr>
<td>disagree</td>
<td></td>
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<tr>
<td>Strongly</td>
<td></td>
<td></td>
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<tr>
<td>agree</td>
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</tbody>
</table>

14 I generally feel confused during sports classes.

<table>
<thead>
<tr>
<th></th>
<th>disagree</th>
<th>agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly</td>
<td>0 1 2 3 4 5 6 7 8</td>
<td>9 10</td>
</tr>
<tr>
<td>disagree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly</td>
<td></td>
<td></td>
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<tr>
<td>agree</td>
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</table>

15 How challenging do you usually find sports classes.

<table>
<thead>
<tr>
<th></th>
<th>disagree</th>
<th>agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>1 2 3 4 5 6 7 8</td>
<td>9 10</td>
</tr>
<tr>
<td>challenge</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

16 How are your sports skills during lessons.

<table>
<thead>
<tr>
<th></th>
<th>disagree</th>
<th>agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>1 2 3 4 5 6 7 8</td>
<td>9 10</td>
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<tr>
<td>skills</td>
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<tr>
<td>High</td>
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<td></td>
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<tr>
<td>skills</td>
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</tr>
</tbody>
</table>
SELF-DESCRIPTION QUESTIONNAIRE-I

Your Name: ________________________________

School: ________________________________

Teacher: ________________________________

Circle one:  Boy  Girl

Grade: _______ Age: _______

Date: ____________________________

This is a chance to look at yourself. It is not a test. There are no right answers, and everyone will have different answers. Be sure that your answers show how you feel about yourself. PLEASE DO NOT TALK ABOUT YOUR ANSWERS WITH ANYONE ELSE. We will keep your answers private and not show them to anyone.

When you are ready to begin, please read each sentence and choose an answer. (You may read quietly to yourself as I read aloud.) There are five possible answers for each question: "True;" "False;" and three answers in between. There are five boxes next to each sentence, one for each of the answers. The answers are written at the top of the boxes. Choose your answer to a sentence and make a check mark in the box under the answer you choose. DO NOT say your answer out loud or talk about it with anyone else.

Before you start, there are three examples below. A student, Bob, has already answered two of these sentences to show you how to do it. In the third example you must choose your own answer and put in your own check mark.

**EXAMPLES**

1. I like to read comic books ....... 1

   Bob checked the box under the answer "True." This means that he really likes to read comic books. If Bob did not like to read comic books very much, he would have answered "FALSE" or "MOSTLY FALSE;"

2. In general, I am neat and tidy ....... 2

   Bob answered "SOMETIMES FALSE, SOMETIMES TRUE;" because he is not very neat, but he is not very messy either.

3. I like to watch TV ....... 3

   For this sentence you have to choose the answer that is best for you. First you must decide if the sentence is "TRUE;" or "FALSE;" or somewhere in between. If you really like to watch TV a lot, you would answer "TRUE" by making a check mark in the last box. If you hate watching TV, you would answer "FALSE" by making a check mark in the first box. If your answer is somewhere in between, then you would choose one of the other three boxes.

If you want to change an answer you have marked, you should cross out the check mark and put a new check mark in another box on the same line.

For all the sentences be sure that your check mark is on the same line as the sentence you are answering. You should have one answer and only one answer for each sentence. Do not leave out any of the sentences. Once you have started, PLEASE DO NOT TALK. Turn over the page and begin.
<table>
<thead>
<tr>
<th>Number</th>
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<th>Options</th>
<th>Options</th>
<th>Options</th>
<th>Options</th>
</tr>
</thead>
<tbody>
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<td>1</td>
<td>I am good looking</td>
<td>FALSE</td>
<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>2</td>
<td>I'm good at all SCHOOL SUBJECTS</td>
<td>FALSE</td>
<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>3</td>
<td>I can run fast</td>
<td>FALSE</td>
<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>4</td>
<td>I get good marks in READING</td>
<td>FALSE</td>
<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>5</td>
<td>My parents understand me</td>
<td>FALSE</td>
<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>6</td>
<td>I hate MATHEMATICS</td>
<td>FALSE</td>
<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>7</td>
<td>I have lots of friends</td>
<td>FALSE</td>
<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>8</td>
<td>I like the way I look</td>
<td>FALSE</td>
<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>9</td>
<td>I enjoy doing work in all SCHOOL SUBJECTS</td>
<td>FALSE</td>
<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>10</td>
<td>I like to run and play hard</td>
<td>FALSE</td>
<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>11</td>
<td>I like READING</td>
<td>FALSE</td>
<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>12</td>
<td>My parents are usually unhappy or disappointed with what I do</td>
<td>FALSE</td>
<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>13</td>
<td>Work in mathematics is easy for me</td>
<td>FALSE</td>
<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>14</td>
<td>I make friends easily</td>
<td>FALSE</td>
<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>15</td>
<td>I have a pleasant looking face</td>
<td>FALSE</td>
<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>16</td>
<td>I get good marks in all SCHOOL SUBJECTS</td>
<td>FALSE</td>
<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>17</td>
<td>I hate sports and games</td>
<td>FALSE</td>
<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>18</td>
<td>I'm good at READING</td>
<td>FALSE</td>
<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>19</td>
<td>I like my parents</td>
<td>FALSE</td>
<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>20</td>
<td>I look forward to MATHEMATICS</td>
<td>FALSE</td>
<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
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<tr>
<td>21</td>
<td>Most kids have more friends than I do</td>
<td>FALSE</td>
<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
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<tr>
<td>22</td>
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<td>FALSE</td>
<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
<td>TRUE</td>
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<tr>
<td>23</td>
<td>I hate all SCHOOL SUBJECTS</td>
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<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>24</td>
<td>I enjoy sports and games</td>
<td>FALSE</td>
<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>25</td>
<td>I am interested in READING</td>
<td>FALSE</td>
<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
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</tr>
<tr>
<td>26</td>
<td>My parents like me</td>
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<td>MOSTLY FALSE</td>
<td>SOME TIMES TRUE</td>
<td>TRUE</td>
</tr>
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<td></td>
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</tr>
<tr>
<td>27</td>
<td>I get good marks in <strong>MATHEMATICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>I get along with kids easily</td>
<td></td>
<td></td>
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<tr>
<td>29</td>
<td>I do lots of important things</td>
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<tr>
<td>30</td>
<td>I am ugly</td>
<td></td>
<td></td>
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<tr>
<td>31</td>
<td>I learn things quickly in all <strong>SCHOOL SUBJECTS</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>32</td>
<td>I look forward to <strong>MUSIC</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>I have good muscles</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>34</td>
<td>I am dumb at <strong>READING</strong></td>
<td></td>
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<tr>
<td>35</td>
<td>If I have children of my own, I want to bring them up like my parents raised me</td>
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<td>36</td>
<td>I get good marks in <strong>MUSIC</strong></td>
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<td>37</td>
<td>I am interested in <strong>MATHEMATICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>I am easy to like</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>Overall, I am no good</td>
<td></td>
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<td>Other kids think I am good looking</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>41</td>
<td>I hate <strong>MUSIC</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>42</td>
<td>I am interested in all <strong>SCHOOL SUBJECTS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>43</td>
<td>I am good at sports</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>44</td>
<td>I enjoy doing work in <strong>READING</strong></td>
<td></td>
<td></td>
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<tr>
<td>45</td>
<td>My parents and I spend a lot of time together</td>
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<tr>
<td>46</td>
<td>I learn things quickly in <strong>MATHEMATICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>Other kids want me to be their friend</td>
<td></td>
<td></td>
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<tr>
<td>48</td>
<td>In general, I like being the way I am</td>
<td></td>
<td></td>
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<tr>
<td>49</td>
<td>I have a good looking body</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>50</td>
<td>I learn things quickly in <strong>MUSIC</strong></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>51</td>
<td>I am dumb in all <strong>SCHOOL SUBJECTS</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>I can run a long way without stopping</td>
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</tr>
</tbody>
</table>
53 Work in **READING** is easy for me.................................

54 My parents are easy to talk to..................................

55 I like **MUSIC**..........................................................

56 I like **MATHEMATICS**.............................................

57 I have more friends than most other kids..................

58 Overall I have a lot to be proud of............................

59 I'm better looking than most of my friends.................

60 I'm good at **MUSIC**................................................

61 I look forward to all **SCHOOL SUBJECTS**...................

62 I am a good athlete................................................

63 I look forward to **READING**....................................

64 I get along well with my parents.............................

65 I enjoy doing work in **MUSIC**..................................

66 I'm good at **MATHEMATICS**....................................

67 I am popular with kids of my own age.......................

68 I can't do anything right........................................

69 I am interested in **MUSIC**......................................

70 I have nice features like nose, and eyes, and hair...

71 Work in all **SCHOOL SUBJECTS** is easy for me...

72 I'm good at throwing a ball....................................

73 I hate **READING**..................................................

74 My parents and I have a lot of fun together..............

75 I can do things as well as most other people.............

76 Work in **MUSIC** is easy for me..............................

77 I enjoy doing work in **MATHEMATICS**.....................

78 Most other kids like me.........................................
<table>
<thead>
<tr>
<th></th>
<th>Statement</th>
<th>False</th>
<th>Mostly False</th>
<th>Sometimes False</th>
<th>Mostly True</th>
<th>True</th>
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</thead>
<tbody>
<tr>
<td>79</td>
<td>Other people think I am a good person</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>80</td>
<td>I like all <strong>SCHOOL SUBJECTS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>81</td>
<td>A lot of things about me are good</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>82</td>
<td>I learn things quickly in <strong>READING</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>83</td>
<td>I'm as good as most other people</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>84</td>
<td>I am dumb at <strong>MATHEMATICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>85</td>
<td>When I do something, I do it well</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Appendix B: Questionnaire for Parents

Thank you for agreeing to participate in this study.
If possible, it is requested that the parent/guardian who has primary involvement with educational matters concerning the child participating in this study should complete the questionnaire. Would you please circle one of the following:

Relationship to child participant: **Mother / Father / Other (specify)**..........................

Marital status: **Married / Single / Divorced / Other (specify)**..........................

Education level: **Mother** -- Primary / Secondary / Tertiary
**Father** -- Primary / Secondary / Tertiary
**Other** -- Primary / Secondary / Tertiary

The following questions concern the child participating in this study.

**Child's Name:**.............................. **Child's birthdate:**........../......./......

**School:**.............................. **Date:**........../......./......

Is this child currently learning a musical instrument? **Yes / No**
If yes, what is this instrument(s)? (1)...............(2).............(3)...............
How long has this instrument(s) been learnt (years/months)? (1)...............(2).............(3)...............

Has this child previously learnt a musical instrument? **Yes / No**
If yes, what was the instrument(s)? (1)...............(2).............(3)...............
How long was this instrument(s) learnt (years/months)? (1)...............(2).............(3)...............

The following questions are divided into two sections. **Section 1** questions ask about your own views on intelligence and the four subject areas being investigated (maths, English, instrumental music and sport). **Section 2** questions are focused on your beliefs about the child participating in this study.

Each question can be answered by circling one number to show your view.
Responses of "0" and "10" represent extreme opposing beliefs and a response of "5" represents the most moderate position.
Please do not take too long over each response as your first impression will probably be fairly accurate. If there is any question that you think is too difficult to answer or is not covered adequately by the response options, please feel free to leave that question blank.

Please circle only one number in response to each statement or question.
Section 1: Personal Beliefs

1. You have a certain amount of intelligence and you really can’t do much to change it.
   
<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Strongly Agree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Your intelligence is something about you that you can’t change very much.
   
<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Strongly Agree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. You can learn new things, but you can’t really change your basic intelligence.
   
<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Strongly Agree</td>
<td></td>
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<td></td>
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</table>

4. Compared to other subjects taught at school, how important do you consider maths?
   
<table>
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<tr>
<th></th>
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<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<th>7</th>
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</tr>
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<tbody>
<tr>
<td>Not at all Extremely</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

5. Compared to other subjects taught at school, how useful do you consider maths?
   
<table>
<thead>
<tr>
<th></th>
<th>0</th>
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<th>3</th>
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<th>7</th>
<th>8</th>
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<th>10</th>
</tr>
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<tbody>
<tr>
<td>Not at all Extremely</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

6. How interesting do you find maths?
   
<table>
<thead>
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<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all Extremely</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

7. You have a certain amount of maths ability and you really can’t do much to change it.
   
<table>
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<th>1</th>
<th>2</th>
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<td>Strongly Agree</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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</tbody>
</table>

8. Your maths ability is something about you that you can’t change very much.
   
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<tbody>
<tr>
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</table>

9. You can learn new things, but you can’t really change your basic maths ability.
   
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</tbody>
</table>
10 Compared to other subjects taught at school, how **important** do you consider reading?

0 1 2 3 4 5 6 7 8 9 10
Not at all Extremely

11 Compared to other subjects taught at school, how **useful** do you consider reading?

0 1 2 3 4 5 6 7 8 9 10
Not at all Extremely

12 **How interesting** do you find reading?

0 1 2 3 4 5 6 7 8 9 10
Not at all Extremely

13 You have a certain amount of reading ability and you really can’t do much to change it.

0 1 2 3 4 5 6 7 8 9 10
Strongly
Disagree

14 Your reading ability is something about you that you can’t change very much.

0 1 2 3 4 5 6 7 8 9 10
Strongly
Disagree

15 You can learn new things, but you can’t really change your basic reading ability.

0 1 2 3 4 5 6 7 8 9 10
Strongly
Disagree

16 Compared to other subjects taught at school, how **important** do you consider instrumental music?

0 1 2 3 4 5 6 7 8 9 10
Not at all Extremely

17 Compared to other subjects taught at school, how **useful** do you consider instrumental music?

0 1 2 3 4 5 6 7 8 9 10
Not at all Extremely

18 **How interesting** do you find music?

0 1 2 3 4 5 6 7 8 9 10
Not at all Extremely
19 You have a certain amount of music ability and you really can’t do much to change it.

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<td>Agree</td>
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<tr>
<td>Strongly</td>
<td>Not at all</td>
<td>Extremely</td>
<td>Agree</td>
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20 Your music ability is something about you that you can’t change very much.

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21 You can learn new things, but you can’t really change your basic music ability.

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22 Compared to other subjects taught at school, how important do you consider sport?

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23 Compared to other subjects taught at school, how useful do you consider sport?

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24 How interesting do you find sport?

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25 You have a certain amount of sports ability and you really can’t do much to change it.

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26 Your sports ability is something about you that you can’t change very much.

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27 You can learn new things, but you can’t really change your basic sports ability.

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Section 2: Beliefs about your child

28 How good is your child in maths?

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29 How well do you expect your child to do next semester in maths?

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30 Compared to other children, how much innate ability or talent does your child have in maths?

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31 In comparison to other children, how do you evaluate your child's performance in maths?

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32 How good is your child in reading?

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33 How well do you expect your child to do next semester in reading?

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34 Compared to other children, how much innate ability or talent does your child have in reading?

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35 In comparison to other children, how do you evaluate your child's performance in reading?

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36 How good is your child at music?

0 1 2 3 4 5 6 7 8 9 10
Not at all good Very good

37 How well do you expect your child to do next semester in instrumental music?

0 1 2 3 4 5 6 7 8 9 10
Very poorly Exceptionally well

38 Compared to other children, how much innate ability or talent does your child have in music?

0 1 2 3 4 5 6 7 8 9 10
Much less than other children Much more than other children

39 In comparison to other children, how do you evaluate your child’s performance in music?

0 1 2 3 4 5 6 7 8 9 10
Much worse than other children Much better than other children

40 How good is your child at sport?

0 1 2 3 4 5 6 7 8 9 10
Not at all good Very good

41 How well do you expect your child to do next semester in sport?

0 1 2 3 4 5 6 7 8 9 10
Very poorly Exceptionally well

42 Compared to other children, how much innate ability or talent does your child have in sport?

0 1 2 3 4 5 6 7 8 9 10
Much less than other children Much more than other children

43 In comparison to other children, how do you evaluate your child’s performance in sport?

0 1 2 3 4 5 6 7 8 9 10
Much worse than other children Much better than other children

Thank you very much for taking the time to complete this questionnaire. Please place this questionnaire in the prepaid envelope provided and deposit it in a post box.
Appendix C: Teacher Questionnaire

Date: ......./......./....... 

The following questions refer to your beliefs about the children participating in this study. Each question can be answered by selecting a number representing your view about the relative position of the children concerned along a continuum of possible responses. Responses of 1 and 10 represent extreme opposing beliefs and responses of 4, 5 and 6 represent the most moderate positions.

Please write down one response number for each child participating in this study.

1 Compared to other children how good is this child at maths?

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<thead>
<tr>
<th>Number</th>
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<tbody>
<tr>
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<td>Much better than other children</td>
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<tr>
<th>Child's Name</th>
<th>Response number</th>
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<td>Name</td>
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2 How well do you expect this child to do next semester in maths?

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<th>Number</th>
<th>Description</th>
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<tbody>
<tr>
<td>0</td>
<td>Not at all well</td>
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<tr>
<td>1</td>
<td>Exceptionally well</td>
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<tr>
<th>Child's Name</th>
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<td>Name</td>
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Reading

1 Compared to other children how good is this child at reading?

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2 How well do you expect this child to do next semester in reading?

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<td>Name</td>
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Thank you very much for taking the time to complete this questionnaire.
Please place the questionnaire in the prepaid envelope provided and deposit it in a post box (the envelope does not require a stamp).
Teacher Questionnaire

Date:....../....../......

The following questions refer to your beliefs about the children participating in this study. Each question can be answered by selecting a number representing your view about the relative position of the children concerned along a continuum of possible responses. Responses of 1 and 10 represent extreme opposing beliefs and responses of 4, 5 and 6 represent the most moderate positions.

Please write down one response number for each child participating in this study.

1 Compared to other children how good is this child at sport?

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<th>Response</th>
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<tr>
<td>Much worse</td>
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<td>than other</td>
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Child's Name          Response
Name                   ......
Name                   ......

2 How well do you expect this child to do next semester in sport?

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<th>Response</th>
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<tbody>
<tr>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Not at all</td>
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<td>well</td>
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Child's Name          Response
Name                   ......
Name                   ......

Thank you very much for taking the time to complete this questionnaire. Please place the questionnaire in the prepaid envelope provided and deposit it in a post box (the envelope does not require a stamp).
Teacher Questionnaire

Date:....../....../......

(please circle one)  Age: 21-30 / 31-40 / 41.  Gender: Male / Female

The following questions refer to your beliefs about the children participating in this study. Each question can be answered by selecting a number representing your view about the relative position of the children concerned along a continuum of possible responses. Responses of 1 and 10 represent extreme opposing beliefs and responses of 4, 5 and 6 represent the most moderate positions.

Please write down one response number for each child participating in this study.

1 Compared to other children how good is this child at instrumental music?

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Child's Name  Response

Name  ......
Name  ......

2 How well do you expect this child to do next semester in instrumental music?

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Child's Name  Response

Name  ......
Name  ......

Thank you very much for taking the time to complete this questionnaire.
Please place the questionnaire in the prepaid envelope provided and deposit it in a post box (the envelope does not require a stamp).
Appendix D:  

DEAKIN UNIVERSITY  
ETHICS COMMITTEE  

PLAIN LANGUAGE STATEMENT (Children)

Project Title: Towards an integration of theories of achievement motivation as applied to children's school performance

My name is David Wellman and I am a psychology student at Deakin University. I would like to invite you to participate in a project I am doing as part of my university studies. I am interested in finding out what children of your age think and feel about mathematics, reading, sport and instrumental music. I am also interested in whether your thoughts about each subject are related to what your parents think. Finally, I would like to know if your thoughts and feelings about these subjects change during year 5 and how these are related to how well you are doing in each subject.

In the first week, I will come to the school and ask you a series of questions about your thoughts about these subjects, and also some concerning how you see yourself. You will be able to answer each question by circling a number from 1 to 10. This should take about 45 minutes. I will come back to the school later in the year to ask you some of these questions again and this should take about 20 minutes. Your parents will be asked similar questions including how good they think you are in each subject.

At the end of terms two and four your teachers will be asked two questions about how well they think you are doing in each of the four subjects.

I would like to know if you would like to take part in my project. If you say "Yes" and then decide that you do not want to answer my questions, then you don’t have to. If you change your mind about taking part in my study, you can tell me at any time and you won’t have to take part any more.

None of your answers will be available to anybody except me; your parents and teachers will not see your answers. When I write up my report I will not use any names.

I would like you to take home an envelope and ask your parents to read the contents. If you and your parents agree to participate in my study, please bring back the signed consent forms within the next few days and I will come and collect it.

Thank you very much,

David Wellman
Appendix E:

DEAKIN UNIVERSITY
ETHICS COMMITTEE
PLAIN LANGUAGE STATEMENT (Parents)

Project Title: Towards an integration of theories of achievement motivation as applied to children’s school performance

My name is David Wellman and I am currently enrolled in a Master of Arts degree by research in the School of Psychology at Deakin University. As part of my degree I am undertaking a research project under the supervision of Dr Sue Chambers to discover if children’s thoughts and feelings about school subjects differ and, if so, how these differences are related to school achievement. I am also interested in looking at the relationship between beliefs and values about achievement in school subjects by children, parents and teachers. The focus of this research will be on the school subjects of maths, English/reading, instrumental music and sport during grades four and five.

I would like to invite you, the primary carer (parent/guardian), and your grade 5 child to participate in this study. The principal of the school has given approval for the research to take place. The project will involve you, your child and their school teachers each completing two separate questionnaires during 1999. These will take place during March/April and August/September. Children will complete the questionnaires during school hours and the first of these should take approximately 45 minutes and the second about 25 minutes. All questions will be read aloud to the children. The parent questionnaires will be sent home with your child, and can be returned to Deakin University through a prepaid envelope provided. As well as the questions outlined below, the questionnaire for parents will ask several general questions, such as parents’ education level and marital status. The first parent questionnaire should take approximately 20 minutes to complete and the other about ten minutes. Teachers will complete a similar questionnaire to parents in which, among other things, they will be asked to rate the competence of your child in the four subject areas.

Some of the questions to be asked are similar for children, parents and teachers, while others are exclusively for children.

(A) Questions for Children, Parents and Teachers ___. These will focus on competence beliefs by, and about, your child. Questions will ask about personal values attached to each subject, general beliefs about intelligence, and subject specific views on achievement and ability. All of these questions can be answered by circling one response option from a scale provided. Some examples of questions included in the study are,

1) Child: “How well do you expect to do in maths this semester?” (not very well/very well)
   Parent: “How well do you expect your child to do in maths this semester?” (not very well/very well)
   Teacher: “How well do you expect ...child’s name... to do in maths this semester?”(not very well/very well)
2) Child: “Compared to most of your other activities, how important is it for you to be good at English?” (not very important/very important)
   Parent/Teacher: “Compared to most school subjects, how important is it for children to be good at English?”
3) Child: “You have a certain amount of music ability and you can’t really do much to change it” (strongly agree/strongly disagree)
   Parent/Teacher: “You have a certain amount of music ability and you can’t really do much to change it” (strongly agree/strongly disagree)

(A) Questions for Children Only ___. These questions will only be asked in the first questionnaire for children and concern their general self-concept. Some examples of the self-concept questions are,

1) “I’m good at all school subjects” (true/false)
2) “I make friends easily” (true/false)

During the course of each semester, children would also be required to complete a 9-item questionnaire measuring their thoughts and feelings about their experience during lessons at four different times for each subject. Questions will ask “How challenging was maths class today?” and “How were your skills in maths class today?”, as well as questions about their current feelings (i.e., happy/sad). It is expected that these questionnaires will take no longer than five minutes.
In order to compare children’s beliefs and values about each subject with their subsequent achievement in those subjects, teachers will be asked to provide a ranked achievement score at the end of each semester for each subject.

Because of the longitudinal nature of this research, it would be required that you and your child place your names on each questionnaire so that they can be matched. However, as soon as they are received they will be coded onto a computer program anonymously and the written responses and coding files stored in a locked filing cabinet at Deakin University. In reporting my research, aggregate responses will be used so that no individual participants can be identified.

All participants in this study will be free to withdraw at any time. If a participant does choose to withdraw, all personal data collected to that time would be destroyed without any adverse consequences.

A summary of my findings will be provided to the school during February, 2000, and will be made available for anyone interested in the outcome of the research. It is anticipated that the results will provide valuable educational information about differences and changes in children’s beliefs and values associated with achievement in each of the subject areas being investigated. The results will enable appropriate strategies to be introduced to encourage children to be motivated in their participation in the different subject areas.

Should you have any concerns about the conduct of this research, please contact the Secretary, Deakin University Ethics Committee, Research Services, Deakin University, 221 Burwood Highway, BURWOOD Vic. 3125. Tel (03) 9251 7123.

If you and your child agree to participate, please complete and sign the accompanying consent forms and return them to school in the next few days sealed in the Deakin University envelope provided. Thank you very much for taking the time to read my proposal. If you have any queries, please do not hesitate to contact:

**Student Researcher:** David Wellman.  **Supervisor:** Dr Sue Chambers, Senior Lecturer in the School of Psychology

Tel: (03) 9244 6262
Appendix F: DEAKIN UNIVERSITY ETHICS COMMITTEE

CONSENT FORM: SURVEYS, QUESTIONNAIRES

Parents

I, of

Hereby consent to be a subject of a human research study to be undertaken

By David Wellman

and I understand that the purpose of the research is to investigate the relationship between children’s thoughts and feelings about the school subjects of maths, English/reading, instrumental music and sport, and their achievement in those subjects. The relationship between children’s achievement beliefs and those of parents will also be investigated. I understand that I will be required to complete two questionnaires during 1999, rating my child’s level of competence in each subject as well as answering questions about my own achievement related beliefs and values. I also understand that questionnaires will take between 10 and 20 minutes to complete.

I acknowledge that

1. Upon receipt, my questionnaire will be coded and my name and address kept separately from it.
2. Any information that I provide will not be made public in any form that could reveal my identity to an outside party ie. that I will remain fully anonymous.
3. Aggregated results will be used for research purposes and may be reported in scientific and academic journals.
4. Individual results will not be released to any person except at my request and on my authorisation.
5. That I am free to withdraw my consent at any time during the study in which event my participation in the research study will immediately cease and any information obtained from me will not be used.

Signature: Date:

NOTE:
In the event of a minor’s consent, or person under legal liability, please complete the Ethics Committee’s "Form of Consent on Behalf of a Minor or Dependent Person".
Appendix G

DEAKIN UNIVERSITY
ETHICS COMMITTEE
CONSENT ON BEHALF OF A MINOR OR DEPENDENT PERSON

1. 

of

Hereby give consent for my son / daughter / dependent

to be a subject of a human research study to be undertaken by David Wellman.

I understand that the purpose of the research is to investigate the relationship between children's thoughts and feelings about the school subjects of maths, English/reading, instrumental music and sport, and their achievement in those subjects. The relationship between children's achievement beliefs and those of parents will also be investigated. I understand that my child will be required to complete two questionnaires during 1999 concerning their thoughts and feelings about maths, reading, instrumental music, sport, achievement and general self-concept. I am aware that the first of these will take approximately 45 minutes to complete, and the second about 25 minutes.

I acknowledge

1. That the aims, methods, and anticipated benefits, and possible hazards/risks of the research study, have been explained to me.

2. That I voluntarily and freely give my consent to my child's / dependent's participation in such research study.

3. I understand that aggregated results will be used for research purposes and may be reported in scientific and academic journals.

4. Individual results will not be released to any person including medical partitioners.

5. That I am free to withdraw my consent at any time, during the study in which event my child's/dependent's participation in the research study will immediately cease and any information obtained will not be used.

Signature: 

Date:

NOTE: Probably both parents should consent if both parents are living together. If divorced or separated, certainly the parent who has legal custody of the child should consent, and it would be prudent to obtain the consent of both even in this event. If such consent of the other parent is not readily obtainable the consent of the custodial parent would be or should be sufficient unless the second parent actively refuses consent. If this occurs, the child or dependent person should not participate. Joint guardianship of a dependent should be treated in the same manner.
Appendix H: DEAKIN UNIVERSITY
ETHICS COMMITTEE

PLAIN LANGUAGE STATEMENT (Teachers)

Project Title: Towards an integration of theories of achievement motivation as applied to children’s school performance

My name is David Wellman and I am currently enrolled in a Master of Arts degree by research in the School of Psychology at Deakin University. As part of my degree I am undertaking a research project under the supervision of Dr Sue Chambers to investigate how children’s thoughts and feelings about school subjects differ and whether these differences are systematically related to school achievement. I am also interested in looking at the relationship between beliefs and values about achievement in school subjects by children, parents and teachers. The focus of this research will be on the school subjects of maths, English/reading, instrumental music and sport, and how children’s thoughts and feelings change during grades four and five.

I would like to invite you to participate in this study. The principal of the school has given approval for the research to take place. The project will involve students in grade four during 1998, and grade five during 1999, their parents, and their teachers in maths, English/reading, instrumental music (general music in grade four) and sport. You would be required to complete up to three questionnaires over a twelve-month period, depending on which semester(s) you were teaching the participating children. Questionnaires will be distributed in September/October 1998, March/April 1999, and August/September 1999. It is expected that the first questionnaire will take approximately 20 minutes to complete, with later questionnaires taking about 10 minutes.

You would be asked in each questionnaire to rate the competence of the participating children in the subject(s) that you teach. For instance, “How well do you expect this child to do next semester in maths?” (not very well/very well). In the first questionnaire, you would also be asked about your personal values related to the four subjects being studied as well as general and subject-specific views on intelligence and achievement. Some examples are, “Compared to most school activities, how important is it for children to be good at sport?” (strongly agree/strongly disagree), and “You have a certain amount of intelligence and you can’t really do much to change it?” (strongly agree/strongly disagree). All questions can be answered by circling one response along a scale of response options.

Because of the longitudinal nature of this research, it would be required that you place your name on each questionnaire so that they can be matched. However, as soon as they are received they will be coded onto a computer program anonymously and the written responses and coding files stored in a locked filing cabinet at Deakin University, where they will remain for a minimum of five years. In reporting my research, aggregate responses will be used so that no individual participants can be identified.

All participants in this study are free to withdraw at any time. If a participant does choose to withdraw, all personal data collected to that stage would be destroyed without any adverse consequences.

A summary of my findings will be provided to the school during February, 2000, and will be made available for anyone interested in the outcome of the research. It is anticipated that the results will provide valuable educational information about differences and changes in grade four and five children’s beliefs and values associated with achievement in each of the subject areas being investigated. The results will enable appropriate strategies to be introduced to encourage children to be motivated in their participation in the different subject areas.

Should you have any concerns about the conduct of this research, please contact the Secretary, Deakin University Ethics Committee, Research Services, Deakin University, 221 Burwood Highway, BURWOOD Vic. 3125. Tel (03) 9251 7123.

If you agree to participate, please complete and sign the accompanying consent form and return it in the prepaid envelope provided. If you have any queries, please contact:

Student Researcher: David Wellman. Supervisor: Dr. Sue Chambers, Senior Lecturer in the School of Psychology
Tel: (03) 9244 6262
Appendix I

DEAKIN UNIVERSITY
ETHICS COMMITTEE
CONSENT FORM: SURVEYS, QUESTIONNAIRES

I, __________________________ of __________________________

Hereby consent to be a subject of a human research study to be undertaken

By David Wellman
(TEACHERS)
and I understand that the purpose of the research is to investigate the relationship between children's thoughts and feelings about the school subjects of maths, English/reading, instrumental music and sport, and their achievement in those subjects. The relationship between children's achievement beliefs and those of parents and teachers will also be investigated. I understand that I will be required to complete up to three questionnaires over a 12-month period, rating children's level of competence in the subject(s) I teach as well as my own achievement beliefs and values. I also understand that questionnaires will take between 10 and 20 minutes to complete.

I acknowledge that

1. Upon receipt, my questionnaire will be coded and my name and address kept separately from it.
2. Any information that I provide will not be made public in any form that could reveal my identity to an outside party ie that I will remain fully anonymous.
3. Aggregated results will be used for research purposes and may be reported in scientific and academic journals.
4. Individual results will not be released to any person except at my request and on my authorisation.
5. That I am free to withdraw my consent at any time during the study in which event my participation in the research study will immediately cease and any information obtained from me will not be used.

Signature: __________________________
Date: __________________________

NOTE:
In the event of a minor's consent, or person under legal liability, please complete the Ethics Committee's "Form of Consent on Behalf of a Minor or Dependent Person".
Appendix J: Children's Achievement Motivation Questionnaire

Name:.................................Age:.... Circle one: Boy / Girl
School:.................................Class:.............
Teacher:...........................................

In the questions that follow, I am interested in finding out what you think. This is not a test and there are no right or wrong answers. Be sure that your answers show how you feel.

PLEASE do not talk about your answers with anyone else or copy what other people write.

When I ask you to begin, I want you to read each sentence quietly to yourself as I read aloud.

To answer, circle one number in each row between 0 and 10.

Do not take too long answering each question as your first choice is probably the best.

Before we start, let's look at three examples below. A student called Hilda has already answered two of these sentences to show you how to do it. In the third example you must choose your own answer and put in your own circle.

EXAMPLES

A How good are you at computer games?

0 1 2 3 4 5 6 7 8 9 10
Not very (average) Very good
good

Hilda circled number 8. This means that she thinks that she is quite good at computer games but not the very best. If she thought that she was the best she would have circled number 10 "Very good".

Some questions ask you to agree or disagree with a statement, like example B.

B In general, I find working on science projects very interesting.

0 1 2 3 4 5 6 7 8 9 10
Strongly (neither) Strongly
disagree agree

Hilda circled 0. This means that she really does not find science projects interesting. If she thought that science projects were sometimes boring and sometimes interesting, she would have circled number 4, 5 or 6, to show her interest in science projects was about average.

Now its your turn.

C For me, being good at drawing is...........

0 1 2 3 4 5 6 7 8 9 10
Not at all Very
important important

If you want to change an answer you have marked, you should cross out your circle and put a new circle on the number of your choice. If there is a question that you do not understand, please leave that one and I will give you some time at the end to finish.

If any of you feel uncomfortable about any of my questions, you can simply not answer those questions.

I will be the only person to see your answers, not your parents or teachers, so answer as honestly as you can.

Are there any questions?

Let's turn the page and begin! Remember, I am interested in what YOU think!
The first three questions ask about your general view of smariness.
Smariness has to do with schoolwork. We sometimes call children who do very well on their schoolwork "smart". I want to see how much you agree or disagree with the following statements about smariness.

1. You're a certain amount smart and you can't really do much to change it.

   0 1 2 3 4 5 6 7 8 9 10
   Strongly disagree       Strongly agree

2. How smart you are is something about you that you can't change very much.

   0 1 2 3 4 5 6 7 8 9 10
   Strongly disagree       Strongly agree

3. You can learn new things, but you can't change how smart you really are.

   0 1 2 3 4 5 6 7 8 9 10
   Strongly disagree       Strongly agree
Maths Questions

1. How good in maths are you?

   0 1 2 3 4 5 6 7 8 9 10
   Not at all good
   Very good

2. If you were to list all the students in your class from the worst to the best in maths, where would you put yourself?

   0 1 2 3 4 5 6 7 8 9 10
   One of the worst
   One of the best

3. Some kids are better in one subject than in another. For example, you might be better in maths than English. Compared to most of your other school subjects, how good are you in maths?

   0 1 2 3 4 5 6 7 8 9 10
   A lot worse in maths than in other subjects
   A lot better in maths than in other subjects

4. How well do you expect to do in maths this semester?

   0 1 2 3 4 5 6 7 8 9 10
   Not at all well
   Very well

5. How good would you be at learning something new in maths?

   0 1 2 3 4 5 6 7 8 9 10
   Not at all good
   Very good

6. Some things that you learn in school help you do things better outside of class, that is, they are useful. For example, learning about plants might help you grow a garden. In general, how useful is what you learn in maths?

   0 1 2 3 4 5 6 7 8 9 10
   Not at all useful
   Very useful

7. Compared to most of your other activities, how useful is what you learn in maths?

   0 1 2 3 4 5 6 7 8 9 10
   Not at all useful
   Very useful

8. For me, being good in maths is ......
9  Compared to most of your other activities, how **important** is it for you to be good at maths?

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10  In general, I find working on maths assignments ....

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11  How much do you **like** doing maths?

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12  You have a certain amount of maths ability and you really can’t do much to change it.

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| Disagree | Agree |

13  Your maths ability is something about you that you can’t change very much.

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| Disagree | Agree |

14  You can learn new things, but you can’t really change your basic maths ability.

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| Disagree | Agree |
Reading Questions

1. How good in reading are you?

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2. If you were to list all the students in your class from the worst to the best in reading, where would you put yourself?

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3. Some kids are better in one subject than in another. For example, you might be better in reading than music. Compared to most of your other school subjects, how good are you in reading?

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4. How well do you expect to do in reading this semester?

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5. How good would you be at learning something new in reading?

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6. Some things that you learn in school help you do things better outside of class, that is, they are useful. For example, learning about plants might help you grow a garden. In general, how useful is what you learn in reading?

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7. Compared to most of your other activities, how useful is what you learn in reading?

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8. For me, being good in reading is …..

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9 Compared to most of your other activities, how important is it for you to be good at reading?

Not at all 1 2 3 4 5 6 7 8 9 10 Very

10 In general, I find working on reading assignments ....

Very boring 1 2 3 4 5 6 7 8 9 10 Very interesting

11 How much do you like doing reading?

Not at all 1 2 3 4 5 6 7 8 9 10 Very much

12 You have a certain amount of reading ability and you really can’t do much to change it.

Strongly disagree 1 2 3 4 5 6 7 8 9 10 Strongly agree

13 Your reading ability is something about you that you can’t change very much.

Strongly disagree 1 2 3 4 5 6 7 8 9 10 Strongly agree

14 You can learn new things, but you can’t really change your basic reading ability.

Strongly disagree 1 2 3 4 5 6 7 8 9 10 Strongly agree
Music Questions

1. How good are you at music?

0  1  2  3  4  5  6  7  8  9  10
Not at all good  Very good

The next series of questions ask for your beliefs about playing a musical instrument.
Some of you are already learning instruments or have learnt musical instruments in the past.
If you are not currently learning a musical instrument, I want you to imagine what it would be like
when you answer the next series of questions.

2. If you were to list all the students in your class from the worst to the best at playing
a musical instrument, where would you put yourself?

0  1  2  3  4  5  6  7  8  9  10
One of the worst  One of the best

3. Compared to most of your other school activities how good are you, or would you be,
at playing a musical instrument?

0  1  2  3  4  5  6  7  8  9  10
A lot worse  A lot better

4. How good are you, or would you be, at learning something new on your musical instrument?

0  1  2  3  4  5  6  7  8  9  10
Not at all good  Very good

5. Compared to most of your other activities, how useful is what you learn in music?

0  1  2  3  4  5  6  7  8  9  10
Not at all useful  Very useful

6. Some things you learn in school are useful and help you do things better outside of class.
In general, how useful is what you learn in instrumental music?

0  1  2  3  4  5  6  7  8  9  10
Not at all useful  Very useful

7. For me, being good at playing a musical instrument is …..

0  1  2  3  4  5  6  7  8  9  10
Not at all important  Very important

8. How important is it for you to be good at playing a musical instrument?

0  1  2  3  4  5  6  7  8  9  10
Not at all important  Very important
9  In general, I find working on music assignments ......

0 1 2 3 4 5 6 7 8 9 10
Very boring Very interesting

10  How much do you **like** playing a musical instrument?

0 1 2 3 4 5 6 7 8 9 10
Not at all Very much

11  You have a certain amount of music ability and you really can’t do much to change it.

0 1 2 3 4 5 6 7 8 9 10
Strongly agree Strongly disagree

12  Your music ability is something about you that you can’t change very much.

0 1 2 3 4 5 6 7 8 9 10
Strongly disagree Strongly agree

13  You can learn new things, but you can’t really change your basic music ability.

0 1 2 3 4 5 6 7 8 9 10
Strongly disagree Strongly agree
# Sports Questions

1. How good at sport are you?

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<tbody>
<tr>
<td>Not at all good</td>
<td>Very good</td>
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2. If you were to list all the students in your class from the worst to the best in sport, where would you put yourself?

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<tbody>
<tr>
<td>One of the worst</td>
<td>One of the best</td>
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3. Some kids are better in one subject than in another. For example, you might be better in sport than English. Compared to most of your other school subjects, how good are you in sport?

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<tbody>
<tr>
<td>A lot worse in sport than in other subjects</td>
<td>A lot better in sport than in other subjects</td>
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4. How well do you expect to do in sport this semester?

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<td>Not at all well</td>
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5. How good would you be at learning something new in sport?

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6. Some things that you learn in school help you do things better outside of class, that is, they are useful. For example, learning about plants might help you grow a garden. In general, how useful is what you learn in sport?

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7. Compared to most of your other activities, how useful is what you learn in sport?

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8. For me, being good in sport is ......

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9 Compared to most of your other activities, how important is it for you to be good at sport?

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10 In general, I find working on sport assignments ....

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11 How much do you like doing sport?

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<td>Not at all</td>
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12 You have a certain amount of sports ability and you really can’t do much to change it.

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<td>Disagree</td>
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<td>Agree</td>
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13 Your sports ability is something about you that you can’t change very much.

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<td>Strongly</td>
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14 You can learn new things, but you can’t really change your basic sports ability.

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**General Questions**

For these questions I want you to describe how you usually feel during lessons in maths, reading, music and sport. If you are learning a musical instrument describe how you feel during those lessons.

1. I generally feel happy and alert during maths lessons.
   - 0 1 2 3 4 5 6 7 8 9 10
   - Strongly disagree
   - Strongly agree

2. I generally feel confused during maths classes.
   - 0 1 2 3 4 5 6 7 8 9 10
   - Strongly disagree
   - Strongly agree

3. How challenging do you usually find maths classes?
   - 1 2 3 4 5 6 7 8 9 10
   - Low challenge
   - High challenge

4. How are your maths skills during lessons?
   - 1 2 3 4 5 6 7 8 9 10
   - Low skills
   - High skills

5. I usually feel happy and alert during reading classes.
   - 0 1 2 3 4 5 6 7 8 9 10
   - Strongly disagree
   - Strongly agree

6. I generally feel confused during reading classes.
   - 0 1 2 3 4 5 6 7 8 9 10
   - Strongly disagree
   - Strongly agree

7. How challenging do you usually find reading classes.
   - 1 2 3 4 5 6 7 8 9 10
   - Low challenge
   - High challenge

8. How are your reading skills during lessons.
   - 1 2 3 4 5 6 7 8 9 10
   - Low skills
   - High skills

9. I normally feel happy and alert during music lessons.
   - 0 1 2 3 4 5 6 7 8 9 10
   - Strongly disagree
   - Strongly agree
10 I generally feel confused during music classes.

   0  1  2  3  4  5  6  7  8  9  10
Strongly disagree

11 How challenging do you usually find music classes.

   1  2  3  4  5  6  7  8  9  10
Low challenge

12 How are your music skills during lessons.

   1  2  3  4  5  6  7  8  9  10
Low skills

13 I usually feel happy and alert during sports classes.

   0  1  2  3  4  5  6  7  8  9  10
Strongly disagree

14 I generally feel confused during sports classes.

   0  1  2  3  4  5  6  7  8  9  10
Strongly disagree

15 How challenging do you usually find sports classes.

   1  2  3  4  5  6  7  8  9  10
Low challenge

16 How are your sports skills during lessons.

   1  2  3  4  5  6  7  8  9  10
Low skills
Appendix K: Questionnaire for Parents

Thank you for agreeing to participate in this study.

If possible, it is requested that the parent/guardian who has primary involvement with educational matters concerning the child participating in this study should complete the questionnaire.

Would you please circle one of the following:

Relationship to child participant: Mother / Father / Other (specify) .......................

The following questions concern the child participating in this study.

Child's Name: ....................... Child's birthdate: ....../......

School: ...................................... Date: ....../......

Is this child currently learning a musical instrument? Yes / No
If yes, what is this instrument(s)? (1) ............ (2) ............ (3) ............
How long has this instrument(s) been learnt (years/months)? (1) ............ (2) ............ (3) ............

Has this child previously learnt a musical instrument? Yes / No
If yes, what was the instrument(s)? (1) ............ (2) ............ (3) ............
How long was this instrument(s) learnt (years/months)? (1) ............ (2) ............ (3) ............

Each question can be answered by circling one number to show your view.
Responses of "0" and "10" represent extreme opposing beliefs and a response of "5" represents the most moderate position.
Please do not take too long over each response as your first impression will probably be fairly accurate. If there is any question that you think is too difficult to answer or is not covered adequately by the response options, please feel free to leave that question blank.

Please circle only one number in response to each statement or question.

1  How good is your child in maths?

    0  1  2  3  4  5  6  7  8  9  10
    Not at all good
    Very good

2  How well do you expect your child to do next semester in maths?

    0  1  2  3  4  5  6  7  8  9  10
    Very poorly
    Exceptionally well

3  Compared to other children, how much innate ability or talent does your child have in maths?

    0  1  2  3  4  5  6  7  8  9  10
    Much less than other children
    Much more than other children
4. In comparison to other children, how do you evaluate your child's performance in maths?

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5. How good is your child in reading?

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6. How well do you expect your child to do next semester in reading?

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7. Compared to other children, how much innate ability or talent does your child have in reading?

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8. In comparison to other children, how do you evaluate your child's performance in reading?

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9. How good is your child at music?

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10. How well do you expect your child to do next semester in instrumental music?

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11. Compared to other children, how much innate ability or talent does your child have in music?

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12 In comparison to other children, how do you evaluate your child's performance in music?

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13 How good is your child at sport?

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14 How well do you expect your child to do next semester in sport?

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15 Compared to other children, how much innate ability or talent does your child have in sport?

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16 In comparison to other children, how do you evaluate your child's performance in sport?

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Thank you very much for taking the time to complete this questionnaire. Please place this questionnaire in the prepaid envelope provided and deposit it in a post box.
Appendix I: DEAKIN UNIVERSITY
ETHICS COMMITTEE
PLAIN LANGUAGE STATEMENT (Children)

Project Title: Towards an integration of theories of achievement motivation as applied to children’s school performance

My name is David Wellman and I am a psychology student at Deakin University. I would like to invite you to participate in a project I am doing as part of my university studies. I am interested in finding out what children of your age think and feel about mathematics, reading, sport and instrumental music. I am also interested in whether your thoughts about each subject are related to what your parents think. Finally, I would like to know if your thoughts and feelings about these subjects change during year 5 and how these are related to how well you are doing in each subject.

In the first week, I will come to the school and ask you a series of questions about your thoughts about these subjects, and also some concerning how you see yourself. You will be able to answer each question by circling a number from 1 to 10. This should take about 45 minutes. I will come back to the school later in the year to ask you some of these questions again and this should take about 20 minutes. Your parents will be asked similar questions including how good they think you are in each subject.

At the end of terms two and four your teachers will be asked two questions about how well they think you are doing in each of the four subjects.

I would like to know if you would like to take part in my project. If you say “Yes” and then decide that you do not want to answer my questions, then you don’t have to. If you change your mind about taking part in my study, you can tell me at any time and you won’t have to take part any more.

None of your answers will be available to anybody except me; your parents and teachers will not see your answers. When I write up my report I will not use any names.

I would like you to take home an envelope and ask your parents to read the contents. If you and your parents agree to participate in my study, please bring back the signed consent forms within the next few days and I will come and collect it.

Thank you very much,

David Wellman
Appendix M: DEAKIN UNIVERSITY
ETHICS COMMITTEE
PLAIN LANGUAGE STATEMENT (Parents)

Project Title: Towards an integration of theories of achievement motivation as applied to children’s school performance

My name is David Wellman and I am currently enrolled in a Master of Arts degree by research in the School of Psychology at Deakin University. As part of my degree I am undertaking a research project under the supervision of Dr Sue Chambers to discover if children’s thoughts and feelings about school subjects differ and, if so, how these differences are related to school achievement. I am also interested in looking at the relationship between beliefs and values about achievement in school subjects by children, parents and teachers. The focus of this research will be on the school subjects of maths, English/reading, instrumental music and sport during grades four and five.

I would like to invite you, the primary carer (parent/guardian), and your grade 5 child to participate in this study. The principal of the school has given approval for the research to take place. The project will involve you, your child and their school teachers each completing two separate questionnaires during 1999. These will take place during March/April and August/September. Children will complete the questionnaires during school hours and the first of these should take approximately 45 minutes and the second about 25 minutes. All questions will be read aloud to the children. The parent questionnaires will be sent home with your child, and can be returned to Deakin University through a prepaid envelope provided. As well as the questions outlined below, the questionnaire for parents will ask several general questions, such as parents’ education level and marital status. The first parent questionnaire should take approximately 20 minutes to complete and the other about ten minutes. Teachers will complete a similar questionnaire to parents in which, among other things, they will be asked to rate the competence of your child in the four subject areas.

Some of the questions to be asked are similar for children, parents and teachers, while others are exclusively for children.

(A) Questions for Children, Parents and Teachers. These will focus on competence beliefs by, and about, your child. Questions will ask about personal values attached to each subject, general beliefs about intelligence, and subject-specific views on achievement and ability. All of these questions can be answered by circling one response option from a scale provided. Some examples of questions included in the study are,

1) Child: “How well do you expect to do in maths this semester?” (not very well/very well)
   Parent: “How well do you expect your child to do in maths this semester?” (not very well/very well)
   Teacher: “How well do you expect …child’s name… to do in maths this semester?”(not very well/very well)
2) Child: “Compared to most of your other activities, how important is it for you to be good at English?” (not very important/very important)
   Parent/Teacher: “Compared to most school subjects, how important is it for children to be good at English?”
3) Child: “You have a certain amount of music ability and you can’t really do much to change it” (strongly agree/strongly disagree)
   Parent/Teacher: “You have a certain amount of music ability and you can’t really do much to change it” (strongly agree/strongly disagree)

(A) Questions for Children Only. These questions will only be asked in the first questionnaire for children and concern their general self-concept. Some examples of the self-concept questions are,

1) “I’m good at all school subjects” (true/false)
2) “I make friends easily” (true/false)

During the course of each semester, children would also be required to complete a 9-item questionnaire measuring their thoughts and feelings about their experience during lessons at four different times for each
subject. Questions will ask “How challenging was maths class today?” and “How were your skills in maths class today?”, as well as questions about their current feelings (i.e., happy/sad). It is expected that these questionnaires will take no longer than five minutes.

In order to compare children’s beliefs and values about each subject with their subsequent achievement in those subjects, teachers will be asked to provide a ranked achievement score at the end of each semester for each subject.

Because of the longitudinal nature of this research, it would be required that you and your child place your names on each questionnaire so that they can be matched. However, as soon as they are received they will be coded onto a computer program anonymously and the written responses and coding files stored in a locked filing cabinet at Deakin University. In reporting my research, aggregate responses will be used so that no individual participants can be identified.

All participants in this study will be free to withdraw at any time. If a participant does choose to withdraw, all personal data collected to that time would be destroyed without any adverse consequences.

A summary of my findings will be provided to the school during February, 2000, and will be made available for anyone interested in the outcome of the research. It is anticipated that the results will provide valuable educational information about differences and changes in children’s beliefs and values associated with achievement in each of the subject areas being investigated. The results will enable appropriate strategies to be introduced to encourage children to be motivated in their participation in the different subject areas.

Should you have any concerns about the conduct of this research, please contact the Secretary, Deakin University Ethics Committee, Research Services, Deakin University, 221 Burwood Highway, BURWOOD Vic. 3125. Tel (03) 9251 7123.

If you and your child agree to participate, please complete and sign the accompanying consent forms and return them to school in the next few days sealed in the Deakin University envelope provided. Thank you very much for taking the time to read my proposal. If you have any queries, please do not hesitate to contact:

Student Researcher: David Wellman. Supervisor: Dr. Sue Chambers, Senior Lecturer in the School of Psychology

Tel: (03) 9244 6262
Appendix N:  

DEAKIN UNIVERSITY 

ETHICS COMMITTEE 

CONSENT FORM: SURVEYS, QUESTIONNAIRES 

Parents 

I, 

of

Hereby consent to be a subject of a human research study to be undertaken 

By David Wellman 

and I understand that the purpose of the research is to investigate the relationship between children's thoughts and feelings about the school subjects of maths, English/reading, instrumental music and sport, and their achievement in those subjects. The relationship between children's achievement beliefs and those of parents will also be investigated. I understand that I will be required to complete two questionnaires during 1999, rating my child's level of competence in each subject as well as answering questions about my own achievement related beliefs and values. I also understand that questionnaires will take between 10 and 20 minutes to complete. 

I acknowledge that 

1. Upon receipt, my questionnaire will be coded and my name and address kept separately from it. 
2. Any information that I provide will not be made public in any form that could reveal my identity to an outside party i.e. that I will remain fully anonymous. 
3. Aggregated results will be used for research purposes and may be reported in scientific and academic journals. 
4. Individual results will not be released to any person except at my request and on my authorisation. 
5. That I am free to withdraw my consent at any time during the study in which event my participation in the research study will immediately cease and any information obtained from me will not be used. 

Signature: 

Date: 

NOTE: 
In the event of a minor's consent, or person under legal liability, please complete the Ethics Committee's "Form of Consent on Behalf of a Minor or Dependent Person".
Appendix O: DEAKIN UNIVERSITY ETHICS COMMITTEE CONSENT ON BEHALF OF A MINOR OR DEPENDENT PERSON

I. of

Hereby give consent for my son / daughter / dependent

to be a subject of a human research study to be undertaken by David Wellman.

I understand that the purpose of the research is to investigate the relationship between children’s thoughts and feelings about the school subjects of maths, English/reading, instrumental music and sport, and their achievement in those subjects. The relationship between children’s achievement beliefs and those of parents will also be investigated. I understand that my child will be required to complete two questionnaires during 1999 concerning their thoughts and feelings about maths, reading, instrumental music, sport, achievement and general self-concept. I am aware that the first of these will take approximately 45 minutes to complete, and the second about 25 minutes.

I acknowledge

1. That the aims, methods, and anticipated benefits, and possible hazards/risks of the research study, have been explained to me.

2. That I voluntarily and freely give my consent to my child’s / dependent’s participation in such research study.

3. I understand that aggregated results will be used for research purposes and may be reported in scientific and academic journals.

4. Individual results will not be released to any person including medical partitioners.

5. That I am free to withdraw my consent at any time, during the study in which event my child’s/dependent’s participation in the research study will immediately cease and any information obtained will not be used.

Signature: Date:

NOTE: Probably both parents should consent if both parents are living together. If divorced or separated, certainly the parent who has legal custody of the child should consent, and it would be prudent to obtain the consent of both even in this event. If such consent of the other parent is not readily obtainable the consent of the custodial parent would be or should be sufficient unless the second parent actively refuses consent. If this occurs, the child or dependent person should not participate. Joint guardianship of a dependent should be treated in the same manner.
Appendix P:  

DEAKIN UNIVERSITY
ETHICS COMMITTEE

PLAIN LANGUAGE STATEMENT (Teachers)

Project Title: Towards an integration of theories of achievement motivation as applied to children's school performance

My name is David Wellman and I am currently enrolled in a Master of Arts degree by research in the School of Psychology at Deakin University. As part of my degree I am undertaking a research project under the supervision of Dr Sue Chambers to investigate how children's thoughts and feelings about school subjects differ and whether these differences are systematically related to school achievement. I am also interested in looking at the relationship between beliefs and values about achievement in school subjects by children, parents and teachers. The focus of this research will be on the school subjects of maths, English/reading, instrumental music and sport, and how children's thoughts and feelings change during grades four and five.

I would like to invite you to participate in this study. The principal of the school has given approval for the research to take place. The project will involve students in grade four during 1998, and grade five during 1999, their parents, and their teachers in maths, English/reading, instrumental music (general music in grade four) and sport. You would be required to complete up to three questionnaires over a twelve-month period, depending on which semester(s) you were teaching the participating children. Questionnaires will be distributed in September/October 1998, March/April 1999, and August/September 1999. It is expected that the first questionnaire will take approximately 20 minutes to complete, with later questionnaires taking about 10 minutes.

You would be asked in each questionnaire to rate the competence of the participating children in the subject(s) that you teach. For instance, "How well do you expect this child to do next semester in maths?" (not very well/very well). In the first questionnaire, you would also be asked about your personal values related to the four subjects being studied as well as general and subject-specific views on intelligence and achievement. Some examples are, "Compared to most school activities, how important is it for children to be good at sport?" (strongly agree/strongly disagree), and "You have a certain amount of intelligence and you can't really do much to change it" (strongly agree/strongly disagree). All questions can be answered by circling one response along a scale of response options.

Because of the longitudinal nature of this research, it would be required that you place your name on each questionnaire so that they can be matched. However, as soon as they are received they will be coded onto a computer program anonymously and the written responses and coding files stored in a locked filing cabinet at Deakin University, where they will remain for a minimum of five years. In reporting my research, aggregate responses will be used so that no individual participants can be identified.

All participants in this study are free to withdraw at any time. If a participant does choose to withdraw, all personal data collected to that stage would be destroyed without any adverse consequences.

A summary of my findings will be provided to the school during February, 2000, and will be made available for anyone interested in the outcome of the research. It is anticipated that the results will provide valuable educational information about differences and changes in grade four and five children's beliefs and values associated with achievement in each of the subject areas being investigated. The results will enable appropriate strategies to be introduced to encourage children to be motivated in their participation in the different subject areas.

Should you have any concerns about the conduct of this research, please contact the Secretary, Deakin University Ethics Committee, Research Services, Deakin University, 221 Burwood Highway, BURWOOD Vic. 3125. Tel (03) 9251 7123.

If you agree to participate, please complete and sign the accompanying consent form and return it in the prepaid envelope provided. If you have any queries, please contact:

Student Researcher: David Wellman. Supervisor: Dr. Sue Chambers, Senior Lecturer in the School of Psychology
Tel: (03) 9244 6262
Hereby consent to be a subject of a human research study to be undertaken

By David Wellman

(Teachers)

and I understand that the purpose of the research is to investigate the relationship between children's thoughts and feelings about the school subjects of maths, English/reading, instrumental music and sport, and their achievement in those subjects. The relationship between children's achievement beliefs and those of parents and teachers will also be investigated. I understand that I will be required to complete up to three questionnaires over a 12 month period, rating children's level of competence in the subject(s) I teach as well as my own achievement beliefs and values. I also understand that questionnaires will take between 10 and 20 minutes to complete.

I acknowledge that

1. Upon receipt, my questionnaire will be coded and my name and address kept separately from it.
2. Any information that I provide will not be made public in any form that could reveal my identity to an outside party i.e. that I will remain fully anonymous.
3. Aggregated results will be used for research purposes and may be reported in scientific and academic journals.
4. Individual results will not be released to any person except at my request and on my authorisation.
5. That I am free to withdraw my consent at any time during the study in which event my participation in the research study will immediately cease and any information obtained from me will not be used.

Signature: Date:

NOTE:
In the event of a minor's consent, or person under legal liability, please complete the Ethics Committee's "Form of Consent on Behalf of a Minor or Dependent Person".